

Neck Measurements

While sedating a lion can be a difficult and dangerous task, this temporary immobilisation allows researchers to collect valuable data and samples they otherwise wouldn't be able to.

Why sedate a lion?

Researchers will sedate a lion for a few reasons:

- to provide medical care, particularly if a lion has been shot and survived, or become entangled in a wire **snare**.
- to fit a tracking collar
- to **translocate** a lion to a safe place.



How do you sedate a lion?

Sedating a lion requires a team, including a veterinarian to deliver the sedative and monitor the health of the lion while they are asleep. The team will identify which lion they need to sedate and then track the group from a distance. The veterinarian will shoot a 2-part dart, with a fast acting **tranquilliser** that will immobilise the lion quickly, and a longer acting **anesthetic** that will keep the lion asleep. The team will have between 45 minutes and 1 hour to do their work on the lion.

They will use this time to do the work needed, and will take the opportunity to collect

- body measurements, such as paw size, neck diameter, and body length
- blood samples, for disease analysis
- tissue samples for DNA analysis
- hair samples for **stable isotope analysis** (diet information)



Once the team has completed their work, and collected their data, the veterinarian will give the lion a different medication to reverse the effects of the anesthetic.

The team will then monitor the lion from a distance to make sure they recover properly and are reunited with their group.

Disney



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What are the benefits of neck measurements?

The neck measurement provides valuable information to researchers. It lets them know:

- how the lion is growing over time
- how good or poor the lion's body condition is
- what size collar they need to fit the lion properly.



It is very important to make sure the collars are fitted properly. Collars that are too tight can rub and irritate the lion. Collars that are too loose are at risk of getting caught on things like sticks or branches. Collars that are far too loose may come off and not collect any useful data!



What are the risks of neck measurements?

When a lion is sedated it means:

- the veterinarian has to judge how much sedative to use: too little and the lion may wake up, too much and the lion will be asleep and vulnerable for a long time
- they are separated from their group which provides them protection.

For the people it means:

- they need to be aware of where the other lions are in case they try to help their pride-mate.
- they need to be cautious of other wildlife like elephants.
- they need to work quickly and carefully in case the lion they are working on wakes up.



Vocabulary

anesthetic - a medicine that keeps an animal sleep until it wears off or an antidote is administered by the veterinarian.

snare - loops of wire that tangle and trap animals. There are set out by poachers hoping to capture animals to sell as 'bushmeat', and can catch lions as bycatch.

stable isotope analysis - this looks at the isotopes in a sample, and identifies where in the food web they have come from, so we can see what an animal has been eating.

tranquilliser - a fast-acting medicine that will make an animal fall asleep.

translocate - to move to a new location.

Practicalities

What are the costs involved in this method? (materials, resources, etc.)

What are the personnel requirements? Break your answer down into the different steps in this method and what level of expertise and how much time is required for each step.

Implications

What questions is this method of data collection trying to answer?

What might the flow on impact be for conservation of lions?



Neck Measurement Data

On the following page we have provided the neck measurement data of lions from three different national parks in Zambia. This data was collected by the Zambian Carnivore Program.

Questions

Circle which type of sampling has occurred:

simple random, stratified, quota, clustered, systematic, convenience, judgement

This list includes adult and sub-adult lions. What does including sub-adult lions in our data set mean for our data?

Let's create some data displays to help us interpret and understand this data.

How big is a lion's neck?

Find the values listed, and then use these to create a box and whisker plot in the space provided.

Minimum	
Q1	
Q2 (median)	
Q3	
Maximum	



Neck Measurements

Site	Sex	Class	Neck (cm)
Liuwa Plains	Female	Adult	63.00
Liuwa Plains	Male	Adult	87.20
Liuwa Plains	Male	Adult	91.00
Liuwa Plains	Female	Adult	86.00
Liuwa Plains	Male	Subadult	61.50
Liuwa Plains	Male	Subadult	76.00
Liuwa Plains	Female	Subadult	58.40
Liuwa Plains	Male	Subadult	62.20
Liuwa Plains	Male	Adult	74.00
Liuwa Plains	Male	Adult	74.60
Liuwa Plains	Male	Subadult	66.00
Liuwa Plains	Male	Adult	95.00
Kafue	Female	Sub Adult	61.60
Kafue	Female	Adult	56.30
Kafue	Female	Adult	63.50
Kafue	Female	Adult	61.50
Kafue	Female	Sub Adult	53.00
Kafue	Male	Sub Adult	67.00
Kafue	Female	Juvenile	53.00
Kafue	Male	Adult	77.00
Kafue	Female	Adult	62.00
Kafue	Female	Sub-Adult	64.50
Kafue	Female	Adult	65.50
Kafue	Female	Adult	58.40
Kafue	Female	Adult	54.00
Kafue	Female	Adult	52.00
Kafue	Male	Sub-Adult	74.00
Kafue	Male	Adult	68.00
Kafue	Female	Adult	58.00
Kafue	Female	Adult	60.00
Kafue	Male	Adult	63.00

Site	Sex	Class	Neck (cm)
Kafue	Female	Adult	52.00
Kafue	Female	Adult	53.10
Kafue	Female	Adult	55.00
Kafue	Female	Adult	56.50
Kafue	Female	Adult	55.50
Kafue	Female	Adult	56.70
Kafue	Female	Sub-Adult	56.50
Kafue	Male	Sub-Adult	74.00
Luangwa	Female	Adult	61.00
Luangwa	Female	Adult	55.00
Luangwa	Female	Adult	63.00
Luangwa	Female	Adult	62.00
Luangwa	Male	Adult	82.00
Luangwa	Female	Adult	67.00
Luangwa	Female	Adult	64.40
Luangwa	Female	Adult	57.60
Luangwa	Female	Adult	62.00
Luangwa	Female	Adult	68.00
Luangwa	Female	Adult	61.00
Luangwa	Female	Adult	58.00
Luangwa	Female	Adult	56.00
Luangwa	Female	Adult	65.00
Luangwa	Male	Adult	73.00
Luangwa	Female	Adult	70.00
Luangwa	Female	Adult	57.40
Luangwa	Female	Adult	60.00
Luangwa	Female	Adult	61.10
Luangwa	Male	Adult	74.50
Luangwa	Female	Adult	62.40
Luangwa	Female	Adult	58.00
Luangwa	Male	Adult	76.00
Luangwa	Female	Adult	68.00

Does having a mane mean you have a bigger neck?

Male lions are visually distinguishable from lionesses because of their manes. This is called 'sexual dimorphism' or a systematic difference between the biological sexes. But does having a mane translate to having a bigger neck? In the spaces below, create a box and whisker plot for each of the sexes.

Note: As sub-adult lions are still growing and their neck will change due to age, for this exercise do not include sub-adult measurements.

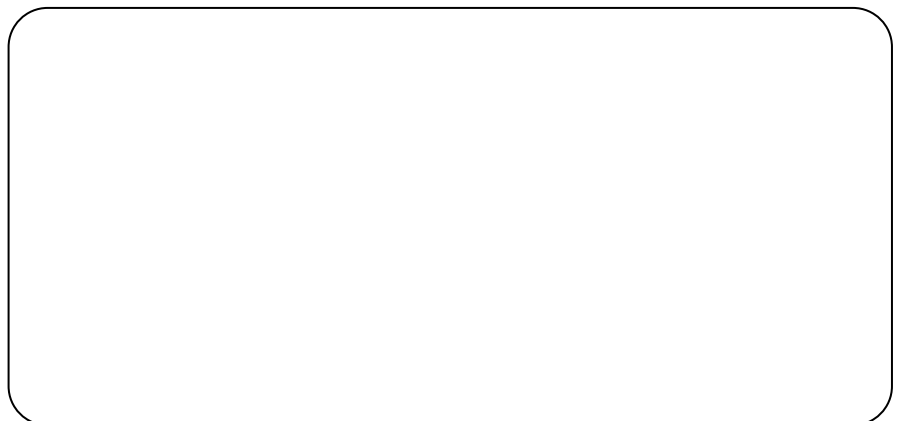
Female Lions

Minimum	
Q1	
Q2 (median)	
Q3	
Maximum	



Male Lions

Minimum	
Q1	
Q2 (median)	
Q3	
Maximum	



Questions

1. Do your displays show a significant difference in neck size between lions of different sexes? Yes / No
2. Do you believe there is enough data here to draw a conclusion from? Yes / No
3. In Tsavo the male lions do not have manes, and elsewhere lions are evolving smaller manes as a result of hunting pressures (lions with small manes are less likely to be targeted by trophy hunters). Would neck measurements be a reliable way to tell the sex of a lion? Yes / No



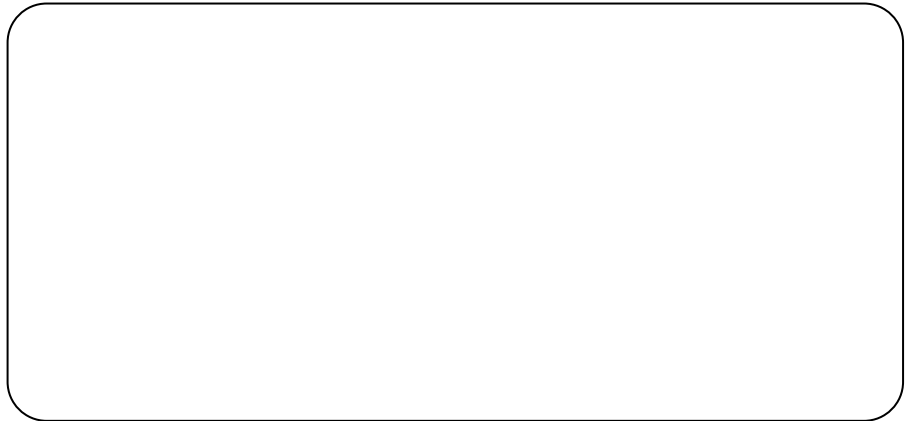
Is there a difference in neck size between different locations?

Is there a difference in lion neck size based on location? We asked researchers from the Zambian Carnivore Program and their answer was, "We don't know, but we would like to find out!" So let's find out.

In the spaces below, create a box and whisker plot for each location.

Liuwa Plains

Minimum	
Q1	
Q2 (median)	
Q3	
Maximum	



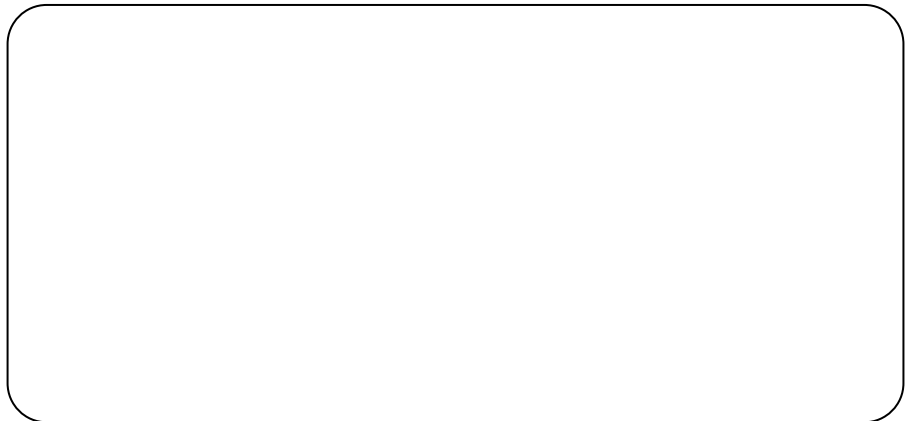
Kafue

Minimum	
Q1	
Q2 (median)	
Q3	
Maximum	



Luangwa

Minimum	
Q1	
Q2 (median)	
Q3	
Maximum	



Interpreting Our Displays

Questions

Neck measurements can be used as a judgement of lion body condition, and can be used to make an assessment of the lion habitat quality. Based on the box and whisker plots you have created, which location do you think has the best habitat? Justify your answer.

The data collected on lions from the Liuwa Plains has more sub-adult lions and more male lions than the other locations. Why do you think this is?

What does this bias mean for interpreting the data?

Is this sample size large enough to draw comprehensive conclusions from? Explain your answer.

What would your recommendations be for continuing this research? What data would you need and how would you sort the data and present it?

