Some Aspects Of Neurometrics In Sahel Goats In Maiduguri, Nigeria

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Abstract: The study was done on the nerometrics of the sahel goats using a total of 14 goats between the ages of <1½-3 years. The mean brain weight obtained was 96.14g, weight of the head, length of cerebrum, depth of cerebrum, length of cerebellum and depth of cerebellum were 1.19kg, 7.18cm, 3.81cm, 3.42cm and 2.77cm respectively. Animals >2-3years have slightly higher brain values than those <1½-2 years. The females have lower brain weight than males. Location has no effect on the neurometrical data of the sahel goats. The results obtained in this study can be used as a research data for neuroanatomy, neurophysiology and pharmacology, in animal psychiatry and in comparative studies between breed and species. [Academia Arena, 2010;2(8):44-47] (ISSN 1553-992X).

Key words: Brain, Sahel goat, Cerebrum, Cerebellum

INTRODUCTION

The head is the most superior part of the body. It is the most important region by virtue of the location of some vital organs of the body. These organs include the brain, eyes, nose, tongue, ears and mouth (Sisson and Grossman, 1975; Chibuzo and Sivachelvan, 1994; Olopade and Onwuka, 2003). Other organs such as the mandibular lymph nodes, salivary glands, parotid lymph nodes and the tonsils are in close association with the head.

Indeed the head is vital since the clinical status of the organs located on it and the body could be used to deduce the health status of an individual animal. For example, the paleness of the mucous membrane of the mouth and the eye is clinically assessed to determine anaemic condition of an animal. The degree of wetness of the muzzle, the brightness and shiny state of the eye, the alertness of the ears and excesses of saliva are other parameters used to assess the health status of an animal (Peacock, 1996; Olopade and Onwuka, 2003).

The head can also be used in describing animal species within and between breeds (Devendra and Mcleroy, 1982; Dyce et al., 1987; Gall, 1996).

The brain which makes the head the most vital region of the body is highly protected from the outside environment. Nevertheless, the cavitations such as the paranasal sinuses in the cranium could serve as a route of infection into the head. The brain is the master coordinator of the body. Any change in the structural or functional anatomy of the brain could result in abnormality and inefficiency. This would probably explain why the brain is highly secured. The central nervous system consists of the cerebrum, cerebellum and the spinal cord. It has almost no connective tissue and is therefore a relatively soft, gel-like organ (Junqeira and Carneiro, 2005).

Brain weights and other linear measurement in the brain remain important indices in neuroanatomy and other related studies of the brain (Chrisman, 1991; Benclouif and Rosenzweig, 1995). While some studies were carried out by Olopade and Onwuka (2002), Onwuka et al., (2002) on the breeds in Nigeria, alot needs to be done on the sahel goat ecotypes which necessitate this study.

MATERIALS AND METHODS

SAMPLE COLLECTION.

A total of fourteen heads of sahel goats (seven males and seven females) of different age groups of between ≤1½ year to about 3years where used for this study. The heads were obtained from the Maiduguri township abattoir and the source is from within and outside Maiduguri metropolis. The age and sex of the goats where determined using the external features and dentition as described by Sisson and Grossman (1975) and Dyce *et al*., (1987). The goats where slaughtered and then decapitated after restraint at the occipito-atlantal junction. The head was weighed using a sensitive balance in kilogram (kg).The heads were kept at -20^{o}c and brain were later removed without chemical fixation according to the method of Olopade *et al*., (2005).

WEIGHT OF THE BRAIN

The brain after being removed from the cranial cavity and cutting off the attachment of the cranial nerves that hold the brain in place was weighed using a sensitive balance (digital). The weight was recorded in grams (g).

MEASUREMENT OF THE BRAIN

A measuring tape was used to measure the brain. Measurements taken include the length of the cerebrum, (LOC), depth of the cerebrum (DOC), length of the cerebellum, (LOCB) and the depth of the cerebellum (DOCB). Measurements were recorded in centimetres (cm).

DATA ANALYSIS

The values obtained in this study were analysed using the Pearson correlation students t-test at 5% level of significance and presented as mean standard deviation ±S.D.

RESULTS

Table 1. Neurometrical data of the sahel goats, N=14

WOH(kg)	WOB(g)	LOC(cm)	DOC(cm)	LODB(cm)	DOCB(cm)
1.19±0.17	96.14±2.07	7.18±0.33	3.81±0.57	3.42±0.39	2.77±0.31

WOH-Weight of head
WOB-Weight of brain
LOC-Length of cerebrum
LOCB-Length of cerebellum
DOCB-Depth of cerebellum.
DOC-Depth of cerebrum

Table 2 Age-based data of the sahel goat.

Age(yrs)	WOH(kg)	WOB(g)	LOC(cm)	DOC(cm)	LOCB(cm)	DOCB(cm)
<1½-2	1.09±0.78	96.0±2.70	7.21±0..25	4.04±0.54	3.42±0.54	2.93±0.26
>2-3	1.40±0.07	96.4±1.52	7.12±0.48	3.40±0.37	3.42±0.36	2.50±0.12

Table 3 Sex-based neurometrical data of sahel goat.

Sex	WOH(kg)	WOB(g)	LOC(cm)	DOC(cm)	LOCB(cm)	DOCB(cm)
M	1.07±0.08	96.14±1.34	7.27±0.26	3.60±0.49	3.37±0.34	2.63±0.26
F	1.31±0.16	83.29±1.06	7.09±0.39	4.03±0.59	3.47±0.46	2.93±0.29

Table 4 Location based neurometrical data of sahel goat

Location	WOH(kg)	WOB(g)	LOC(cm)	DOC(cm)	LOCB(cm)	DOCB(cm)
Urban	1.19±0.16	96.12±2.30	7.23±0.36	3.63±0.57	3.41±0.45	2.75±0.29
Periurban	1.20±0.20	96.33±1.63	7.20±0.31	4.20±0.51	3.38±0.35	2.87±0.38

This study revealed that the mean brain weight of fourteen sahel goat in the study is 94.14g. The mean length and depth of cerebrum and that of the cerebellum were 7.18cm, 3.81cm, 3.42cm and 2.77cm respectively.

Animals that are <1½-2 years show no significant difference (p>0.05) with animals >2-3years

From this result, it can be seen that there was no significant difference (p>0.05) between the males and female Sahel goats.

Goats from the urban Sahel goats show no significant difference (p>0.05) with those of periurban sahel goat when.

DISCUSSION AND CONCLUSION

The weight of the brain obtained in this study is 94.14g as seen in table 1,which is slightly higher than that obtained for the Red Sokoto goat which was 85.85g (Olopade and Onwuka, 2002) and much higher than that obtained for the West African Dwarf goats which weigh about 56.89g. Linear measurement of the LOC, DOC, LOCB and DOCB are 7.18 cm, 3.81 cm, 3.42 cm and 2.77 cm respectively as seen in table 1.

Animals <1½-2 years had lower values of LOC, DOC and DOCB than those of >2½-3 years though there was no significant difference (p>0.05) between them. This suggests that as the animals begin to grow in age, a rostrocaudal compression occurs in the brain development in this breed. Since the LOC is higher than the DOCB, the result obtained in this study thus suggests that the much greater differences between DOCB in favour of the former could have occurred in the early months of the life of the Sahel goat as shown in table 2. This is a similar finding to the work of Olopade *et al*., 2007.

The weight of the brain of the male sahel goat is higher than that of the female as seen in table 3 though there was no significant difference (p>0.05), which is inconsistent with the results of

West African Dwarf and for Red Sokoto goats (Onwuka et al., 2002, Oopade *et al*. 2005, Olopade and Onwuka, 2002) and this may partially be the outcome of a lower cerebellar length in the females though not significantly different ($p>0.05$). This study is in agreement with human studies where females had smaller brains (Skulleruel, 1985), and males were also found to have a larger cerebral volume (Giedd *et al*., 1987) and also in agreement with Frederic *et al*., 2001 where brain size varies considerably among individual. The brain of males' average about 10 percent larger than those of females, owing to differences in average body size. No correlation exists between brain size and intelligence. Individuals with smallest brains and largest brains are functionally normal.

Goats from the urban and periurban pastoral settings showed no significant ($P>0.05$) variation in the WOH, WOB, LOC, DOC, LOCB and DOCB. This suggests that location has no effect on the neurometrical data of sahel goats.

The cerebellum is involved in motor learning and cognitive functions in humans and animal experiments have found structural changes in the cerebellum in response to long-term motor skill activity (Hutchinson *et al*., 2003). The relatively longer cerebellum in this study may indicate a response to a specialized motor activity in the Sahel goat in comparison to other breeds.

The results obtained in this study can be used as a research data for neurophysiology and pharmacology, and in animal psychiatry (Bencloucif and Rosenzeig, 1995) in controls when comparing with pathological cases like scrapie encephalomyelitis and other brain abnormally like cerebellar hyperplasia and neoplastic conditions of the brain (CNN, 2000, Chrisman, 1991) and in comparative studies between breed and species (Kawakami, 1994)

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