

GRASSCUTTER: A REVIEW OF THE HABITAT, FEEDS AND FEEDING, BEHAVIOUR AND ECONOMIC IMPORTANCE

¹ Aluko F. A., ²Salako A. E., ³Ngere, L. O. and ⁴Eniolorunda O.O.

^{1,2 & 3} Department of Animal Science, University of Ibadan, Oyo state, Nigeria
E-mail: deolaaluko@gmail.com

⁴Department of Animal Production, Olabisi Onabanjo University,
P.M.B 0012, Ayetoro, Ogun State, Nigeria

Abstract

This study evaluates in a review the habitat, feeds and feeding, behaviour and economic potentials of cane rat. In Africa, wildlife and the meat derived from it is known as bushmeat but a world wild term is game. Among the threatened and endangered wildlife species are duikers (Antelope), porcupine, bush pig, cane rat, and guinea fowl. Cane rat is also called grasscutter or cutting grass. The breeds of cane rat are: *Thryonomys swinderianus swinderianus* (Temmincks, 1927), *Thryonomys swinderianus gregorianus* (Thomas, 1894), *Thryonomys swinderianus raptorum* (Thomas, 1922), *Thryonomys swinderianus variegatus* (Ansell, 1960) and *Thryonomys swinderianus logani* (Romer et Nesbit, 1930). The lesser cane rats or savanna cane rats are found in Eastern Africa and some Western Africa countries. Cane rat feeds on sugar cane, tuber crops especially cassava, cereals like wheat, maize and when feeding it uses the incisors to cut grasses at their base, take the grass in the forepads, sit upright and begin to feed the grass into the mouth. Cane rats when threatened, thump their feet on the ground alert others and run with great speed into dense vegetation and nearest open water. Cane rats use narrow trails through the grass and reeds to move around their territories. The meat of grasscutter fetches higher prices than meat of domestic animals, it is a good source of high quality protein, low fat and have a unique taste. The cost of

establishing cane rat is low because it requires less space, the feed are not competed for by man.

{**Citation:** Aluko F. A.; Salako A. E.; Ngere, L. O.; Eniolorunda O.O. Grasscutter: a review of the habitat, feeds and feeding, behavior and economic importance. American Journal of Research Communication, 2015, 3(9): 96-107} www.usa-journals.com, ISSN: 2325-4076.

Introduction

In African, forest is often referred to as “bush”, thus wildlife and the meat derived from it is referred to as “bush meat”. This term applies to all wildlife species including threatened and endangered used for meat including: elephant, gorilla, chimpanzee and other primates, forest antelope (duikers), Crocodile, porcupine, bush pig, cane rat, pangolin, monitor lizard, guinea fowl (Anon, 2013a). Today the term bush meat is commonly used for meat of terrestrial wild animals, killed for sustenance or commercial purposes throughout the humid tropics of Americas, Asia and Africa. To reflect the global nature of hunting wild animals resolution 2.64 of the IUCN General Assembly in Amman in October 2000 referred to wild meat rather than bushmeat (Anon, 2013b). A more worldwide term is game (Anon, 2013b). In some developing countries in Africa bush meat is the main source of animal protein among rural communities and the demand for it is rapidly increasing at the very time when the supply is diminishing (Jayeoba and Adebambo, 2009). Cane rat meat popularly called bush meat is highly acceptable in Nigeria. There is no restriction to its consumption (Owen and Dike, 2012). *Thryonomys* species can do considerable damage to sugar cane fields (Nowak, 1991). Many plantations protect predators such as pythons are used to prey on cane rats, lessening crop damage (Nowak, 1991). Cane rats also damage maize, millet, groundnut, sweet potato, cassava and pumpkin fields (Nowak, 1991). Domestication of grasscutter is a relatively novel practice in Nigeria with its potentialities, challenges and opportunities (Owen and Dike,

2012). Grasscutter farming has social acceptability, good meat quality of high biological value (high protein and low fat), inexpensive feeds and amenability to captive rearing, good litter size and short generation interval. Despite the challenges of domestication of grasscutter, non-steady supply of the meat, air pollution and ecological devastation as a result of bush burning to hunt cane rats and threat to extinction of grasscutter; the domestication and production of grasscutter is another dimension in the livestock industry that has the potential to ensure regular and sustainable animal production in the nation (Owen and Dike, 2012). This study was carried out with the primary aim of evaluating the habitat, feeds and feeding, behavior and economic potentials of cane rat.

Characteristics, Habitat and Behavior

Cane rat is also called cutting grass, a tropical African cavy-like hystricomorph rodents (Hank, 1979). It belongs to the family *Thryonomidae* (Adoun, 1993) and Genus *Thryonomys*. Other species are *swinderianus swinderianus* (Temmincks, 1927), *swinderianus raptorum* (Thomas, 1922), *swinderianus variegatus* (Ansell, 1960) and *swinderianus longani* (Romer et Nesbit, 1930). Dorsal pelage is deep brown to rufous brown flecked with yellow and black (Happold, 1987). Dorsal hairs thick coarse, mostly brown with yellow band at terminal end and usually black tip. Flanks similar dorsal pelage merging into grayish–white ventral pelage (Happold, 1987). Cane rat lives amongst dense grasses reed near rivers and swamp and are rampant among herbaceous vegetation where there is a good cover. They do not normally dig burrows although, they hide in holes but scrape a small saucer–shaped depression amongst the vegetation (Happold, 1987). Despite their size and short limbs cane rats run quickly and are reputed to be good swimmers (Ewer, 1969). Many species are fossorial, nesting and living much of the time in burrows, others at ground level (Wood, 1994). They are represented in all climatic zones (Wood, 1994). In Nigeria they live in most habitats from rain forests of the South to the semi-arid regions of the extreme north (Happold, 1987). Most

of them are ground living, some are arboreal and one species is fossorial. Most distribution of cane rat are in dense grasslands and secondary growth in rainforest, derived and guinea savannah zones like Aba, Baissa, Bali, Calabar, Choko Choko, Ede, Elele, Gambari, Ibadan district, Igangan, Ilaro, Ilesha, Ilo, Jalingo, Kanji, Lake Kangoro, Kudu, Lagos, Mamu river (Ogun-Osun river), Muri, Nikrowa, Nsukka, Oba hills, Okogere, Ondo, Owerri, Pandam, Sapoba, Serki, Shasha, Upper Ogun, Yankari (Happold, 1987). Hopf et al (1976) observed that these animals are found mostly in areas consisting of South Eastern part of Nigeria and South Western Cameroon. The animals were observed to be present in primary and secondary forest adjacent to major plantings especially in new oil palm planting (Hopf et al, 1976). In suitable habitat, they are quite common and their presence is usually revealed by the 45° cut on grass stem, by their characteristic faecal pellets scattered on the ground besides the cut grasses and their runaways through the vegetation (Ewer, 1969). Cane rat are heavily-built rodents, with bristly brown fur speckled with yellow or grey (Anon, 2013c). grasscutter furs comprise a mixture of brown reddish and gray hairs that vary depending on its habitat (Jori and Chardonnet, 2001). They live in marshy areas and along river and lake banks and are herbivores, feeding on aquatic grasses in the wild, (Anon, 2013c). In agricultural areas they will also as the name suggests, feed on the crops in cane plantations, making them a significant Pest (Bishop, 1984). Cane rats are widely distributed and farmers expend substantial energy fencing the rodent out of their fields, but they are also valued as a source of “bushmeat” in West and Central Africa (Anon, 2013c). In the savanna area of West Africa, people have traditionally captured wild cane rats and fattened them in captivity (Anon, 2013c). More recently, intensive production of cane rats has been undertaken in countries such as Benin and Togo and agricultural extension services in Cameroon, Cote d’Ivoire, Gabon, Ghana, Nigeria and Democratic Republic of Congo have also encouraged farmers to rear these rodents in rural and peri-urban areas (Anon, 2013c).

Cane rat live in small groups led by a single male (Anon, 2013d). They are nocturnal and make nests from grasses or burrow under ground. Individual may live in excess of four years (Anon, 2013d). If frightened, they grunt and run towards water. The cane rat expanded from their native reeds into plantations, particularly the sugar cane plantation from which they derived their name (Anon, 2013d). Their tendency to adopt plantations as habitat, where they feed on agricultural crops such as maize, wheat, sugar cane and cassava often earns them the label of Agricultural pest (Anon, 2013d). In Ghana and other regions of West Africa, they are called Grasscutters (Anon, 2013d). Cane rat earned their African nick name of “grasscutter” because of their method of eating after using their powerful incisors to cut grasses at their base, the animal take the bunch of grass in their fore feet, sit upright on their haunches and begin to feed the grass into their mouth slowly cutting it up into small bits (Anon, 2013g). When eating and when relaxed they make soft grunting noises. When threatened, cane rats thump their powerful rear feet on the ground to alert others while emitting a piercing whistling sound. Although its teeth are formidable, a frightened cane rat will virtually always run with great speed into dense vegetation and towards the nearest open water rather than turning to fight (Anon, 2013g). If captured, the animals thrash frantically and are frequently injured. When enclosed in a box or crate, the rat often use their padded nose as battering rams to try to escape. Primarily nocturnal, cane rats create and use narrow trails through the grass and reeds to move around their territories. Biologists think they live in groups of not more than twelve individuals. Males, who live with their young and a few mature females, do not tolerate the presence of other mature males, aggressively defend their family groups. Male fight by pressing their padded noses together until one eases up on the pressure, at which point his opponent may swiftly swing his rump around to knock the weaker rat of balance (Anon, 2013g). Despite their well-developed claws, cane rats use burrowing only as a last resort for shelter and even then would rather use abandoned

porcupine or armadillo burrows or holes in stream banks caused by erosion if dense vegetation for hiding is absent. Cane rats have been observed gnawing on rocks, pieces of tusk and bones, presumably to sharpen their teeth. The cane rat mates with multiple partners throughout the year, although primarily during the rainy season when more food is available (Anon, 2013g). Though nocturnal, after a certain period of acclimatization to their enclosure, grasscutters in captivity have also started to feed by day.

Greater and Lesser cane rat

The greater cane rat (*Thryonomys swinderianus*) and the lesser cane rat (*Thryonomys gregorianus*); both inhabit non forested sub-Saharan Africa except for Namibia and most South Africa and Botswana. The two species are found together in certain regions but they occupy different habitats (Anon, 2013e). In Ogun State, Nigeria; Aluko (2014) observed the shape of head, eye placement, ear shape, body pelage, tail shape, breed, tail colour in *Thryonomys swinderianus swinderianus* (Tss) and *Thryonomys swinderianus gregorianus* (Tsg)). In her study, the Tss population had more of the broad heads than the narrow heads. The broad heads animals had broad tip ear, brown and yellow-belly white body colour. Their tail is broad based and thin out to tip although a few had broad base and even out to tip. These broad heads animals had black and hairy tail. She further stated that in the Tsg population, most of the animals had narrow heads than broad heads. These narrow heads animals had ear with broad tip and have black and yellow – belly white body colour. The tail is broad based and thin out to tip. All these narrow heads, black and yellow-belly white animals had black and hairy tail. The greater cane rat lives along rivers and lakes and in swamps, reed beds and tall, dense grass with thick cane like stems whereas the lesser cane rat prefers grassy ground in moist savannas and tall grass on rocky hill sides (Anon, 2013e). Cane rats are swift and agile on land and swim very well. Though primarily nocturnal, they are occasionally active during the day. Depending on the season, greater cane rats are

solitary or communal (Anon, 2013e). Lesser cane rats live in small family groups, usually denning in thick vegetation, although, termite mounds and the abandoned burrows of aardvarks or porcupine are also used. Their diet consists of grass, other plants, and sometimes bark and fruits (Anon, 2013e). Cane rats also eat crops and can become serious pests in regions where corn (maize), sugar cane, pineapples, cassava and egg plant are cultivated. On the other hand these large rodents provide a significant source of protein for Africans and are intensively hunted throughout their range (Anon, 2013e). *Thryonomys gregorianus* also called lesser cane rat occurs throughout Eastern African and into Western African in countries of Cameroon, the Central African Republic, Chad, the Democratic Republic of Congo, Kenya, Malawi, Sudan, Tanzania, Uganda and Zambia. An isolated population also exists in Zimbabwe and Mozambique. It is likely that population exists in Angola, however no records have been collected of the Zambian border (Antonanzas et al., 2004; Skinner and Chimimba, 2005). Lesser cane rats, occasionally referred to as savanna cane rats, inhabit most grasslands dominated by elephant grass (*Pennisetum purpureum*). They are also occasionally found along the fringes of swamps and in wooded areas. Individuals usually use tall grass for shelter, but have also been found digging shallow burrows or using rock crevices, termite mounds and abandoned aardvark or porcupine holes. This species is considered non-aquatic, differing in habit preference from the semi-aquatic *Thryonomys swinderianus*. Individuals have been recorded up to altitudes of 2,600m (Ansell, 1966; Kingdon, 1984; Nowak, 1991; Sheppe and Osborne, 1971). Lesser cane rats are solitary in their habits, but can occupy acture during the day. Dominance fighting between male involves a nose to nose pushing duel. Both individual push until one relieves pressure, causing the dominant individual to whip its rump around and hit its opponent, knocking the weaker individual off balance (Ewer, 1968; Nowak, 1991; skinner and chimimba, 2005). *Thryonomys gregorianus* family groups have territory sizes of 3,000 to 4,000 square meters

(Nowak, 1991). *Thryonomys gregorianus* individual have poor eyesight, but good senses of smell and hearing. Vocalizations include whistling and low hooting grunts. They will also thump their hind feet when alarmed (Kingdon, 1984; Nowak,1991). The greater cane rat (*Thryonomys swinderianus*) live by reed-beds and river banks in sub-saharan Africa (Anon,2013d). It has rounded ears, a short nose and coarse bristly hair. Its forefeet are smaller than its hindfeet, each with three toes (Anon, 2013d).

Economic Importance

Thryonomys species are intensively hunted as an important source of protein throughout their range. They are typically hunted with dogs, spears, and fall traps or by burning vegetation. It is estimated that in West Africa, 80 million are harvested annually, equalling 300,000 metric tons of meat. To increase meat availability, *Thryonomys* species have been domesticated and currently efforts are being made to expand the industry. Greater cane rats are preferred over lesser cane rat because of their larger body size, however it has been suggested that both species should be reared as part of the industry. *Thryonomys* species meat has more protein than chicken, rabbit and guinea pig and lower fat than pork, beef and lamb. The expansion of this domesticated market may also relieve pressure on wild population of cane rats(Fiedler,1994; Hoffmann,2008a; Howell, 1981; Jori et al,1995). The meat of grasscutter fetches higher price than meat of domestic animals (Martins, 1983; Asibey, 1986 and 1987). Adeboye(2007) reported that grasscutter is a good source of animal protein of high biological value. Cane rat meat has good nutritional qualities: high quality protein, low fat, high dressing percentage and a unique taste (Fayenuwo et al, 2003; Olomu et al, 2003). The taste of establishment is low and grasscutters are hardy animal. Its domestication requires less space and less capital (Agwunobi et al, 2009). It can be raised in backyards, within limited space by landless farmers. Grasscutters feeds are not competed for. They range from green forage to kitchen wastes which can easily be obtained by the most poverty stricken farmer

compare to large livestock which require large expanse of land and capital (Agwunobi et al, 2009). The market for both fresh and smoked grasscutter meat as well as its contribution to per capita consumption of animal protein is unlimited (Ntiamoa-Baidu, 1987). The meat quality is leaner and non-cholesterologenic (Bello et al, 2011). The meat is very tasty when compared to both domestic and familiar game species. Igene(1992) reported that grasscutter play an important role in traditional African medicine for preparation of concoctions for fertility. In Ghana, the hair of the grasscutter is used to season food just as much as its stomach and intestine contents. The pancreas of the grasscutter contains a high concentration of insulin which is used for local preparation for the treatment of diabetes (Bello et al, 2012). Grasscutter socio economic important include its trading in both local and international markets. In Ghana, it has been ascertained that grasscutter contribute to both local and export earnings. Olayemi (2002) pointed that about 73 tonnes of the animals are sold in a year and recent survey show that grasscutter dominates bush meat trade in Ghana. The author further affirmed that most of these quantities are traded locally as fresh or smoked form. Smoked grasscutter is exported to USA and Europe hence, becoming a source of foreign exchange earnings. This implies that grasscutter can serve as a considerable income earner for both the small scale peri-urban or rural livestock producers (Bello et al, 2012). *Thryonomys swinderianus* is one of the most preferred meats in Africa and it can be more expensive than lamb, chicken, beef or pork (Anon, 2013f). It has been sold in Ghana for almost twice as much as beef and pork. In one African market, about 200,000kg which is worth about \$220,000 U.S. was sold in a year's time (Anon, 2013f).

Conclusion

Most rural farmers have access to capture cane rat on a daily basis. These farmers sometimes capture live animals but oftentimes animal are trapped dead. Many individuals that love to rear cane rat are faced with the challenge of technical know how of handling animals,

differentiating the breeds, feeds and housing methods to use on these animals. The feeds of cane rat especially *Pennisetum purpererum* (Elephant grass) and *Panicum maximum* (Guinea grass) are found commonly growing in the rain forest and guinea savanna zone of Nigeria. Cane rat is a micro-livestock that can be reared in captivity to meet the protein requirement of poverty stricken rural people of Nigeria. The establishment of cane rat requires less space and less capital.

Reference

- Adeboye, O. (2007). Grasscutter rearing in Nigeria. Greenland Publication, Nigeria.
- Adoun, C. (1993). Place De L'aulacode (*Thryonomys swinderianus*) Dans le Regne Animal et sa repartition géographique. Place of Grasscutter (*Thryonomys swinderianus*) in animal kingdom and its geographical distribution.
- Agwunobi, L. N., Ajuobi, V. I. and Wogar, G.S.I. (2009). The performance of grasscutter (*Thryonomys swinderianus*) on diets containing varying levels of crude fibre. Proc. Nig. Soc. Anim. Prod. 34th Ann. Conf. 15th March, Uyo, Nigeria. Pp 124-125.
- Aluko, F. A. (2014). Qualitative characteristics of *Thryonomys swinderianus swinderianus* and *Thryonomys swinderianus gregorianus*. Nig. J. Anim. Prod. Vol.41(1), Pg 258-263.
- Anon (2013a). Bush meat crisis Task Force. Pg1. 19/11/13.
- Anon (2013b). Bush meat. Wikipedia. the free encyclopedia. Pg 1. 31/10/13.
- Anon (2013c). Cane rat. Wikipedia. the free encyclopedia. Pg1.30/10/13.
- Anon (2013d). Greater cane rat. Wikipedia. The free encyclopedia. Pg1.8/9/13
- Anon (2013e). Cane rat. www.britannica.com/cane rat/92531/siyanbona Africa - Greater cane rat.
- Anon (2013f). *Thryonomys swinderianus – Marsh cane rat. Encyclopedia of life. eol.org pg1.20/11/2013.*
- Anon (2013g).<ahref = [http://animals.jrank.org/pages/3422/](http://animals.jrank.org/pages/3422/Cane_Rats-Thryonomyidae-Behavior-Reproduction.Intml) Cane Rats- Thryonomyidae-Behavior-Reproduction.Intml>Cane Rats: *Thryonomyidae – Behavior and Reproduction*
- Antonanzas, R., Sen, S. and Mein, P. (2004). Systematics and phylogeny of the cane rats (Rodentia:Thryomyidae). *Zoological Journal of the Linnean Society*, 142: 423-444.

- Ansell, W. F. H. (1960). *Thryonomys gregorianus* and *Thryonomys swinderianus* in Zambia. The puku, occ. Papers. Dept. game and fisheries, Zambia. 4:1-16.
- Ansell, W. (1966). *Thryonomys gregorianus* and *Thryonomys swinderianus* in Zambia. The Puku, 4: 1-16.
- Asibey, E. O. A. (1986). Wildlife and Food Security. Paper presented for the forestry Department. FAO.Rome. Italy (unpublished).
- Asibey, E. O. A. (1987). The grasscutter. Accra, Ghana, FAO, Regional Office for Africa.
- Bello, Y. O., Bello, M. B., Iwanegbe, I. Gladys, I. and Okoli, C. I. (2011). Contemporary Approach to Quality and Food Production. Benin Diamond Publishing House.
- Bello, Y. O., Bello, M. B. and Iwanegbe, I. (2012). Grasscutter cultivation and uses: Issues and challenges. A study of selected Local Government Areas in Edo State, Nigeria. Continental J. Agricultural Science 6 (2): 23-29.
- Bishop, Ian (1984). Macdonald, D., ed. The Encyclopedia of Mammals. New York: Facts on File. P.703. ISBNO – 87196-871-1.
- Ewer, R. F. (1969). Form and Function of the grasscutter. *Thryonomys swinderianus* Temm. (*Rodentia, Thryonomidae*). *Ghana. J. Sci.* 9:131-141.
- Fayenuwo, J. O., Aknde, M., Taiwo, A. A., Adebayo, A. O., Saka, J. O., Lawal, B. O., Tihamiyu, A. K. and Oyekan, P. O. (2003). Guidelines for grasscutter rearing. Technical Bulletin, IAR&T, Ibadan. Pp.38.
- Fiedler, L. (1994). Rodent pest management in Eastern Africa. Rome: Food and Agriculture organization of the United Nations.
- Hanks, P. (1979). Collins dictionary of English Language. Publ. Williams. Collins Sons and Co. Ltd. Great Britain.
- Happold, D. C. D. (1987). The mammals of Nigeria. Clarendon Oxford.
- Hoffmann, L. (2008). The yield and nutritional value of meat from African Ungulates, camelidae, rodents ratites, and reptiles. *Meat Science*, 80:94-100.
- Hoffmann, M. (2008). "*Thryonomys gregorianus*" (on-line). ICUN Red list of Threatened species. Version 2011. 2. Accessed November 29, 2011 at www.icunredlist.org
- Hopf, H. S., Morley, G. E. I. and Humphries, J. R. O. (1987). Rodent damage to growing crops and to farm village storage in tropical and subtropical region centre for overseas. Pest Research. London and tropical products institute London. Pg115.
- Howell, K. (1981). A note on the identification of cane rats, with records from Dares Salaam. Bulletin – East Africa Natural History Society 1981: 41-43.
- Igene, J. O. (1992). Food Technology National Feed self-sufficiency and Agro Industrilization. The Nigeria Experience. Inaugural Lecture series 91/92, University of Maiduguri.

- Jori, F., Mensah, G. and Adjanohoun, E. (1995). Grasscutter production: an example of rational exploitation of wildlife. *Biodiversity and conservation*, 4: 257-265.
- Jori, F. and Chardonnet, P. (2001). Cane rat farming in Gabon. Status and perspective. *Proceedings of the 5th International Wildlife Ranching symposium*, March 2001, Pretoria, South Africa, pp33-51.
- Kingdom, J. (1984). *Thryonomyid* Rodents. In *East African Mammals, Part B (hares and rodents)*, Chicago Illinois: University of Chicago Press. Vol 2, Pp696-704.
- Martin, G. H. (1983). Bushmeat in Nigeria as a natural resource with environmental implications. *Environmental conservation*. 10:25-132.
- Nowark, R. (1991). Cane rats. In *Walker's mammals of the world*. Baltimore: The John Hopkins University Press. 5th edition. Vol.2, Pp956-957.
- Ntiamao – Baidu, Y. (1987). West African Wildlife. A resource in jeopardy. *Unaslva*, 39: 27-35.
- Olayemi, J. K. (2002). Challenges of food security in Nigeria. A paper presented at a seminar on planning and management of Agriculture sector. Guarantee food security at all times held at Cape Coast University, Ghana on 12th November.
- Olomu, J. M., Ezieshi, V. E. and Orheruata, A. M. (2003). Grasscutter production in Nigeria. Principles and practices. Jachem publishers. Pp 62,
- Owen, O. J. and Dike, U. A. (2012). Grasscutter (*Thryonomys swinderianus*) Husbandry in Nigeria: A Review of the Potentialities, opportunities and challenges. *Journal of Environmental Issues and Agriculture in Developing Countries*. Vol 4, No 1.Pp 104-111.
- Romer et Nesbitt (1930). In Place de l'aulacode (*Thryonomys swinderianus*). Dans le Regne Animal et sa repartition geographic. Adoun, C. (1992). Pg 36.
- Sheppe, W. and Osborne, T. (1971). Patterns of use of a flood plain by Zambian mammals. *Ecological Monographs*, 41:179-205.
- Skinner, J. and Chimimba, C. (2005). Lesser cane rat. In the mammals of the South African Subregion, 3rd edition. Cambridge: Cambridge University Press. Pp96-97.
- Temminck, C. I. (1927). *Aulacodus swinderianus* Temminck 1927. *Monographies de Mammal I. Sierra Leone*, pg 248.
- Thomas, O. (1894). Description of a new species of reed rat (aulacodus) from East Africa, with remarks on the milk dentition on the game. *Ann. Mag. Nat. Hist. XIII*, ser 6:202-204.
- Thomas, O. (1922). On the animal known as "Ground Hogs" or "Cane rat" in Africa. *Ann. Mag. Nat. Hist. Ser. 9(9)*. Pg386-392.
- Wood, B. J. (1994). Rodents in Agriculture and Forest. *Rodent Pest and their control*. Pg. 45-83.