A STUDY OF THE FEEDING BEHAVIOUR OF THE WEDGE- SNOUTED LIZARD (*Meroles cuneirostris)* IN THE PRO-NAMIB DUNE VALLEYS

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1. Introduction

The wedge-snouted lizard (*Meroles cuneirostris)* is one of the endemic species of the Southern Namib Desert, and is identifiable by it is wedge shaped snout (Branch, 1998). The wedge-snouted lizard belongs to the class reptilia, order Squamata and to the Lacertidae family. The lizard is 13-15 cm from the snout to the end of the tail and weighs fully grown 7 to 10 g. The skin of the wedge-snouted lizard looks like dune sand which makes it easy to hide and camouflage in its environment. The lizard lives in vegetated dunes, and when frightened they run into bushes or dive into soft dune sand. Wedge-snouted lizard feed during the day, usually during the coolest time of the day, Kenneth (1999). Wedge-snouted lizards are known to use their pointed snout to dive into the sand and escape enemies and hot conditions, (http://www.ehow.com/facts_5124711_animals-namib-desert.html). They are thought to feed on termites and other small insects and get water from their food (Ehrenbold & Keding, 2010).

The feeding behaviour of wedge-snouted lizard was studied in the vegetated dunes surrounding Namib Desert Environmental Education Trust (NaDEET centre). The project covered what the wedge-snouted lizard was feeding in its natural environment, the preferred food in captivity and how it is reacted to sand temperature during feeding.

The study helps neuroscientist Dr. Barry Dworkin on his research with the wedge-snouted lizard's response to temperature change. Dr. Dworkin's research requires the use of live wedge-snouted lizards to determine thermo-regulatory and thermo-protective behaviours to avoid over-heating when the sand gets hot in the dunes (temperatures of 70°C has been recorded) (B. Dworkin, personal communication, January 26, 2011). The results of the studies will set a precedent to encourage other scientists to study the wedge-snouted lizard as well as the shovel-snouted lizard.

Study area

The study was done on the vegetated dunes surrounding the Namib Desert Environmental Education Trust (NaDEET). NaDEET is a small non-profit environmental education NGO situated in the Namib Desert within the privately owned NamibRand Nature Reserve in south western Namibia. NaDEET consists of three units: NaDEET centre, NaDEET Base and Staff Valley. It is located on one of the thirteen farms that made up NamibRand Nature Reserve

called Die Duine. NaDEET Base shares ground with old farm house rented by TokTokkie Trails, TokTokkie staff house, a workshop and two gardens. NaDEET Centre is a model in sustainable living and aims to protect the natural environment of Namibia by educating its citizens to practice a sustainable lifestyle. The environmental NGO offers programmes for children, youth and adults that focus on the four areas of the environment: water, waste, energy and biodiversity. Learners explore how much energy and water they have used throughout the week by doing a daily water count and electricity monitoring. Likewise, they collect and weigh all waste generated. This information is analysed daily as part of each group's environmental audit.

Other activities include Namib Desert dune walk that allows participants to explore nature and learn more about Namib Desert plants and animals. Learners also capture nocturnal animals in order to learn more about adaptation of desert animals. Another activity at NaDEET centre is making recycled firebricks.

The climate in the desert is semi-arid marked by low, unpredictably rainfall and high evaporation each year. Since the rainfall is typically less than 100mm each year, most of the animals and plants in the area survive by mist and fog. Originating from the Benguela Current off the west coast of southern Africa, fog typically forms at night. The temperature in the area is very hot during the day but can drop drastically during the night (Seely & Pallet, 2008).

The area around NaDEET is covered by a variety of vegetation, especially grasses like Tall bush-man grass (*Stipagrostis ciliata*), Ostrich grass (*Cladoraphis spinosa*), Namib dune Bushman- grass (*Stipagrotis sabulicola*) and Kalahari sour grass (*Schmidtia kalahariensis*). Trees that can be found in the desert are mainly the Camel thorn tree (*Acacia erioloba*) and the Smelly shepherd tree (*Boscia foetida*). Large wildlife in the vegetated dunes includes springbok (*Antidorcas marsupialis),* gemsbok (*Oryx gazella),* ostriches (*Struthio camelus*), and bat-eared foxes (*Otocyon megalotis*). Smaller animals include reptiles and insects such as the Wedge-snouted lizard (*Meroles cuneirostris),* cape cobra (*Naja nivea),* namib dune gecko (*Pachydactylus rangei*), common barking gecko (*Ptenopus garrulous)* and western three striped skink (*Trachylepis occidentalis).* Insects include sugar ants (*Camponotus* sp.), dune ant *(Camponotus fulvopilosus*) and a variety of beetles (Ehrenbold & Keding).

2. Objectives

As discussed in the introduction, the main aim of the study was to:

1. Collect information about the preferred food of the wedge-snouted lizard in its natural environment.
2. Relate activity patterns of the Wedge-snouted lizards to sand surface temperature in the dunes.
3. Establish what kinds of food Wedge-snouted lizards can be fed with when kept in captivity.

3. Materials and Methods

Materials used during the study are:

- Infrared thermometer
- Two buckets
- Pair of binoculars
- Nets
- Stop watch
- A cotton ball
- Pieces from egg box
- Camera
- Small scale balance

Methods

1. Preferred food of the wedge-snouted lizard in its natural environment.

To achieve this objective a pair of binoculars was used to view the lizard when there is a long distance between the observer and the lizard. This was done not to scare the lizard away and not to influence the natural behaviour of the lizard. Food type that the lizard was feeding on was recorded twice a week, twice a day on the data collection sheet and the size of the lizard was determined also. The size was to determine if there is difference in two different sized wedge-snouted lizards. Everything that the lizard was eating or trying to eat was recorded.

2. Activity patterns of the Wedge-snouted lizards related to sand surface temperature in the dunes.

The infra-red thermometer was used to measure sand temperature ($^{\circ}C$) after every fifteen minutes of three hour observation. Activities were recorded at the same time that food was recorded. This was to find out how the wedge-snouted lizard was responding to sand temperature while feeding. Every kind of activities done by the lizard within fifteen minutes was recorded on the data sheet.

3. Kinds of food Wedge-snouted lizards can be fed with when kept in captivity.

Two wedge-snouted lizards were collected from the field and kept in captivity for six weeks. Their weight was taken after capture to compare the weight in captivity with their weight when in natural environment. Weight was taken every Sunday and recorded to determine if the lizard is gaining or losing weight from what it's given in captivity. One different kind of food was given each week, every Sunday and Wednesday. Six different foods given were: cooked rice, raw meat, sugar ants, cooked carrot, small grasshopper (Burrowing grasshopper) and detritus. Food observation was done and recorded every day by looking at the amount eaten. Sand, skin and outside temperature was taken each and every day. This was to compare the captivity temperature with the temperature in their natural environment when feeding. At the end of every week, the record was kept on how the lizard was acting throughout the week (if it was active or not active) and how the lizard was feeding.

Figure 1 Two buckets used to keep two different lizards.

4. Results

4.1 Preferred food of the wedge-snouted lizard in its natural environment.

Table 1 Preferred food of the wedge-snouted lizard recorded during visual observation (all nineteen days, twice a day)

Type of food	**Number of time observed to be eaten**
Moths	6
Detritus	10
Sugar ants	13
Dune ants	6
Other small flying insects	4

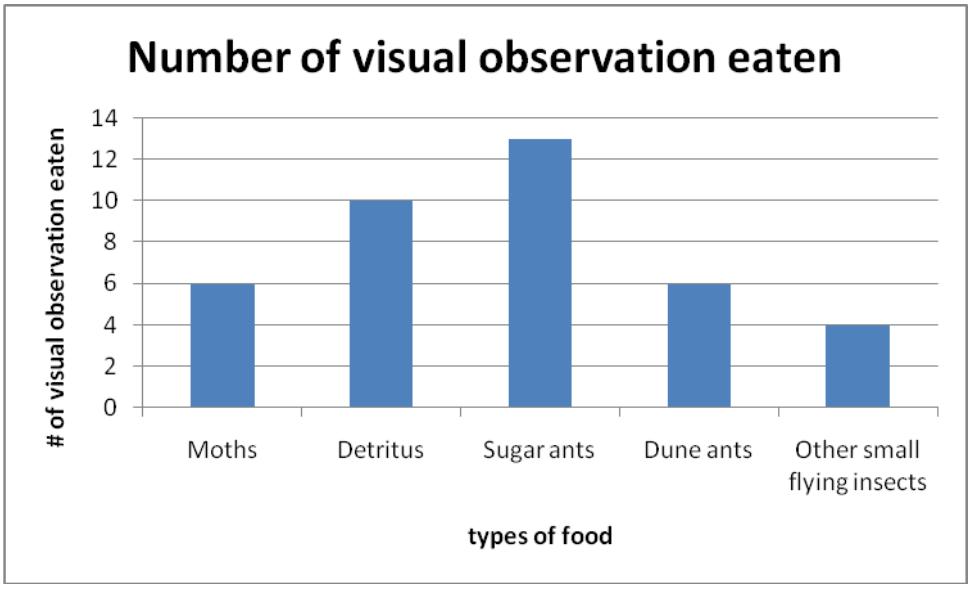

Figure 2 Number of visual observations of food eaten by the wedge-snouted lizards in their natural environment.

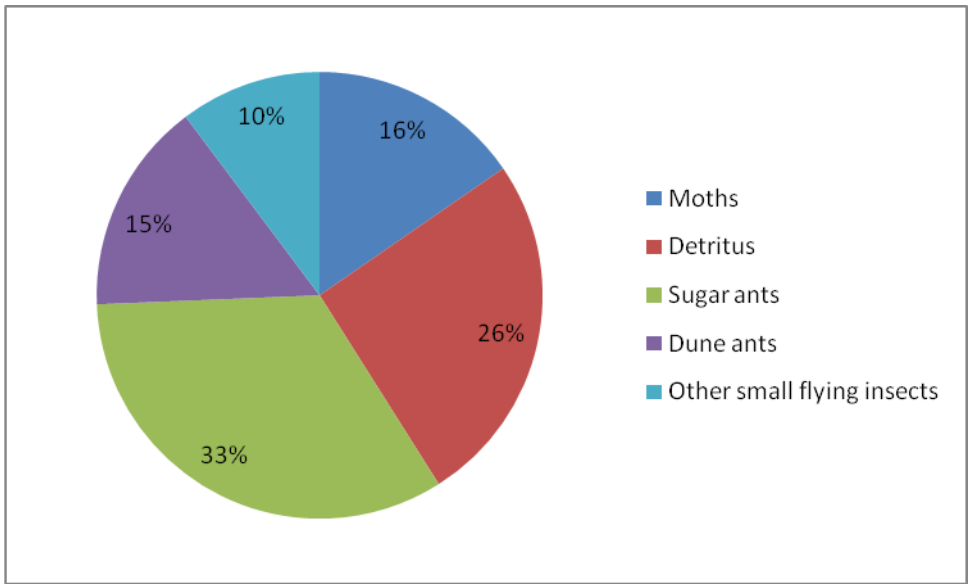

Figure 2 Percentages of visual observation of food eaten. n= percentages

4.2. Relate activity patterns of the Wedge-snouted lizards to sand surface temperature in the dunes.

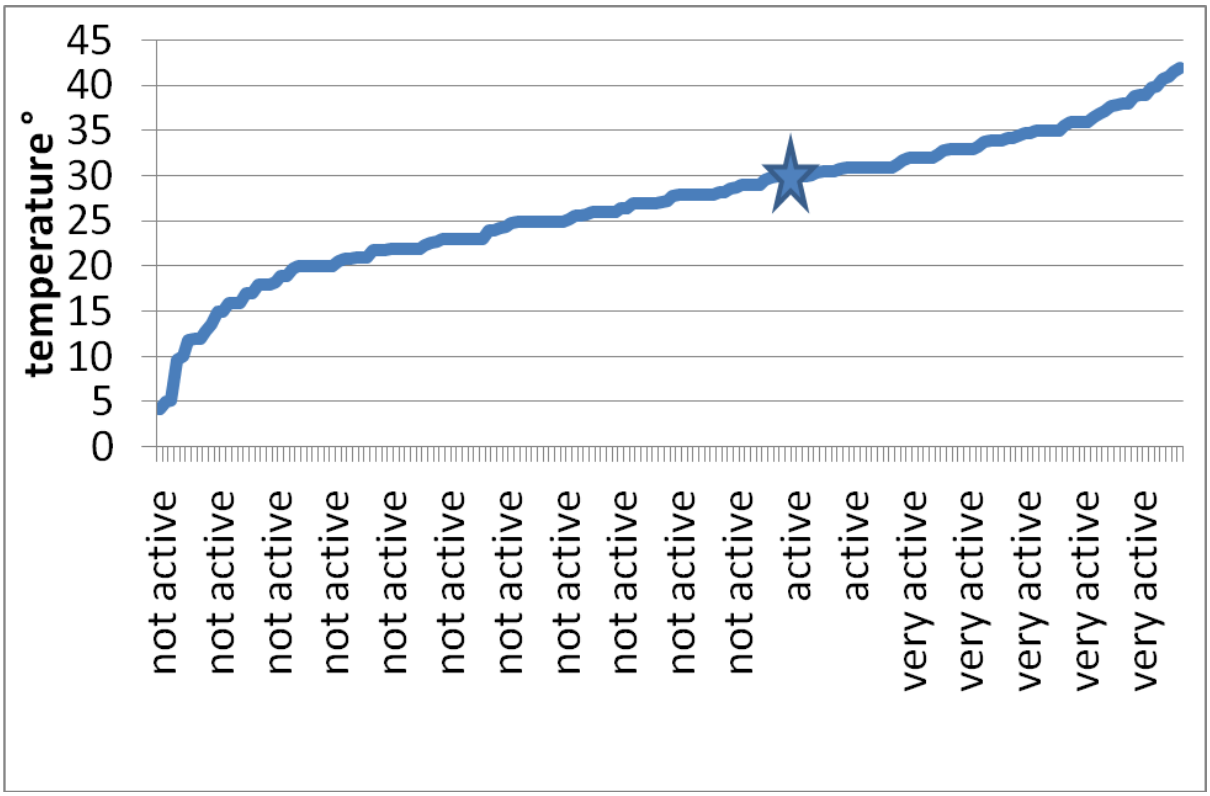

Fig 3 Comparison of temperature with rate of activities in natural environment.

4.3. Kinds of food Wedge-snouted lizards can be fed with when kept in captivity.

Table 2 Types of food established in captivity and amount eaten (lizard 1)

Type of food	**Amount given**	**Amount eaten each week**
Cooked rice	28 kernels	8 kernels
Raw meat	13 pieces	7 pieces
Boiled carrots	10 pieces	0 pieces
Sugar ants	12 ants	12 ants
Small grasshoppers	6 grasshoppers	6 grasshoppers

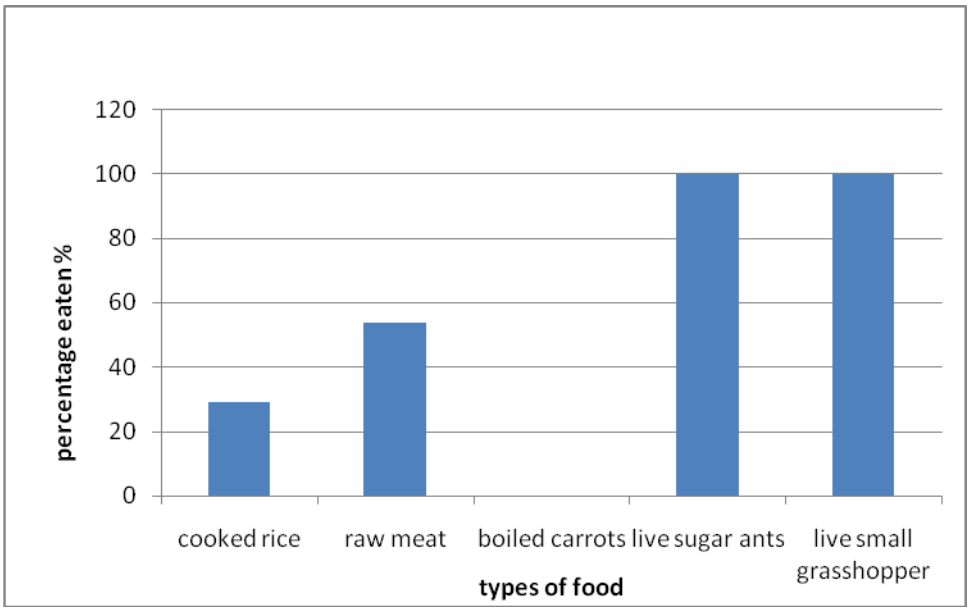

Fig 4 Preferences of food types eaten in captivity (lizard 1)

Table 3 Types of food given in captivity and amount eaten (lizard 2)

Type of food	**Amount given**	**Amount eaten**
Cooked rice	28 kernels	15 kernels
Raw meat	13 pieces	1 pieces
Boiled carrots	10 pieces	0 pieces
Live sugar ants	12 ants	9 ants
Live small grasshoppers	6 grasshoppers	5 grasshoppers

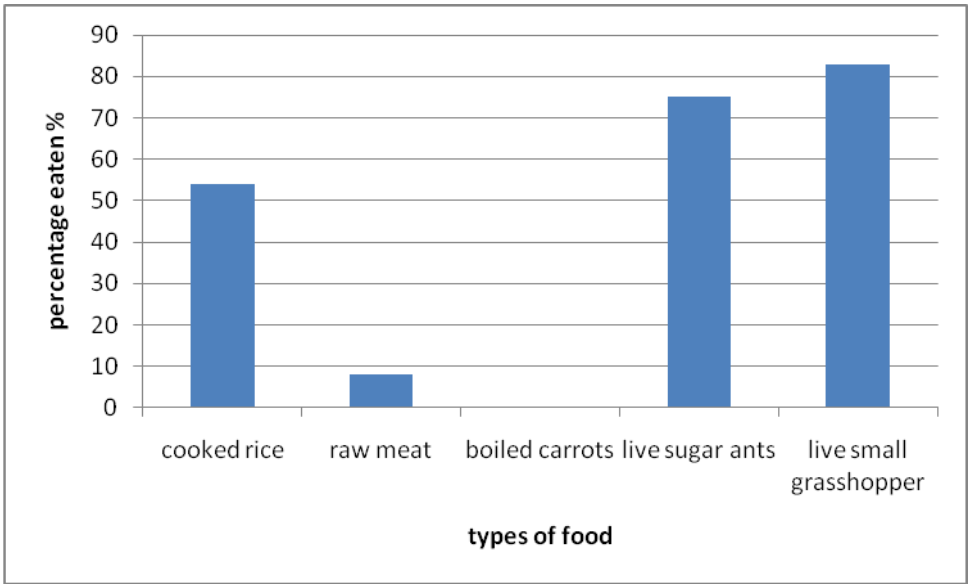

Fig 5 Preferences of food types eaten in captivity (lizard 2).

Table 4 Percentage of preferred food eaten in captivity and the resulted weight change for Lizard 1.

Types of food	Percentage eaten %	Weight change (g)
Cooked rice	29	+1
Raw meat	54	-2
Boiled carrots	0	0
Live sugar ants	100	+1
Live small grasshopper	100	+1

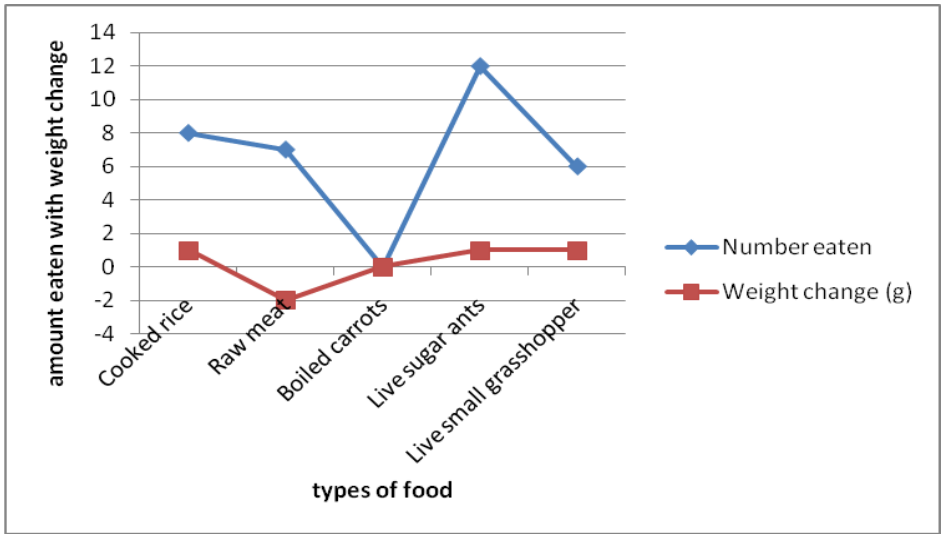

Fig 6 Amount of food eaten in captivity with resulted weight change of lizard 1.

Table 5 Percentage of preferred food eaten in captivity and the resulted weight change for lizard 2.

Types of food	Percentage eaten %	Weight change (g)
Cooked rice	54	2
Raw meat	8	3
Boiled carrots	0	-2
Live sugar ants	75	-2
Live small grasshopper	83	+1

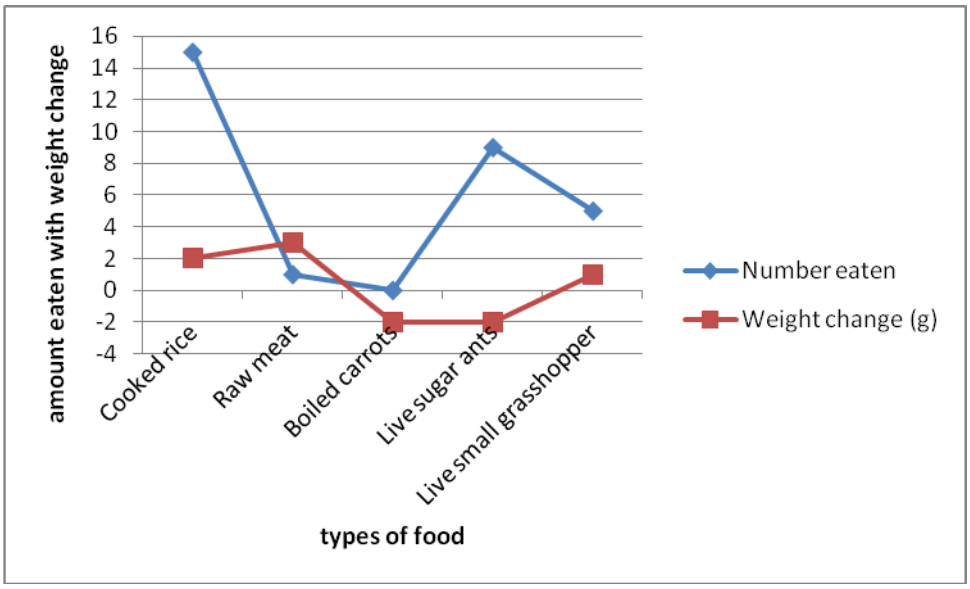

Fig 7 Amount of food eaten in captivity with resulted weight change of lizard 2.

5. Discussion

According to literature most of the scientists know more about the shovel-snouted lizard but they do not know about the wedge-snouted lizard. This study concluded that the wedge-snouted lizard feed on different kinds of foods other than termites only. The wedge-snouted lizard feeds on: moths, sugar ants, dune ants and detritus when in their natural environment.

The study was not really looking at the amount of food the lizard is eating every time but it focuses on what the lizard was eating. As shown in table 1,fig 1 and fig 2, the study found out that the wedge-snouted lizard feeds on sugar ants the most (with 33 %). The second most food recorded during the visual observation was detritus (with 26 %), moths came third (with 16 %) and lastly the dune ants (with 15%) and other small flying insects like flies (with 10 %).

When feeding, the wedge-snouted lizard reacts to the sand temperature differently, depends on how the temperature is (hot or cold). The wedge-snouted lizard adapt to surface temperature when feeding by lifting up their hind legs, lifting up their tail, jumping high without their body touching the ground ("fly-running") and by shaking their tail. When the temperature is too high e.g. 40°c or too low e.g. 5°c, the lizard activity rate will be low but if the temperature is moderate, the lizards will be active and acting normal. The wedge-snouted lizard stays out as long as the temperature is moderate e.g. 35°c but as soon as the temperature become too hot or too low, the lizard will dives into the ground or run into the bush. Fig 3 compares the temperature with activity rate, when the temperature is too low the activity rate will decrease or the lizard will not be active.

The study found out that the higher the sand temperature the more active the lizard. The activity rate increase rapidly, activities are like running fast to avoid the hot sand temperature, lifting up legs and head are the most frequent activities done by the wedge-snouted lizard when the sand temperature is too high.

Objective 3 concluded that cooked rice, sugar ants, detritus and small burrowing grasshopper are accepted by the wedge-snouted lizard when kept in captivity. As shown in table 2 for lizard number 1, 28 kernels of rice were given for the week but just 8 kernels were eaten by the lizard. Thirteen pieces of raw meat were given the second week, lizard 1ate seven pieces of thirteen pieces. Lizard 1 did not eat boiled carrots at all, as shown in table 2 and fig 4. Ten pieces of boiled carrots were given the third week, but none of the pieces were eaten at the end of the week. The forth week, sugar ants were established, 12 sugar ants were given for the whole week. At the end of the week, all sugar ants were eaten as shown in fig 4 that all hundred percent of sugar ants were eaten by lizard 1. The fifth week, lizard 1 feeds very well too, as all six grasshoppers given were gone at the end of the week. Fig 4 is shows the percentages of each established food type eaten by lizard 1 in captivity.

On the other hand lizard 2 was fed with the same food type as with lizard 1. As shown in table 3, twenty eight kernels of rice were given but only fifteen kernels were eaten. The second week, thirteen pieces of raw meat was established for lizard 2, as shown in table 3 only one piece was eaten at the end of the week. As with lizard 1, the third week ten pieces of boiled carrots were given but none of the pieces were eaten by the lizard. Nevertheless the forth week, twelve sugar ants were given and at the end of the week nine sugar ants were eaten. Six small grasshopper were given the fifth week, lizard 2 ate five of the six grasshopper. Fig 5 is showing the percentage of the preferred food of lizard 2 when in captivity.

Table 4 is comparing the percentage of established food of lizard 1 with weight change. It's shown in table 4 and fig 6, the more the food was eaten, and the more lizard1 is gaining weight. Otherwise lizard 2 is different as shown in table 5 and fig 7, the weight was fluctuating even though food capacity was high.

As appearing above, detritus is not included in the results of objective 3, mistake was done during week six. Detritus was not weighted as how much was given, so it's not useful to include it as the result will not be appropriate.

6. Conclusion

As discussed above, the study concluded that wedge-snouted lizard feed the most on live sugar ants and on live small grasshopper when kept in captivity. This also shows that the wedge-snouted lizard prefers live food material than other food type in captivity and in their natural environment. As the lizards were of the different size, the study is showing that there is a difference in feeding behaviour between lizards of different size. The different sized wedge-snouted lizard reacts differently to sand temperature in order to protect itself from extreme temperature.

7. Recommendations

I recommend that in future if someone happens to do research about feeding behaviours of a wedge-snouted lizard, food should be weighted in grams. Hour to be spent in the field must be reduced as it is not that much useful to spent six hours a day observing one lizard. Fewer weeks for captivity are needed as the lizard becomes weak as days goes on.

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9. References

Branch, B. (1998). *Field guide to snakes and other reptiles of southern africa.* 2nd.). Cape Town: Struik publisher.

Ehrenbold, S., & Keding, V. (2010).*It's time to identify: Selected animals and plants of the Namib.* Windhoek, Namibia: Dirk Heinrich Photo Library

Seely, M., & Pallett, J. (2008). *Namib: Secrets of a desert uncovere*d. Windhoek, Namibia: Venture publications.

World Wildlife Fund.(2010, February 20*)."Namib Desert":* Environmental Information Coalition, National Council for Science and the Environment. Retrieved February 14, 2011, from <http://www.eoearth.org/article/Namib_desert?topic=58073>

Kenneth, D. C. (1999). *Animals in Namib Desert.* Retrieved February 21, 2011, from http://www.ehow.com/facts_5124711_animals-namib-desert.html