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Livestock: An alternative mosquito control measure

A.A. Yakubu*, A. Singh

Department of Agricultural Economics and Extension, Usmanu Danfodiyo University, P.M.B. 2346, Sokoto, Nigeria.
Department of Crop Science, Usmanu Danfodiyo University, P.M.B. 2346, Sokoto, Nigeria.

*Corresponding author

Abstract

A survey was conducted to investigate the indigenous methods or measures adopted by urban livestock owners in the control of mosquito in Sokoto metropolis. Fifty (50) respondents who were engaged in urban livestock production were conveniently sampled, In addition, five (5) locations (Sidi farm, Kara market, Sokoto Cinema, Gidan Ashana, U/Rogo) where animals were kept overnight in large flocks/herds were purposively selected. Data was collected on size and type of animal kept, methods of mosquito control, strategies for eliminating breeding sites, methods of protecting animals from mosquito bite etc. Descriptive statistics and chi-square test was used to analyse the data collected. Results showed that the majority of the respondents raised cattle, goats and sheep due to economic benefit obtained from them. Respondents were small scale cattle and average goat and sheep farmers that generally kept their animals tethered at night. It was observed that the population density of mosquitoes was higher in the animal pen than the human room and among the preventive measures employed by the respondents, most used smoke to repel mosquitoes from both animal pen and human room. It can therefore be concluded that there exists a link between human and livestock population particularly in diverting the vector host (mosquito) away from the humans. The livestock are prevented from mosquito bite by smoke, spray and clean environment.

Keywords: Livestock, Mosquito, Mosquito control, Malaria

Introduction

Of the four species of Plasmodium that infect humans – *P. falciparum*, *P. vivax, P. Malariae* and *P. ovale*- *P. falciparum* causes most of the severe disease and deaths attributable to malaria and is most prevalent in Africa south of the Sahara and in certain areas of South East Asia and the Western Pacific. The second most common malaria species, *P. vivax*, is rarely fatal and commonly found in most of Asia, and in parts of the Americas, Europe and North Africa (World Malaria Report, 2005). There are over 40 species of Anopheline mosquitoes that transmit human malaria, which differ in their transmission potential. The most competent and efficient malaria vector, *Anopheles gambiae*, occurs exclusively in Africa and is also one of the most difficult to control (World Malaria Report, 2005). It is a vector-borne fly that transmits viral disease of livestock and human importance worldwide, caused by a member of the Phelebovirus genus of the Bunyaviridae family (Obi, 2004; Hunter, 1994). Cattle, sheep, goats, camels and human suffer clinical symptom of diseases and some indigenous breeds tend to be more resistant (Hunter, 1994). Some of the diseases caused include Rift Valley fever, encephalitis, heartworm in dogs and malaria in humans. The organism achieves transmission of the pathogen via a deep painful bite of the infected mosquito. It can travel several kilometres from breeding site in search of blood meal. Most female mosquitoes have to feed on an animal and get a sufficient blood meal before she can develop eggs. If they do not get this blood meal, then they will die without laying viable eggs. However, some species of mosquitoes have developed the means to lay viable eggs without getting a blood meal.

Livestock can have a very important role in the control of vectors. Animals attract mosquitoes, thus distracting mosquitoes from people (Richard *et al.*, 2000). Mosquito- livestock interaction may come out in areas where there are many cattle, whereby mosquitoes would feed on both man and cattle (McClelland, 1980). The severity of the disease and mortality rate in livestock diminishes

with age, however, adults usually have sub-acute symptoms of the disease in which clinical signs may be absent or confined to low grade fever and mild depression, and pregnant animals may abort (Hunter, 1994; Keiser, 2004; Richard *et al.*, 2000). Currently there is no known treatment for the disease (Malaria) in livestock (Daniel and Adrian, 2003) thus; attention is turning to ways of controlling breeding grounds through more careful environmental management until an effective vaccine is developed. Using common-sense approaches to reduce risk of infection may offer the best value for money (Anon., 2001; SIMA, 2004).

This paper attempts to investigate the indigenous methods or measures adopted by urban livestock owners in the control of mosquito (malaria) in Sokoto metropolis which is characterized by large stock of ruminant livestock and human population due to urbanisation which provides excellent breeding sites (gutters, poor drainage, sludge, animal watering point, laundries etc.) for mosquitoes and the parasite has gained immunity to drugs by increasingly able to withstand chemical control methods.

Materials and Methods

Sokoto metropolis is the capital of Sokoto State. The city is located at the north-western part of the country, and lies within the latitude 12-140 N and longitude 4-60 E (Junaidu *et al.*, 1995) The city has old traditional setting with high human and livestock population. The inhabitants of the city are mainly the descendents of the pastoral Fulbe whose major socio-economic activities is the livestock rearing particularly ruminant animals such as cattle, sheep and goats, and therefore the animals reared mainly are business oriented under semi-intensive management for the purpose milk, meat, social activities and income generation.

Fifty (50) respondents who were engaged in urban livestock production were sampled conveniently. In addition, five (5) locations (Sidi farm, Kara market, Sokoto Cinema, Gidan Ashana, U/Rogo) where animals were kept overnight in large flocks/herds were purposively selected. Data was collected on size and type of animal kept, method of housing, methods of mosquito control, strategies for eliminating breeding sites, methods of protecting animals from mosquito bite, experience of mosquitos' bites on animals etc. Descriptive statistics and chi-square test was used to analyze the data collected.

Results and Discussion

Majority of livestock kept by the city dwellers were food animals for social economic and prestige purpose as seen in the Table 1. 56% of the respondents raised goats, 48% raised cattle while 46% raised sheep. Similar observation was made by Junaidu *et al.*, 1997.

Table 1
Animals raised by city respondent

Types of animal	Responses	Percent	Chi-square test for equal proportions	
Cattle	24	48	Chi-square	46.94
Goat	28	56	Df	3
Sheep	23	46	Pr>chisq	<0.0001
Donkey	1	2		
Total	76*	152*		

* = Multiple responses observed, Total number of respondents = 50

Despite the fact that the city is densely populated, findings show that respondents managed to raise animals. Ovine species were found to be higher in number 16 respondents had 1-5 cattle and 13 had 6-10 goats while 8 had more than 11 sheep. Preference for goat and sheep could be attributed to their small body size therefore requiring a small space to be accommodated in the house unlike cattle and other big size animals that require large space for accommodation (Table 2).

Table 2
Livestock holding size kept by respondents

Type of livestock	Range of Holding (no.)*		
	1-5	6-10	>11
Cattle	16	6	1
Goat	9	13	6
Sheep	8	6	8
Donkey	1	-	-

* Multiple responses observed, Total number of respondents = 50

Survey showed that 92% of the animals were tethered in the city confined to a particular area or space, while 8% were untethered; move freely, shake body to repel mosquitoes etc. (Table 3). Respondents noticed that animals tethered were severely bitten by mosquitoes particularly on the unhaired part of the body (ear, tail, nostril, etc.).

Majority (78%) of the respondents observed that mosquito population density was more in the animal pen than human room (16%). This could be attributed to the preventive measures taken by the respondents using mosquito nets, blankets, repellents, insecticide, mosquito coil etc. resulting in shift from human to animal blood meal as an alternative. The finding is in agreement with that of David (2000) (Table 4).

Table 3
Housing of animals overnight

Location	Responses	Percent	Chi-square test for equal proportions	
Tethered	46	92	Chi-square	35.28
Untethered	4	8	Df	1
			Pr>chisq	<0.0001
Total	50	100		

Total number of respondents = 50

Table 4
Mosquito population density in the household

Location	Responses	Percent	Chi-square test for equal proportions	
Animal pens	39	78	Chi-square	45.64
Human room	8	16	Df	2
Others	3	6	Pr>chisq	<0.0001
Total	50	100		

Total number of respondents = 50

Table 5 presents the symptoms of malaria as observed by farmers. All the respondents observed incidence of mosquito bite in the livestock in their holding. From their experience, they observed certain disease symptoms associated with mosquito bites. 35.3% of the respondents observed loss of appetite, 33.6% observed dullness, 28.7% observed mild fever, and 6% observed blood letting and ruffled hairs also are among the symptoms of malaria. Hunter (1994) reported that malaria could lead to abortion.

Table 5
Symptoms of mosquito bite observed by the animal keepers

Symptoms	Responses	Percent	Chi-square test for equal proportions	
Mild fever	35	70	Chi-square	68.39
Dullness	41	82	Df	3
Loss of appetite	43	86	Pr>chisq	<0.0001
Others (blood letting)	3	6		
Total	122*	244*		

* = Multiple responses observed, total number of respondents = 50

Table 6
Preventive measures practiced by the farmers

Preventive measures	Responses	Percent	Chi-square test for equal proportions	
Spraying	31	62	Chi-square	136.31
Injection	8	16	Df	5
Cleaning of Environment	27	54	Pr>chisq	<0.0001
Smoke	50	100		
Applying local repellent	14	28		
Others	3	6		
Total	133*	266*		

* = Multiple responses observed, total number of respondents = 50

Table 6 shows the preventive measures taken by the keepers to control the population of mosquitoes. 37.6% of the respondents used smoke to repel mosquitoes, 23.3% used spray and 20.4% controlled mosquitoes by cleaning the environment, 10.5% used local herbs, plant oils, ointment as repellent when rubbed on the body of the animal. 8% of the respondents injected with chloroquine phosphate seasonally prior to appearance of symptoms. All the respondents used smoke of cow dung, crop residues and neem leaves as means of repelling mosquitoes from animals (Plates 1 and 2).

Plate I: Smoke from crop residues and neem leaves used to repel mosquitoes

Plate II: Smoke from crop residues and neem leaves used to repel mosquitoes

Conclusions

Malaria remains a serious threat to human and livestock population. Majority of the respondents raised cattle, goats and sheep due to economic benefit obtained from them. Respondents were small scale cattle and average goat and sheep farmers that generally kept their animals tethered at night. The population density of mosquitoes was higher in the animal pen than the human room and among the preventive measures employed by the respondents, most used smoke to repel mosquitoes from both animal pen and human room. It can therefore be concluded that there exists a link between human and livestock population particularly in diverting the vector host (mosquito) away from the humans. The livestock are prevented from mosquito bite by smoke, spray and clean environment.

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