http://dx.doi.org/10.4314/bajopas.v8i2.16

Bayero Journal of Pure and Applied Sciences, 8(2): 94 – 99
Received: December, 2014
Accepted: July, 2015
ISSN*2006 - 6996*

PREVALENCE OF GASTROINTESTINAL PARASITES OF BABOON (*Papio anubis*), WARTHOG (*Phacochoerus africanus*) AND WATERBUCK (*Kubus deffasa*) IN YANKARI GAME RESERVE, BAUCHI STATE NIGERIA

***Nafiu, S. Inuwa, B. Abdullahi .A and Alkali, Z.**
Department of Science Laboratory Technology, Kano State Polytechnic, Kano Nigeria
nafiushafiu@ymail.com 7030918094, 8035947148, 8065006825, 8031801780
*Corresponding Author

ABSTRACT
A total of ninety four (94) fresh faecal samples of baboons (Papio anubis), Warthogs (Phacochoerus africanus) and Waterbucks (Kubus deffasa) were collected from different strategic locations within Yankari Game Reserve in August, 2008. Samples were collected in sterilized specimen bottles containing 4% formalin and analyzed by simple floatation, sedimentation and concentration Mc master techniques. The sixty (63) fecal samples of baboons examined; 7(11.11%) had intestinal parasites, comprises of 260 (54.1%) metastrongylus eggs, 180 (37.50%) eggs of mites and 40 (8.33) of adult mites. A total of Seven 7 (28%) of the twenty five (25) fecal samples of warthogs had parasites which comprised of 4960 (98.0%) eggs of hyostrongylus eggs and 100 (2.0%) of monizia eggs. Only 2(33.3%) of the six (6) fecal samples of waterbucks had Hystrongylus eggs 180(1.1%).The infection rate was significantly higher (p<0.05) among Warthogs (98%) fallowed by Baboons (54.1%) and the least Waterbucks (1.1%). Exposure to posture may be the predisposing factor responsible for the prevalence rate recorded in the study area. This may posed a potential danger to visitors in Yankari Game Reserve and other wild animals. Implementation of control policy of helminthes parasites in the Reserve will reducethe prevalence of helminthes diseases.
Key words: Baboon, Intestinal parasites, Waterbuck, Warthog, Yankari Game Reserve

INTRODUCTION

Yankari Game Reserve is a wildlife park located in the South central part of Bauchi State, Nigeria; about 117km from Bauchi State capital, Nigeria. It covers an area of 2,244km^2 with coordinates ($9^0$45'16"N $10^0$30'37"E/9.754433^{0}N 10.510317^0). The game reserve was created in 1956; it was upgraded to a national park in 1991 and managed by the National Parks Service until 2006. It is currently under the management of Bauchi State Government. It is a home to several natural warm springs, variety of flora and fauna. (www.nigeriagalleria.com). It's a unique heaven for aesthetic, research, conservation and tourism. Yankari was designated as the Nigeria's largest wildlife park in 1962 (Onokerhoraye, 1985), the most popular destination for tourist, it promotes tourism and ecotourism in the country (Olokesusi, 1990; Odunlami, 2000).

The game reserve e serves as an important refuge for over 50 species of mammals like the African bush Elephant, Olive baboon, Patas and Tantalus monkey, Roan Antelope, Western Hartebeest, Lion, African buffalo, Waterbuck, Bushbuck, Hippopotamus and Warthog (Usman and Adafalu, 2010). There are over 350 species of birds in the park; 130 are resident and 50 are Palearctic migrants and others are intra-African migrants (Olokesusi, 1990).

Warthog Baboons and Waterbuck are the common wild animals in the game reserve. They feed and defecate indiscriminately. They may transfer parasites to humans through air, food or contact. Helminthes infection is the major problem causing morbidity and mortality in captive wild animals (Borghare, 2009). Studies on the prevalence of gastrointestinal parasites in wild animals were reported in Kamala Nehru park, India (Ghoshal,1988), Zoological garden ,Kerala, India (Varadharajan and Pythal, 1999), Zoological garden of Gujarat, India (Patel, 2003) and Vanvihar National park, Bhopal, India (Deshmukh, 2009). Most studies available focused on parasitic infection in domesticated animals. There has been fragmentary information that link up helminthes parasitic infection with wild animals. Particularly, the prevalence of helminthes parasites associated with wild animals in Yankari Game Reserve. In view of the forgoing, this study was conducted in Yankari Game Reserve to determine the prevalence of gastrointestinal parasites among some selected animals.

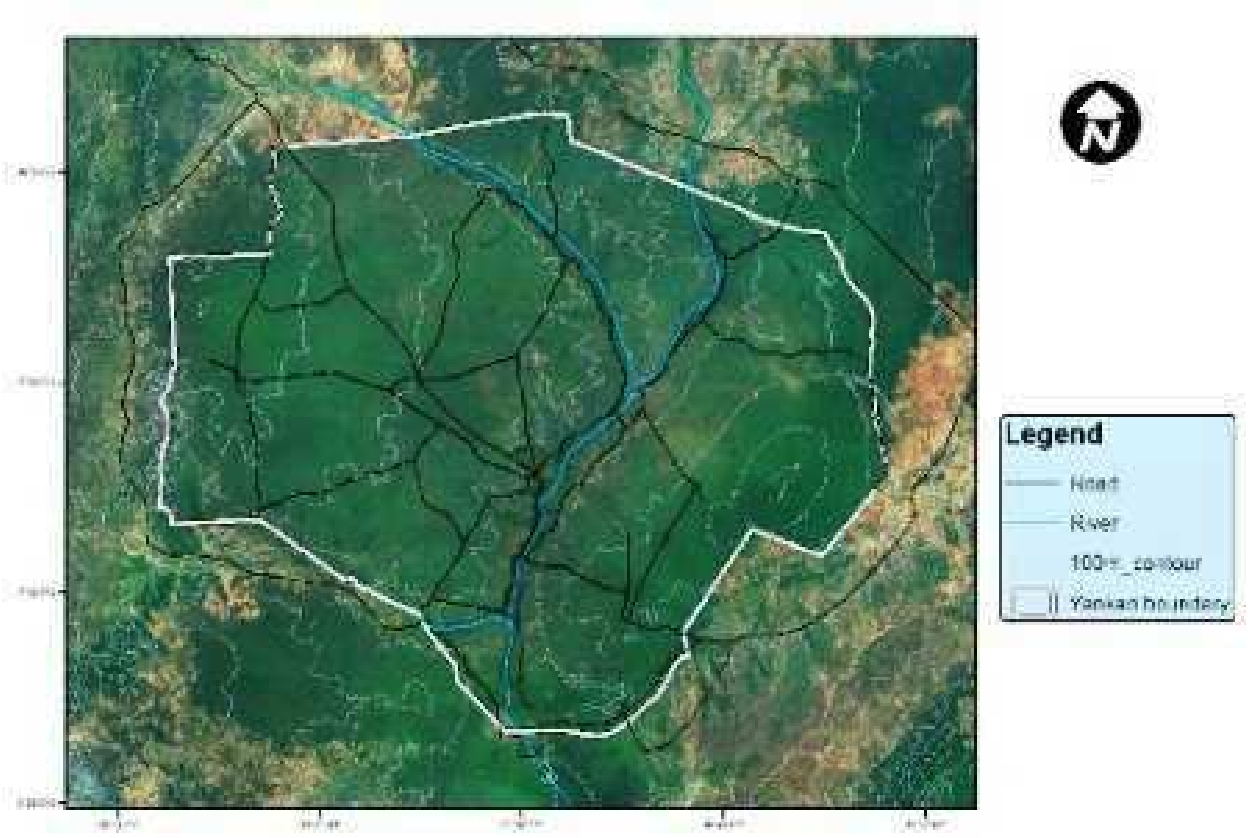

Figure 1.Map showing Yankari Game Reserve (source www.wcsnigeria.org/wildplaces/yankari)

MATERIALS AND METHODS

Sample Collection

A total of ninety four (94) freshly fecal samples of Warthogs (25), Baboons (63) and Waterbucks (6) were randomly collected at strategic location in Yankari Game Reserve. The samples were preserved in 4% formalin.Solid fecal samples were collected in a sterilized, dry, wide mouthed plastic container using polythene bags. It was labeled and handled to prevent parasitic or bacterial auto–infection (FAO, 1998).

Fecal Sample Examination

Faecal samples were brought to the Parasitology Laboratory, Faculty of Veterinary Medicine at Ahmadu Bello University Zaria for qualitative examination. Sheather's sedimentation and floatation method (Zajac and Conboy, 2012) was used. Quantitative examination was conducted by concentration Mc master Techniques (FAO, 1998), in order to assess the intensity of different helminthes infections (FAO, 1998).

Floatation Method

A small quantity of feces (3gm) was mixed well with water (15ml). Emulsion was strained through a nylon tea strainer to remove coarse faecal material .The filtrates were poured into a centrifuge tube; centrifuged at 1500rpm for 5minutes.The supernatant was discarded, tube was refilled with water and centrifuged 2-3 times until the supernatant was cleared. The sediment was mixed with saturated sugar solution (10ml) and centrifuged. A drop of the top layer fluid was placed on a clean, dry glass slide for microscopy at (10x) of the microscope.

Sedimentation method

A small quantity of feces (3gm) was mixed well with water (15ml). The emulsion was strained through a nylon tea strainer to remove coarse fecal material. The filtrate was centrifuged at 1500rpm for 5 minutes. The supernatant was discarded. The tube was refilled with water and centrifuged 2-3 minutes, until the supernatant was cleared. A drop of the sediment on a clean, dry glass slide and examined under low power of the microscope.

Concentration Mc Master Technique

Fecal samples were analysed using the Mc master egg count technique quantitatively (FAO, 1998). A total of 2gm faecal sample was weighed in a universal bottle and 5ml of water was added. They were mixed thoroughly with the aid of glass rod, distilled water was added to about 5 % of the tube, it was closed and shaken vigorously. The sample was centrifuged at 1,500rpm for 4-5 minutes and supernatant was decanted. A 6ml of floatation medium (Zinc sulphate sucrose mixture) was added, centrifuged at l, 500rpm for 3 minutes and the supernatant was poured into another test tube. Another 6ml of floatation medium was added to the sediments, shaken vigorously and centrifuged at l, 500rpm for 2-3 minutes. The supernatant was added together making 12ml of supernatants. Using Pasteur pipette/dropping bottles, Mc master slides were filled with the supernatant consecutively. The two wells of the slide were filled and left on bench for five minutes before egg counting. The eggs within the ruled areas of the slide were counted using a binocular microscope. The number of eggs per gram (EPG) was then calculated as; Egg count/gram = Sum of counts from the two wells X 20.

Statistical Analyses

Data obtained were statistically analysed using Chi-square. A value of $p<0.05$ was considered significant while proportion values of $p<0.05$ was not significant.

RESULTS

Waterbuck faecal samples from the overall percentage prevalence was found to harbor more intestinal parasites fallowed by Warthog and the least was Baboon .They showed a parasites prevalence of 33.3%, 28.0% and 11.0% respectively (Table 1). The infection rate of *Hyostrongylus* eggs of Warthog was highest (98%) compared to Waterbuck (1.1%).The infection rate among the wild animals studied showed a high significant difference ($p<0.05$).

Highest faecal sample of Baboons (*Papio Anubis*) was collected, followed by warthog (*Phacochoerus africanus*) and the least quantity was of Waterbuck (*Kubus deffasa*); represented (Table.1).A total ofsixty three (63) faecal samples of Baboons had 54.1% of *Metastrongylus* eggs, 37.5% mite eggs and 8.33% adult mites' infection (Table 2). The result indicated a significant difference of infection rate ($p<0.05$). The twenty five (25) faecal samples of Warthogs had 98% *Hystrongylus* eggs, and 2% *Moniazia* eggs. The difference in prevalence between *Hystrongylus* eggs and *Monizia* egg was highly significant.($p<0.05$) (Table. 3).

The six (6) samples collected from Waterbuck had 1.1% of *Hystrongylus* eggs (Table. 4). *Hystrongylus* eggs had the highest prevalence rate of 98.2% in Warthog and *Metastrongylus* eggs 54.1% prevalence rate in Baboons.

Table1: Prevalence (%) of Parasitic Infection in Animals of Yankari Game Reserve.

Animal	Sample examined	Number of positive	Prevalence (%)
Baboon	63	7	11.1
Warthog	25	7	28
Waterbuck	6	2	33.3

[x^2 = 11.08 DF =2 P< 0.05]

Table 2: Prevalence of *Metastrongylus* eggs in Baboons (N=63)

Parasite	Positive samples	No. of eggs parasites	Prevalence (%)
Metastrongylus eggs	2	260	54.1
Mites eggs	4	180	37.5
Adults mites	1	40	8.33
Total	7	480	100

[x^2 =71.39 DF= 2 P<0.05]

N= Number of samples examined

Table 3: Prevalence of *Hyostrongylus eggs* in Warthogs (N=25)

Parasites	Positive samples	parasite eggs	Prevalence (%)
Hyostrongylus eggs	5	4960	98.02
Monizia eggs	2	100	2.0
Total	7	5060	100

[x^2 = 570.15 DF =1 P<0.05]

N= Number of samples examined

Table 4: Prevalence of *Hyostrongylus* eggs in Waterbucks (N=6)

Parasite	Positive samples	parasite eggs	Prevalence (%)
Hyostrongylus eggs	2	180	1.1
Total	2	180	

N= Number of samples examined

DISCUSSION

There is relatively high prevalence of gastrointestinal helminthes parasites in Baboons, Warthogs and Waterbucks in Yankari Game Reserve ($p<0.05$). This could be due the feeding habit of the wild animals coupled with favorable environment that enable the survival of helminthes parasites (Kayyu et al., 2003).

The study revealed that, Warthogs harbors *Hyostrongylus* eggs (98.02%) and *Monizia* eggs (2%).The finding agreed with Stephanie*et al.,* (2013) who recorded *strongyle* nematodes (82.7%) on endangered wild Borneanelephants in Sabah, Malaysia. It is also similar with the work of Abuessaila *et al.*, (2011) who reported *Trichostrongylus spp* (13.5%), *Strongyloides spp* (*7.3%*)in Donkeys and 47.9% in Warthogs (*Phacochoerus aethiopicus)* in Radom National Park; South Darfur ,Sudan. The prevalence of *Hyostrongylus* eggs among wild species may be attributed to climatic a condition that favors the development of the parasite (Magona and Musisi, 1999). It was suggested by O'Connor et al., (2007) and Guar et al., (1979), that mean monthly rainfall of 51mm mean maximum and a mean monthly temperature of 25°C had a greater potential to support prolonged survival of infective nematode larvae on pasture, the larvae will subsequently be transmitted to the wild animals through gazing.

The Baboon feacal samples observed had *Metastrongylus* eggs (54.1%), mite eggs (37.5%) and adult mites (8.33%). *Metastrongylus* eggs recorded agreed with (Hahn *et al*., 2004); who reported *Strongyloides* and *Trichuris* species in free ranging baboons in Kenya. Abuessaila *et al.,* (2011), reported a prevalence of *Trichostrongylus spp* (14.5%) in a Patas monkey. Similarly, Munene *et al*. (1998) observed *Trichuris trichuria* in captive and wild trapped baboons. a higher prevalence of helminth parasitic infection in monkeys 89.47% and languor 66.66% was also reported in Madhya Pradesh, Pashu (Bante, 2012).Variation of the prevalence observed in this study could be due to geographical location, host immunity and level of exposure to infective stages of the parasites (Thawai et al., 2014) and (Singh et al., 2006).

The prevalence of *Hyostrongylus* eggs in a Waterbuck was 33.3%. The result is similar to the findings of El-Dirdin *et al*., (1986) who reported a high prevalence of *Hyostrongylus spp* 27% in donkeys at Sennar. Kheir and Kheir (1981) also reported 37.8% prevalence of *Hyostrongylus* eggs in donkeys' feacal samples in Bahr El-Arab, Southern Sudan. Similarly, 71.1% prevalence of *Hyostrongylus* eggs was reported by Seri et al., (2004) in donkeys (*Equus asinus*) at Khartoum, Sudan. It could be explained that *Hyostrongylus spp is* cosmopolitan in nature. Variation in prevalence observed attributed to the number of adult parasites in the gastrointestinal tract, age, and fecundity of the parasites, stage of infection, immunity, age, sex, and food abundance (WHO, 1995).

Hyostrongylus and *Metastrongylus* eggs prevalence is not a peculiar infection in wild animals, zoological animals that tend to receives medical attention were reported to be vulnerable. This support the findings of Opara *et al*., (2010) who reported 76.6% overall prevalence of gastrointestinal parasites among thirty two wild animals at Zoological Garden, Nekede Owerri, South- East, Nigeria. Saad *et al* ., (1983) reported a prevalence of *Trichostrongylus spp* in Khartoum Zoological garden, Sudan in faecal of *Gazella dorcas* (dorcas gazelles), *Acinonyx jubatus* (Cheetah Indian), *Hippootragus equines* (Roan antelope) *Giraffa camelopardalis* (giraffe), *Gazella rufifrons* (Red-fronted gazelles), *Papio cynocephalus* (Nubis baboons) ,*Cercopithecus aethiops* (Vervet monkeys) and *Syncerus caffer* (Cape buffalo).

The work of Munene et al .,(1998) examined a massive infection of *Metastrongylusspp* in non human primates which caused bronchitis, pneumonia with cough and nasal congestion as the major signs leading to reduced weight gains and respiratory complications in the animals. The work of Chakraborty and Goswami, (2001) reported that *Hystrongylus spp* affected pigs and other wild animals in captivity by causing poor feed utilization, reduced weight gains and the larval stages destroy glandular tissues in the stomach, which lead to catarrhal gastritis with excessive secretion of mucus; sometimes with ulceration. Similarly, Ukoli, (1990) reported massive infection of *Hyostrongylus spp* to be fatal to young herbivores animals associated with the loss of appetite, anemia and diarrhea.

The prevalence of gastrointestinal parasites recorded in Baboons (*Papio anubis*), Warthogs (*Phacochoerus africanus*) and Waterbucks (*Kubus deffasa*) in Yankari Game Reserve were attributed to temperature and high moisture content of the area, which favors the growth and development of larvae on pasture. This also leads in increased contact between the host and parasites (Cheesbrough, 1999) and (Murray et al., 1989). This finding is in agreement with Wadhwa *et al.* (2011) and Ohaeri (2012); they recorded higher incidence of parasitic infection in wild animals during rainy season. The higher prevalence of *Hyostrongylus* eggs in Warthog and Waterbuck can be attributed to their feeding habit since they feed mainly on posture where the third stage larvae or eggs are hatched (Ilan, 2008).

Conclusion and Recommendation

Prevalence of gastrointestinal helminthes among wild animals in Yankari Game Reserve is alarming and of public concern. The health status of the animals should be monitored frequently. This will reduced the tendency of mortality due to diseases as evident of the stool sample examined. Proper sanitation and treatment of the grazing areas will reduce the prevailing incidence.The animals should be properly inspected to reduce the tendency of zoonotic potentialities on workers and visitors. Government should set up a research team for epidemiological investigation and prevalence of gastrointestinal parasites in animals of Yankari Game Reserve. Protection of wild animals is a key component of the Millennium Development Goal.

REFERENCES

Abayomi, A. (2007).*A Text Book for Medical Laboratory Practice*, Cambridge University Press, Pp15-55

Abuessailla, A. A., Ismail, A. A. and Agab , H. M.(2011).*Investigation of gastrointestinal parasites in wild and domestic animals in Radom National Park; South Darfur State*, Sudan.Sud.J.Vet.Res 2(4) 7-11

Bante, S.(2012). *Prevalence and efficacy of drugs against helminth parasites in captive wild animals*. M.V.Sc. and A.H. Thesis submitted to Madhya Pradesh Pashu Chikitsa Vigyan Vishwavidyalaya, Jabalpur, Madhya Pradesh

Borghare, A.T., Bagde, V.P., Jaulkar, A D., Katre, D.D., Jamde, P.D., Maske, D.K. and Bhangale, G.N. (2009*) Incidence of gastrointestinal helminthiasis of captive wild deers at Nagpur*.Vet World , 2(9): 337-338

Chakraborty,A and Goswami ,P.K.(2001*) Parasites of non-human primates of Assam State Zoo* J.vet.Parasitol.15(2) :121-124.

Cheng, J.C (1986). *General parasitology*. New York, Academic Press, Pp965.

Cheesbrough , M. (1999). District Laboratory Practice in Tropical Countries. *Part1. Low price edition,Cambridge University Press. Cambridge. Pp 196-198.*

Deshmukh, S. S., Rewatkar, S. G., Agrawal, A.M., Maske, D.M., Bhangale, G.N and Shrikhande, G.B. (2009). *Endoparasitism in wild animals in captivit*y, Zoo's Print J.24(10): 11.

EI- Dirdiri, N. I.; Abu Damir, H. and Wahbi, A. A. (1986): Disease incidence in donkeys *(Equus asinus asinus)* with infection, UDK 6(19): 62

FAO, (1998). *Epidemiology, Diagnosis and Control of Helminth parasites of swine: Animal Health Manual*,Animal Production and Health Division , FAO, Rome, PP 45-46

Guar, S.N.S., M.S. Sethi, H.C. Tewari and Prakash, O. (1979). A note on the prevalence of helminth parasites in wild and zoo animlas in Uttar predesh. Indian J. Anim. Sci. 49:159-161

Ghoshal, S.B., Garg, U.K., Misraulia, K.S. and Jain, P.C. (1988). *Helminth parasites in zoo animals of Kamla Nehru Park, Indore,MP.*live stock adviser , 13(1): 34-36.

Hahn, Nina. E, David Proulx, Philip, M. Muruthi, Susan Alberts and Jeaune Altmann (2004). *Gastrointestinal parasites in Free Ranfing Kenyan Baboons (Papio cynocephalus and P.anubis)*. International journal of Primatology. Vol. 24. No 2. Pages 271-279.

Ilana, C. (2008). *The prevalence of helminthesin warthogs, bush pigs and some antelope speciesin Limpopo Province, South Africa*;M.Sc.Thesis submitted to the department Of Veterinary Tropical Diseases ,University Of Pretoria ,South Africa, pp10-12. .

Kiyyu, J. D. Kassuku, A. A. Kyvsgaard, N. C. and Willingham, A. L. (2003). *Gastrointestinal nematodes in indigenous zebu cattle under pastoral and nomadic management systems in the lower plain of Southern highlands of Tanzania*. *Vet. Res. Commun.* **27**(5): 371-380.

Kheir, S. M. and Kheir, H S. M. (I981). Gastrointestinal nematodes equines in the Southern Darfur region of the Sudan. *Sud.J. Vet. Res*. **3**: 53-57

Magona, J.W. and G. Musisi, L.(1999*). Prevalence and infections levels of gastrointestinal nematodes in Ugandan goats in different agro climatic zones*. Bull. Anim. Health Prod. Afr., 47:49-56

Munene, E., M. Otsyula, D.A.N. Mbaabu, W.T. Mutahi, S.M.K. Murinki and G.M. Muchemi (1998 . *Helminthes and protozoan gastrointestinal tract parasites in captive and trapped African non-human primates.* Veterinary Parasitology. Vol.78. Pg 195-201.

Murray.S ., Stem,C ., Bourdrea ,B., Goodall ,J.(1989).*Intestinal Parasites of Baboons and Chimpanzees* .Turfts University of University Medicine ,Norit Grafton .pp 1536.

O'Connor, L.J., Lewis P. Kahn, Stephen W. Walkden-Brown (2007). *Moisture requirements for free living development of Haemonchus contortus. Quantitative and temporal effects under conditions of low evaporation*. Vet. Parasitol 150:128-138.

Odunlami, S.S.(2000) .*Parks! Vanguard of Ecotourism Promotion*.The Host Magazine Vol.2 No. 1 pp25.

Ohaeri, C.C. (2012). *The parasitic helminths of Cattle slaughtered in abattoir in Umuahia South Local Government Area, Abia State, Nigeria*. *International Journal of Applied Research and Technology,* Vol. 1, No. 7, pp 85-89.

Olokesusi, F. (1990).Assessement of the Yankari Game Reserve,Nigeria:Problems and Prospects.Butterworth Heineman Ltd.pp153-155

Onokerhoraye ,A (1985*).An outline of human geography.The Geography of Planning Study*,unpublished notes , Department of Geography and Planning ,University of Benin.

Opara, M.N., OSUJI, C. T. and Opara J.A .(2010*). Gastrointestinal Parasitism In Captive Animals At The ZoologicalGarden, Nekede Owerri, Southeast Nigeria*.Report and Opinion ,2(5) 36

Parsani, H.R., Momin, R.R., Maradia, M.G. and Singh, V. (2001*). A Survey of gastrointestinal parasites of captive animals at Rajkot Municipal Corporation Zoo, Rajkot*, Gujarat,Zoo's Print J. 16(10 : 604 606

Patel, P.V., Patel, A.I., Sabapara, R.H., Sahu, R.K. and Vyas,R. (2003*). Helminthic infection in wild canids in zoological gardens of Gujarat*, Zoo's Print J. 18(4): 1084

Reddy, N.R.J., Jagannath, M.S., Souza, P.D., Rahman, S.A. and Basavarajappa, K. (1992) .*Prevalence of gastrointestinal parasites in wild mammals and captive birds at Bannerghatta National Park, Bangalore,*Indian J.Anim.Sc , 62(11): 1046- 1048.

Saad, M. B.; El Mubarak, K. A. and El Badri, K. S. (1983). *Endoparasites in wild animals in Khartoum Zoo*. *Bull.Anim. Hlth Prod. Afr.* ***31*** : 9 – 15

Seri, H. I.; Hassan, T.; Salih, M. M. and Abakar, A.D. (2004). A survey of gastrointestinal nematodes in donkeys *(Equus asinus)* in Khartoum State, *Sudan Journal of Animal andVeterinary Advances.* **3** (11):736-739

Singh, P., Gupta, M.P., Singla, L.D., Sharma, S., Sandhu, B.S. and Sharma, D.R. (2006). *Parasitic infection in wild herbivores in the Mahendra Choudhury Zoological Park, Chhatbir, Punjab*. Zoo's Print .J; 21(11): 2459-2461.

Stephanie, H ; Nurzhafarina, O ;Senthilvel K. S. S ; Nathal, M ;Matthew, F; and Benoit, G.(2013) .*First parasitological survey of Endangered Bornean elephants Elephas maximus borneensis*Endangered Species Reseach **,**Vol. 21: 223–230,

Thawait V.K, Maiti S.K and Dixit A.A (2014). *Prevalence of gastro-intestinal parasites incaptive wild animals of Nandan Van Zoo, Raipur, Chhattisgarh*, *Veterinary World* 7(7): 448-451.

Ukoli, F. M. A. (1990). *Introduction to Parasitology in Tropical Africa*, Parasitology Vol. 4, Pp, 55-561.

Usman, B.A and Adafalu, L.L (2010*). Nigerian Forestry Wild life and protected area: Status Report*. Tropical conservancy, pp 44-46

Varadharajan , A . and Pythal, C. (1999). *A preliminary investigation on the parasites of wild animals at the Zoological Garden, Thiruvananthapuram, Kerala Zoo's Print J*, 14(312): 159-164.

Wadhwa A, Tanwar RK, Singla LD, Eda S, Kumar N, Kumar Y (2011).Prevalence of gastrointestinal helminthes in cattle and Buffaloes in Bikanner, Rajasthan, India. *Veterinary World*, Vol.4. No.9. pp 417-419.

WHO,(1995). *Twelve programme report of the UNDP/World Bank/WHO special programme for research and training on tropical disease research (TDR) progres*s, pp1975-1994.

Retrieved October 10,2014 from www.nigeriagalleria.com

Retrieved February 18,2015 from www.wcsnigeria.org/wildplaces/yankari

Zajac,A.M and Conboy,G.A.(2012) .Fecal Examination for the Diagnosis of Parasitism. In: Veterinary Clinical Parasitology.(8th edn). sAmes,Iowa,Wiley –Blackwell , U.S.A, pp 35