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PREVALENCE OF *CAPRA HIRCUS* L. (GOAT) ECTOPARASITE IN MAJOR LIVESTOCK MARKETS OF ZARIA, KADUNA STATE.

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ABSTRACT
Although large numbers of ruminants are slaughtered per annum, the production of quality skins remains very low. Skin diseases account for considerable economic losses, particularly to the skins and hides export due to various defects, 65% of which occur in the pre-slaughter slabs. This work was conducted to seek information on the prevalence of ectoparasites in selected markets with their associated risk factors of age, sex, and breed to know the prevalence rate. A total of 239 *Capra hircus* (goat) were examined for ectoparasites infestation with associated risk factors of age, sex, and breed. Clinical examination was done by visual inspection, physical examination of the skin, palpation of skin, and hair samples were collected from the infested part of the goat in 70% methanol solution and subjected to identification tests. Results showed that ticks and lice prevalence were 0(0%) Two species of mites encountered were *Demodex caprae* and *Sarcoptes scabei* var *caprae* prevalencerateranging from 9.6% - 17.9% at the age range of less than 2 years and the lowest of 0% at age range of 2-5 years for both male and female. However, West African Dwarf (WAD) recorded the highest with 20(8.4%), and the lowest was recorded by Red Sokoto (RS) with 6(6.7%). The study concluded that though the prevalence was a little lower in the selected the rate could still be brought lower to promote the production of quality skins. The study, therefore, recommended that routine and strategic control measures should be employed to reduce downgrade, skin rejection, and mortality of livestock.
Keywords: Hides and skin quality, Ectoparasite infestation, livestock mortality

1. INTRODUCTION:

Ruminants represent an important segment of the Nigeria livestock system . The national ruminant population of Nigeria is the second largest in Africa after Ethiopia and is estimated to be 13.9 million cattle, 22.1 million sheep, and 34.5 million goats (Lawal-Adebowale, 2012). Although large numbers of ruminants are slaughtered per annum, the production of quality skins remains very low . Skin diseases are accountable for considerable economic losses, particularly to the skins and hides export due to various defects, 65% of which occur in the pre-slaughter slabs . This causes often rejection because of poor quality (Bekele, 2012). Goat rearing is one of the most important aspects of agriculture which has contributed immensely toward the growth and development of the national economy of Nigeria . It contributes significantly to the provision of domestic meat, estimated at over 162,000 tonnes per annum . Goats play important roles in the livelihood of farmers as they provide a vast range of products such as meat, milk, skin, hairs, horns, bones, and manure . These products are sources of raw materials for other industries like tannery, milk production, and many more .

There are many breeds of goat, but only three are major Nigerian breeds namely, West Africa Dwarf (WAD), Sahelian, and Red Sokoto Goat (RSG) . Each breed has a different climatic adaptation, WAD is found in the Southern region while RSG and Sahelian are mostly domiciled in the Northern part of Nigeria . Infestation by ectoparasites could lead to skin damage in the form of downgrading, rejection, irritation, creating an opening for the development of secondary infection, cases of vector-borne diseases, weight loss, loss of blood or anemia and in severe cases death with the consequent

socio-economic implications. Ectoparasites infesting livestock animals are majorly lice, ticks, mites, and so on (Teklay, 2019). They contributed greatly to the loss of livestock farmers by reducing the quantity and quality of livestock animals . They are also responsible for causing diseases in livestock animals; some of these diseases are zoonotic. Zoonotic diseases are diseases that can be easily transmitted from animal to man and vice versa, thereby posing a threat to livestock farmers . Lice can be generally classified into two namely; sucking and biting lice. Sucking lice are more harmful because they live on blood and pierce the skin to obtain it. They are blue or dark gray and have pointed heads and sucking mouth parts . The heads are usually longer than broad. Biting lice live on the surface of the skin and feed on scales, bits of hair, and other debris on the skin's surface. They are yellow or reddish brown and have short, broad, rounded heads, which are usually broader than long . Sucking lice pierce the skin to obtain blood for food. In doing so, they cause intense irritation.

Biting lice do not pierce the skin. They move about on the skin surface much more than the sucking lice and irritate the infested animals with their constant movements . They live on particles of hair, dried skin, dried scrum, and other bits of skin debris. Because sucking lice consume blood, they are considered more harmful than biting lice . The damage done by both biting and sucking lice is confined largely to that done by wool or mohair . The attempts made by the infested animals to relieve the irritation caused by lice result in injury to the fleece. The wool or mohair becomes soiled, matted, and broken by the rubbing, scratching, and biting done by the infested animals . The value and utility of both are reduced, and the loss sustained by the producer is considerable, examples are *Lignonathus stenopsis*, *L. pedalis*, and *Bovicola caprae.* Ticks are divided into hard (Ixodidae) and soft ticks (Argasidae) . Ticks contribute innumerably to the damage of livestock animals. They are vectors of some diseases like theiloriosis, ehrlichiosis and many more, examples are *Amblyomma variegatum*, *Ixodes scapularis*, *Ixodes ricinus* Mites are also obligate parasites. Mites are classified as Sarcoptes, Demodex, Psoroptes, and Chioroptes with their unique body morphology and characteristics .

Many works have been done in the area of disease transmission of ectoparasites like theileriosis, ehrlichiosis, anaplasmosis, cowdriosis, and rickettsial , e.t.c but little or no work on the prevalence of ectoparasites in goat in Zaria Community and its environs. This work is to provide information on the prevalence of ectoparasites in the three major livestock markets of Zaria, namely Tundun-Wada, Giwa, and Dogarawa livestock markets with their associated risk factors of age, sex, and breed to know if the prevalence is low or high in the study area.

Therefore, this study sought to answer these research questions;

1. What is the prevalence of goat Ectoparasites in relation to age in the three selected markets?
2. What is the prevalence of Ectoparasites of goats in relation to breed in the three selected markets?
3. What is the prevalence of Ectoparasites in relation to sex in the three markets surveyed?
4. What is the Ectoparasites of goat that is identified in the three market study areas?

2. MATERIALS AND METHODS:

Study Area and Animal: Kaduna State is one of the most popular States in the country in northwest geopolitical zones.it is well known for its housing of many federal government institutions, ministries, departments, agencies, and parastatals. The climate is tropical in Kaduna. When compared with winter, the summers have much more rainfall. The climate here is classified as Aw by the Köppen-Geiger system. The average annual temperature in Kaduna is 25.2 °C | 77.4 °F. About 998 mm | **39.3 inches** of precipitation falls annually (latitude.com, 2021). It is cited on the latitude of 10° 30' 59.99" N and longitude of 7° 25' 59.99" E (latitude.com, 2021). The survey was conducted in three (3) Local Government Areas in Kaduna State namely, Sabon-Gari, Zaria, and Giwa local government of Kaduna State. Three major livestock markets were selected purposively. The markets have their different market days in the week. Giwa market is located in Giwa local government area (LGA), Dogarawa slaughter slab is located in Sabon-Gari LGA and Tudun-Wada is located in Zaria LGA. The markets were visited on their different markets days.

Ectoparasites Identification: The body of the goats was visibly examined for hair loss, keratinization, and attached ectoparasites like ticks, mites, and lice. Hair samples were collected from different parts of the animal body into a methanol container by hair scrapping using a scalpel blade. The sample was immediately transported to the Laboratory of the Department of Parasitological and Entomology in the Faculty of Veterinary Medicine, Ahmadu Bello University (ABU) Zaria for proper identification using morphological characteristics described by Wall and Shearer (2001) after viewing under the microscope of magnification x40. Every goat encountered was tagged to avoid sampling the goat more than once. The hair samples were digested using 30% potassium hydroxide after boiling under a furnace for 10 -15 minutes. The samples were filtered using filter paper and the filtrate was added to methanol to view under the microscope .

3. RESULTS AND DISCUSSION:

Table 1 shows the prevalence of goat ectoparasites in three livestock markets surveyed in relation to their age risk factors, both ticks and lice infestation score 0% prevalence in all the surveyed three livestock markets. Mite infestation was higher in Giwa with 9.6% in less than 2 years and lower at Dogarawa with 0% in all the age ranges (Table 1)

Table 1: Prevalence of Goat Ectoparasites in Relation to Age

Age	TICKS& LICE No. (%)				MITES No. (%)			
	G	T	D	TOTAL	G	T	D	TOTAL
<2 years								
Positive	0 (0)	0(0)	0(0)	0(0)	23(9.6)	14(4.2)	0(0)	37(15.5)
(%)	33402699				10(4.2)	26(10.9)	26(10.9)	62(25.9)
Negative	(13.8)	(16.7)	(10.9)	(41.4)				
(%)								
2-5 years								
Positive	0(0)	0(0)	0(0)	0(0)	0(0)	7(2.9)	0(0)	7(2.9)
Negative	25342988				25(10.5)	27(11.3)	29(12.1)	81(33.9)
	(10.5)	(14.2)	(12.1)	(36.8)				
>5years								
Positive	0(0)	0(0)	0(0)	0(0)	3(1.3)	3(1.3)	0(0)	6(2.5)
Negative	19201352				16(6.7)	17(7.1)	13(5.4)	46(19.24)
	(7.9)	(8.4)	(5.4)	(21.7)				

Key- G: Giwa market, T: Tudun-Wada Market, D: Dogarawa Market, No.: Number, %: Percentage

Table 2 shows the prevalence of ectoparasites in the three surveyed livestock markets in relation to the breed. West African Dwarf scored 8.7% in Giwa which was the highest followed by 6.7% in red Sokoto at Giwa and the lowest was 0% in Dogarawa among all the three breeds considered for this survey (Table 2).

Table 2: Prevalence of Ectoparasites of goats in relation to breed

BREED	TICKS& LICE No. (%)				MITES No. (%)			
	G	T	D	TOTAL	G	T	D	TOTAL
MARADI/RED SOKOTO	0(0)	0(0)	0(0)	0(0)	6(6.7)	10(4.18)	0(0)	16(6.7)
Positive (%)	50	64	41	58				
Negative (%)	(20.9)	(26.8)	(18.4)	(66.1)	44(18.4)	54(22.6)	44(18.4)	142(59.4)
WEST AFRICAN DWARF GOAT								
Positive (%)	0(0)	0(0)	0(0)	0(0)	2	0	1	4
Negative (%)	27	30	24	81	(8.4)	(5.9)	(0)	(14.2)
	(11.3)	(12.6)	(10.0)	(33.9)	7(2.9)	16(6.7)	24(10.0)	47(19.6)

Key- G: Giwamarket; T: Tudun-Wada Market, D: Dogarawa Market, No.: Number, %: Percentage

Table 3 shows the ectoparasites prevalence in relation to sex in three livestock markets surveyed. Tudunwada recorded the highest prevalence for males than females which were 17.9% and 12.1% respectively. Giwa market scored 15.5% for males and 4.6% for females (Table 3).

Table 3: Ectoparasites prevalence in relation to sex

SEX	TICKS& LICE No. (%)				MITES No. (%)			
	G	T	D	TOTAL	G	T	D	TOTAL
Male								
Positive	0(0)	0(0)	0(0)	0(0)	37(15.5)	43(17.9)	0(0)	80(33.5)
Negative	63(26.4)	51(21.3)	46(19.2)	160(66.9)	26(10.9)	8(3.3)	46(19.2)	80(33.5)
Female								
Positive	0(0)	0(0)	0(0)	0(0)	11(4.6)	29(12.1)	0(0)	40(16.7)
Negative	14(5.9)	43(17.9)	22(9.2)	79(33.1)	3(1.3)	14(5.9)	22(9.2)	39(16.3)

Key- G: Giwa market, T: Tudun-Wada Market, D: Dogarawa, MarketNo.: Number, %: Percentage

Table 4 shows the major mite species identified during the survey. Mite species were the only ectoparasites identified throughout the survey period.

Table 4: Mite Species identified

MITES	MARKETS		
	G	T	D
Demodex caprae	65%	70%	0%
Sarcoptesscabei var *caprae*	35%	30%	0%

Key- G: Giwa market, T: Tudun-Wada Market, D: Dogarawa Market

$$\text{Prevalence (P)} = \frac{\textit{TOTAL NUMBER OF GOATS TESTED POSITIVE}}{\textit{TOTAL NUMBER OF GOATS EXAMINED}} \; X\; 100$$

$$\text{Prevalence (P)} = \frac{50}{239}\; x\; 100$$

P = 20. 92%

P = 21%

The overall prevalence rate of ectoparasites of goats at Zaria is 21% which is lower compared to the prevalence recorded in similar work at Anambra state where 70.4% was recorded however, the overall prevalence of 21% recorded in this study is higher than that of Kagira and Kanyari (2001) who reported a prevalence of 10.0% in sheep and goats in Gwagwalada area of FCT Abuja, Nigeria, the 13.1% reported by George *et al*. (1992) in Zaria, Kaduna State, North Western Nigeria. 18.52% reported by Ugochukwu and Apeh (1985) and 8.7% reported by Ohaeri and Ugwu (2013) were also lower than the recorded prevalence rate in this survey. The prevalence of 21% recorded is lower than 45.95% reported by Ugochukwu and Apeh (1985) in Nsukka, Enugu State, South Eastern Nigeria, 55.1% reported by Ohaeri and Ugwu (2013) in Michael Okpara University of Agriculture, Umuidike, animal husbandry farm at Umuahia, Abia State, South Eastern Nigeria and 68.1% reported by Obi *et al*. (2014) in Uli, Anambra State, South Eastern Nigeria. Likewise, 47.0% reported by Onojafe (2008) in Ethiope West Local Government Area of Delta State, South Southern Nigeria, and 69.8% reported by Obi *et al*. (2014).

The lower prevalence rate could be a result of the presence of Ahmadu Bello University veterinary service in Zaria. This gives farmers proximity to cheap and timely treatment of their livestock. The tick prevalence in all surveyed markets was zero percent (0%), this could be attributed to the time of the season in which the survey was carried out. The survey was done from October to December which is considered to be the beginning and the mid of the dry season. This work is contrary to the works of Osman (1997), Onojafe (2008), Mbuh *et al.* (2008), Mulugeta *et al*. (2010), Ohaeri and Ugwu (2013) and Yishak *et al.* (2015) where ticks prevalence was prominent. Ticks are more prevalent during the rainy season ranging from April to September but have a record of low prevalence during the dry season (Table 1, 2, & 3). The overall prevalence of 21% of mites infestation in Zaria is higher than the 15.4% posited in Anambra and Ethiopia . 21% mange prevalence recorded might be as a result of Ahmadu Bello University veterinary services availability and the level of awareness among the livestock farmers in the area the highest of which was recorded in West Africa Dwarf (WAD) than Red Sokoto (RS) breed (Table 3), this may be due to adaptation of red Sokoto goat because they are indigenous breed to the Sudan savannah than rainforest breed of West Africa Dwarf (WAD) (Lawal-Adebowale, 2012). There was no record of the Sahelian goat breed in the location of the study.

The associated risk factors indicated the highest mites prevalence rate in age less than 2 years, (Table 1) this agree with the work of where age 1-5 years had a highest 54% prevalence rate than other age groups, this was attributed to the ability of the animal high activeness, struggling, thriving to survive, low immunity and vulnerability of this young goats that predispose them. Hansen (2011) reported that the young goat's hematological parameters make them susceptible to ectoparasites infestation. Age 2-5 years scored second in the prevalence rate, this could be due to peri-parturient immunity because immunity decreases during pregnancy or in lactating mothers (Hansen, 2011)

The male goat had the highest prevalence rate than their female counterparts (Table 3) this could be a result of using one male goat to carter for the reproduction of a large flock of female goats and their ability to cover a long distance in free range system, this agrees with the finding of Mandefrot (2018) in Angacha where male goats and sheep had the highest prevalence than the female goats and sheep. The common mite species encountered during the survey were *Demodex caprae* and *Sarcoptes scabei* var *caprae*. These are mites of goats; this result indicates that there is no case of co-habitation of the goats with other animals if not other mites peculiar to other animals would have an equal chance of being encountered (Table 4).

1. CONCLUSION AND RECOMMENDATION:

The prevalence rate of ticks and lice was 0% and overall mite prevalence was 21% in this survey. The less than 2 years goat had the highest mite prevalence rate while the West African Dwarf (WAD) breed scored the highest mite prevalence rate. In risk-associated factors for sex; the male had the highest prevalence rate, *Demodex caprae* and *Sarcoptes scabiei* var *caprae*. More veterinary attention should be given to the location to eliminate the existence of skin infestation that lead to downgrade or rejection of the skin from livestock animals. Intensive care methods of livestock farming reduced the chances of infestation among livestock animals. Similar work like this could be conducted during the rainy season in the same locations as compared to the existing works.

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