

Traditional Perception of Cattle Herdsmen: Control of Ticks Invasion on Cattle in Ikorodu Local Area of Lagos State

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ABSTRACT The study dealt with the traditional perception of cattle herdsmen of tick control on cattle in some selected towns in Ikorodu Government Area of Lagos state Nigeria. Simple random sampling technique was used to select 102 cattle herdsmen in the study areas. Descriptive and inferential statistics, which include percentages, frequency distribution, Regression analysis, and Gross margin analysis, were used to analyze, the data. Finding showed that the herdsmen combined indigenous strategies with conventional strategies and the most strategies used by the herdsmen are fire, kerosene and insecticide. The result of the regression analysis reveals that the coefficient of multiple determinations (R^2) is 0.561, which indicate that 56.1% of the variability of the dependent variable (Cattle sale) was jointly explained by the independent variables during the period of the study. The results also revealed that age of the cattle herdsmen has a negative relationship with the cattle sale and is statistically significant at 1%. Marital status of the herdsmen also has a negative relationship with the cattle sale and is significant statistically at 5%. Religion of the herdsmen is also negatively related to cattle sales and is statistically significant at 5%. Education level of the cattle herdsmen has positive relationship with the cattle sale and is statistically significant at 10%. Also the proportion of loss in revenue, as a result of tick invasion is positively related to cattle sale and statistically significant at 1%. This implies that the more the tick invaded the cattle, the more herdsmen spend to control the invasion, thus, reduced the income realized from cattle sale per year. The result of Gross margin analysis is an indication that the profit of the herdsmen is high, positive and efficient market performance.

INTRODUCTION

Many rural communities keep some form of livestock and all have developed strategies to keep their animals healthy and disease free. These practices include many effective remedies and techniques that are uniquely culturally adapted, locally available and often cheaper than conventional methods. Indigenous practices relate to breeding, mating, stock management and replacement.

Livestock diseases, parasitism and deaths are the major threats to communal cattle production in the small-holder production system (Dold and Cocks 2001; Rajput et al. 2006; Hesterburg et al. 2007). Surveys have indicated that communal farmers perceive ticks as the most important health constraint to their cattle (Dreyer et al. 1998; Dold and Cocks, 2001). Ticks and helminths have a wide host and geographic diversity and hence constitute a major constraint to livestock production in the tropics and subtropics (Keyyu et al. 2003; Githiori 2004; Swai et al. 2005). Tick control by frequent application of acaricides is regarded to be costly in indigenous cattle (Mattioli et al. 1998). Communal farmers presently rely on the use of traditional medicines to combat the constraint of ticks and TBDs in their stock (Hesterburg et al. 2007).

According to Akullo et al. (2003), there were interesting findings in the use of indigenous knowledge in chicken production such as; 1. When a brooding hen abandons the eggs completely because of mites' infestation, farmers put dry banana leaves in a mortar and position it near a fireplace to enhance the eggs brooding process. The eggs are regularly turned and eventually the chicks are hatched. 2. Farmers prepare and place a small bottomless basket to encourage hens to lay more eggs and hatch many chicks. The baskets are placed in a small round hole lined with dry banana leaves.

The eggs are removed regularly to increase the number of eggs laid. Secondly chickens are fed on a mixture of millet and paraffin to prevent "sotoka" (coccidiosis). Chickens infected with coccidiosis are also injected with or given mixture of ash, ground pepper and water to drink. Over the years, livestock farmers in Africa have learnt a great deal about animal diseases/ ailments and have explored the potentialities of many medicinal plants in combating disease of their stocks. Bizimana (1994) listed and discussed thousands of such plants that are used in traditional veterinary practice in Africa. In Nigeria, Nwude and Ibrahim (1980) noted that about 92 of such plants tested revealed biological activities.

Different parts of the plant are utilized and can be prepared in many ways. The mode of preparation according to Chavinduka as cited by Guye (2005) however, depends on the active ingredient to be extracted and on the route of administration, studies by Ibrahim et al. (1984). Further revealed that in some cases, the same plant could serve as a cure well as a preventive measure when given in different doses. In other instances, in the prevention of some live-stock diseases, some rural stockowners actually vaccinate their animals. Many societies have forms of controlling ectoparasites of livestock. In some, small fires are lit besides resting cattle, so that smoke drives insect's away. The Fulani's wash their cattle with infusion of *Sesbania aculeata* before traversing a tsetse fly belt. Other measures recorded by Walter and Dietrich as cited by Adekunle et al. (2002).

Include: a nomads avoid an area known to be infested with ticks before leaving their enclosures in the morning, women and children collect ticks from the animals and throw these ticks into a fire burning near the entrance to the enclosures burning of pastures known to be infested with ticks and shady trees were avoided in case of ticks infestation. Animal were fed with plants containing high level of salt, thus the ticks fall off.

In the control of ectoparasites in poultry, ash from the burnt leaves of pawpaw (*Carica papaya*) or tobacco plant (*Nicotiana tabacum* and *Nicotiana rustica*) is rubbed on the feathers of chicken to prevent infestation. Etuk (2006) NIRT studied the efficiency of *Heliotropium Indicum L.* in the treatment of sarcoptic mange in pigs. He observed that three applications of the fresh herb juice of *Heliotropium indicum* were effective for mange treatment in pigs.

Objectives of the Study

This paper intended to study some of the indigenous strategies or methods as they relate to the control of ticks in Cattle rearing. As a result the following specific objectives are raised for the study to:

- determine the socio-demographic characteristics of cattle herdsmen in the study areas,
- indicate some observed characteristics of ticks by the herdsmen in the study area,
- identify the breeds of cattle attacked by ticks,

- identify some indigenous strategies or methods used in controlling ticks on cattle in the study areas
- ascertain the socio-cultural value of ticks in the study area.
- estimate the effect of tick invasion on cattle herdsmen income

Hypothesis

H₀: There is no significant relationship between socio-demographic characteristics of cattle herdsmen and the effect of tick invasion on cattle's herdsmen income from cattle sale (revenue)

H_a: There is significant relationship between socio-demographic characteristics of cattle herdsmen and the effect of tick invasion on cattle's herdsmen income from cattle sale (revenue).

MATERIAL AND METHOD

The study was carried out in Lagos State Nigeria. The study areas were Ikorodu, Imota, Igbogbo, Ipakodo, Ijale, Ibeshe, Isiu, Bariyeku, Agura, Gbenigbe, Offin, Oreta, Igbokuta, Mowo Odo-Nla, Odogunyan and Maya. All in Ikorodu Local Government Area of the State. The study areas were located within the tropics precisely Lagos State, Nigeria along latitude 6° north and 8° north and longitude 2.5° east and 5° east and it cover about 161,954 square-kilometers.

Simple random sampling techniques were used to select 102 Cattle herdsmen which constitute the sample size of the study. Structured questionnaire together with information from the respondents were used as means of data collection. Descriptive and inferential statistics, which include percentages, frequency distribution, Regression analysis, and Gross margin analysis, were used and to analyze, the relationship between socio demographic characteristics of the cattle herdsmen and cattle sale as well as to determine the profit of the cattle herdsmen.

Analytical Techniques

Regression Analysis

The model is specified as follows:

$$Y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + b_7x_7 + b_8x_8 + \epsilon$$

Y	=	cattle sale per year.
b 0	=	constant
x1	=	Age
x2	=	Marital Status.
x3	=	Religion
x4	=	Experience
x5	=	Educational Level
x6	=	Stocking density.
x7	=	Tick duration (1=rainy season, 0=dry season).
x8	=	Proportion of loss from tick invasion
£	=	Stochastic Variable.

Budgetary Techniques:

This is used to determine the profitability of cattle herdsman, which is as follows:

$$GM = TR - TVC \dots \dots \dots (1)$$

$$NI = GM - TFC \dots \dots \dots (2)$$

Where

GM	=	Gross Margin
TR	=	Total Revenue
TVC	=	Total Variable Cost.
TFC	=	Total Fixed Cost (Depreciated value of Fixed Assets).

RESULTS AND DISCUSSION

Socio-Demographic Characteristics of the Respondents

From Table 1, 35.3 percent of the sampled herdsman were within the age of 36 -45 years, 29.4 percent are between the age of 40-55 years, 21.6 percent were within the age range of 26-36 years, 11.8 percent were within the age of 16-20 years and 2 percent were above 56 years. This simply means that majority of the herdsman are of average age and this also implies that majority of herdsman are strong, able bodied men, who can contribute substantially to agricultural production. This agrees with the report of Oladoja et al. (2006) that most Nigerian farmers are between 41-50 years of age and are still active. The marital status of the herdsman indicated that 58.8 percent of the herdsman were married, while 21.6percent, 7.8 percent, 7.8 percent, 3.9 percent were single, divorced, widowed and separated respectively. This means that majority of the herdsman were married and would have more hands to tend the cattle, and particularly the wives to milk the cattle This was supported by Ayalneh and Korf (2005) that women in pastoralist households are also responsible for caring for sheep and goats, the breeding stock, including milking cows and young animals, as well as for marketing animal products, particularly milk. The study also revealed

that majority of the herdsman was Muslim (98.0 percent) while 20 percent belong to Christian religion. This implies that cattle's rearing in the study area is mostly done by the Muslim; the simple explanation of this finding is that cattle-herdsman are Fulani from the Northern part of the country, whose majorities are Muslim. The study also showed the fact that 49 percent of the respondents had no formal education, 43.1 percent of the respondents had primary education and indication that most of them are illiterate or semi-illiterate. (ii) They would stick more to their traditional perception on methods or strategies of controlling ticks invasion on cattle. According to Adekunle et al. (2005) educational attainment of herdsman indicated a high level of informal education. This may affect the method of control of pests and diseases of cattle because the level of educational attainment is not high enough as to re-orientate their views about culture. Results from table 1 also revealed that 56.9 percent of the respondents had 11-20 years of occupational experience in cattle rearing/production, 4.2 percent of them had 1-10 years of experience and 2 percent had above 21years of experience. This means the cattle herdsman have been in cattle production for average of 16 years and they should be a competent hand in cattle production. With respect to stocking density 25.5 percent of the herdsman stocked between 1-20 cattle, 21.6 percent of the herdsman stocked between 21-30 cattle, 9.8 percent of the herdsman stocked between 31-50 cattle, and 7.8 percent stocked above 51cattle. The study therefore, revealed that the stocking density is high and the herdsman are occupying small area of land, thus allowed early transfer of tick borne diseases in the study area. The results in table also revealed that the 75.5 percent of the herdsman were engaged in dairy cattle enterprise, 21.5 percent were engaged in the beef cattle enterprise, while 2 percent of the cattle herdsman were engaged in both enterprises. This is an indication that their women are also involved in their enterprises and they are into milk and cheese production.

Observed Characteristics of Ticks on Cattle by the Herdsman

Table 2 revealed that all the cattle herdsman (100 percent) had observed ticks invasion on cattle in the study area. This corroborates the

Table 1: Socio-demographic characteristics of herdsmen in the study area.

<i>Variables</i>	<i>Frequency</i>	<i>Percent</i>
<i>Age (Years)</i>		
15-25	12	11.8
26-35	22	21.6
36-45	36	35.3
46-55	30	29.4
Above 56	2	2
Total	102	100
<i>Marital Status</i>		
Single	22	21.6
Married	60	58.8
Divorced	8	7.8
Widowed	8	7.8
Separated	4	3.9
Total	102	100
<i>Religion</i>		
Christianity	2	2.0
Islam	100	98.0
Traditional	0	0
Total	102	100
<i>Educational level</i>		
No Formal Education	50	49.0
Primary Education	44	43.1
Secondary Education	8	7.8
Tertiary	0	0.0
Total	102	100
<i>Years of Experience of the Respondents</i>		
1-10	42	4.2
11-20	58	56.9
Above 21	2	2.0
Total	102	100
<i>Stocking rate</i>		
1-10	26	25.5
11-20	26	25.5
21-30	22	21.6
31-40	10	9.8
41-50	10	9.8
Above 51	8	7.8
Total	102	100
<i>Type of Enterprise</i>		
Dairy Cattle	78	75.5
Beef Cattle	22	21.5
Both Dairy and Beef Cattle	2	2.0
Total	102	100

Source: Field Survey 2010

study of Adekunle et al. (2002) in the northern region of the country in which the respondents indicated that all of them have encountered ticks and mosquitoes among their herd. This is an indication of prevalence of ticks in the study area. Majority (78.4 percent) of the cattle herdsmen called ticks "Kaska", This was corroborated by Iro (2009) that other livestock diseases include ticks (kaska), which the Fulani remove by visual inspection. while 21.6 percent referred to ticks as "Eegbon". This simply implies that majority of the herdsmen are Hausa Fulani from the North West and North East zones of Nige-

ria and they are tribes mostly involved in cattle rearing. All the herdsmen pointed out that ticks invasion occur during the rainy season because at that period the weather is humid, which encourage proliferation of ticks. Cattle ticks can be seen at any time of the year, but mainly occur during the wet season and early dry season Radunz (2008). Majority (98 percent) of the herdsmen indicated that of all types of ticks listed the common one observed by them, in the study area is the blue ticks, while 2 percent of the herdsmen observed cattle ticks. 66.9 percent of the herdsmen revealed that that ticks is commonly located on the genital organ of the cattle, while 11.8 percent, 9.8 percent, 5.9 percent, 5.9 percent of the herdsmen opted for chest and brisket, testicles, back, and skin respectively. When cattle are heavily infested, ticks can be found anywhere on the body Radunz (2008). Majority (80.4 percent) of the herdsmen stated that the duration of ticks on cattle was three to five months.

Table 2: Observed Characteristics of Ticks on Cattle by the Herdsmen in the Study Areas.

<i>Variables</i>	<i>Frequency</i>	<i>Percent</i>
<i>Observation of the Herdsmen on Ticks invasion on cattle.</i>		
Yes	102	100
No	-	-
Total	102	100
<i>Local Name of Ticks by the Herdsmen</i>		
"Kaska"	80	78.4
"Eegbon"	22	21.6
Total	102	100
<i>The Period of Observation of Ticks by the Herdsmen</i>		
Rainy Season	102	100
Dry Season	-	-
Total	102	100
<i>Types of Ticks that infest Cattle by the Herdsmen</i>		
Blue ticks	100	98.0
Cattle ticks	2	2
Red Legged ticks	-	-
African black legged ticks	-	-
Black legged ticks	-	-
Brown ear ticks	-	-
Total	102	100
<i>Ticks location on cattle by the herdsmen</i>		
Genital Organ	68	66.9
Chest and Brisket	12	11.8
Testicles	10	9.8
Back	6	5.9
Skin	6	5.9
Total	102	100
<i>Ticks Duration on Cattle by the Herdsmen</i>		
One month	4	3.9
Two months	14	13.7
Three-Five months	82	80.4
Above five months	2	2.0
Total	102	100

Types of Breeds of Cattle attacked by Ticks

Table 3 revealed that all the breeds of cattle reared in the study area were attacked by ticks as indicated by the herdsman, but the ones with the highest percent is White Fulani, Sokoto Gudali, Red Bororo and Yakasa (17.7 percent), followed by the combination of Sokoto Gudali and White Fulani (11.8 percent).

Table 3: Different breeds of cattle reared in the study area which were attacked by ticks

S. No.	Cattle breeds attacked by ticks	Frequency	Percent
1	White Fulani	2	2.0
2	White Fulani and Red Bororo	2	2.0
3	White Fulani, Sokoto Gudali	8	7.8
4	White Fulani, Sokoto Gudali, Pijiaye and Yakasa	10	9.8
5	White Fulani, Sokoto Gudali, Red Bororo and Yakasa	18	17.7
6	White Fulani, Sokoto Gudali, Pijiaye, and Yakasa	10	9.8
7	White Fulani, Yola, Sokoto Gudali and Yakasa.	2	2.0
8	White Fulani, Yola, Red Bororo, and Pijiaye	2	2.0
9	White Fulani and Kuri.	2	2.0
10	White Fulani, Kuri, Red Bororo, and Pijiaye	2	2.0
11	Red Bororo and Pijiaye	4	3.9
12	Red Bororo and Yakasa	2	2.0
13	Pijiaye, and Yakasa	8	7.8
14	Red Bororo, Sokoto Gudali, and Pijiaye.	2	2.0
15	Red Bororo, and Yola.	2	2.0
16	Sokoto Gudali	2	2.0
17	Sokoto Gudali, and White Fulani	12	11.8
18	Sokoto Gudali, Pijiaye, and Yakasa	2	2.0
19	Sokoto Gudali, Yola, Red Bororo and Yakasa.	4	3.9
20	Sokoto Gudali and N'dama	4	3.9
21	Sokoto Gudali and Dwarf short-horned cattle.	4	3.9
22	White Fulani, Yola, Pijiaye, and Yakasa	4	3.9

Source: Field Survey 2010.

Indigenous Strategies adopted by the Cattle Herdsmen to Control Ticks on Cattle in the Study Area

Table 4 revealed that the herdsman combined indigenous strategies with conventional strategies to control ticks invasion on cattle. This was confirmed by A 60 year old man, in Ekiti State, Nigeria as cited by Kolawole et al. (2007) that livestock farmers used combined strategies to control livestock's diseases. Yes, there are some

diseases that affect our animals at home. Examples are scabies, which could be cured by using mixed kerosene with potash. 45.1 percent of the herdsman used fire with insecticide, 31.4 percent used fire with kerosene, 17.7 percent used kerosene only, used of fire only (5.9 percent). The use of insecticide only has the least percentage (2.0 percent). It can be inferred from the study the most strategies used by the herdsman are fire, kerosene and insecticide.

Table 4: Indigenous strategies adopted by the herdsman to control ticks in the study area.

S. No.	Indigenous strategies of ticks control	Frequency	Percent
1	Use of fire only	6	5.9
2	Use of insecticide only	2	2.0
3	Use of fire with insecticide	46	45.1
4	Use of fire with kerosene	32	31.4
5	Use of Kerosene only	18	17.7
	Total	102	100

Source: Field Survey, 2010.

Socio cultural value of Tick in the Study Area

All of the herdsman indicated that ticks is not used for ritual purpose, at the same time no useful product derived from ticks as well as no taboo is attached to tick. 82.4 percent of the herdsman opined that ticks are not evil creatures, while 17.6 percent of the herdsman were of contrary opinion that ticks are evil creatures, implying that it does not matter, even, if they pick ticks when going to pray after ablution (Table 5).

Table 5: Socio-cultural value of tick in the study area

Socio-cultural value of ticks	Frequency	Percent
<i>Ritual use of Ticks</i>		
Yes	-	-
No	102	100
Total	102	100
<i>Useful products from Ticks</i>		
Yes	-	-
No	102	100
Total	102	100
<i>Taboo Attached to Ticks by the Herdsmen</i>		
Yes	-	-
No	102	100
Total	102	100
<i>Ticks as Malevolent Creatures</i>		
Yes	18	17.6
No	84	82.4
Total	102	100

Source: Field Survey, 2010.

Regression Results

The result of Table 6 shows that the coefficient of multiple determinations (R^2) is 0.561 which indicate that 56.1 percent of the variability of the dependent variable (Cattle sale) was jointly explained by the independent variables during the period of the study. The results also revealed that age of the cattle herdsman has a negative relationship with the cattle sale and is statistically significant at 1 percent. This implies that as the herdsman are getting older, the income realized from cattle sales is declining due to declining productivity. Therefore, the young herdsman would be more productive than the older ones. This also emphasized the importance/need to train the younger herdsman the indigenous methods of ticks control on cattle. The significance of age and the use of indigenous knowledge may be due to the fact that age is important when custodians of traditional knowledge are examined (Adekunle et al. 2002). Young men are usually responsible for defending the herds against raids, while elders are the decision makers (Agnew et al. 1983 or Hussein 1984). Marital status of the herdsman also has a negative relationship with the cattle sale and is significant statistically at 5 percent. The inference is that their women are not involved in moving their herds from one pasture to another searching for fodder and water, this is mainly done by men and young herdsman and they are not directly involved in the sale of cattle. This may not be unconnected with the fact that cattle's rearing is a male dominated occupation. Even where the women own a few numbers of herds of cattle, the culture does not permit the women to claim ownership in the presence of a stranger. This is viewed as disrespect for the husband (Adekunle et al. 2002), they are engaged in other enterprises such as milking the dairy cattle, selling cheese and meat. According to Philip and Micheal (1999) among the pastoral Fulani, women tend calves, milk cows, process milk, and prepare milk products for sale as well as for consumption. Religion of the herdsman is also negatively related to cattle sales and is statistically significant at 5 percent. The implication of the finding is that the religion of would be herdsman determined whether the herdsman would be absorbed into the cattle market. Mostly, all the herdsman are Muslim and they believe

that it is their traditional business, thus any attempt for other religion sects to enter/participate in the cattle market could result to conflict, which could disturb the peaceful co-existence enjoy presently in the cattle market. This in turn will affect the cattle sales negatively. Education level of the cattle herdsman has positive relationship with the cattle sale and is statistically significant at 10 percent. Therefore, the implication is that the result from the educational attainment of herdsman shows a high level of informal education among herdsman. This may affect the method of control of pests and diseases of cattle because the level of educational attainment is not high enough as to reorientate their views about culture and modernity as a result they tend to use more of indigenous strategies to control tick on cattle. Ethno-veterinary practices, although mainly transmitted through non-formal education, is practical oriented (Olayide et al. 1981. In addition, the proportion of loss in revenue, because of tick invasion is positively related to cattle sale and statistically significant at 1 percent. This implies that the more the tick invaded the cattle, the more herdsman spend to control the invasion, thus, reduced the income realized from cattle sale per year. Ticks, generally regarded as the ectoparasites that cause the greatest economic losses to livestock production in the world today, (Snelson 1975).

Predictors: (Constant), prop, los, rel, marital, control.co, expyrs, edu.lev, Age, stockngr.

Dependent Variable: Cattle Sale

Multiple R (Coefficient of multiple determination)	0.561
R square	0.315
Adjusted R Square	0.256
Standard Error	20509.226
Durbin-Watson	2.335

Gross Margin Analysis

The result of Table 7: the gross margin analysis, indicated that the herdsman had an average of #510, 050.98 gross margins per herdsman. This is an indication that the profit of the herdsman is high, positive and efficient market performance.

Budgetary techniques used to determine the profitability of cattle herdsman are as follows:
 $GM = TR - TVC$1

Table 6: Relationship between Socio-demographic characteristics of cattle herdsmen and cattle sale in the study area.

Model	Unstandardized coefficients B	Std. error	Standardized coefficients beta	tB	Sig Std. error
Constant	218238.059	34534.035		6.320	.000
Age	-689.158	233.770	-.284	-2.948	.004*1%
Marital	-5727.467	2647.571	-.235	-2.163	.033**5%
Rel	-39397.825	15453.663	-.231	-2.549	.012**5%
Expyrs	2542.604	4092.236	.057	.621	.536
Stockingr	2043.597	1720.235	.134	1.188	.238
control. Co	.105	.072	.132	1.459	.148
edu.lev	6787.384	3461.974	.181	1.961	.053***10%
prop.los	.307	.071	.404	4.327	.000*1%

Source: Field Survey, 2010.

NI= GM – TFC 2
 Where:

GM = Gross margin, TR = Total revenue, TVC = Total variable cost, NI = Net Income, TFC = Total fixed cost (Depreciated value of fixed asset).

Table 7: Gross margin analysis

Parameters	#
Total Revenue (Cow sales)	949,568.63
Variable Cost (VC)	
Feeding	100,294.12
Labour	62,058.82
Drug and Veterinary services	59,117.65
Fuel and Transportation	71,529.41
Cost of traditional control method	91,764.71
Electricity	47,352.94
Rent	5,000
Tax	2,400
TVC	439,517.65
Gross Margin (TR – TVC)	510,050.98

Source: Field Survey: 2010.

CONCLUSION

Current development and research have found that improved technologies are unaffordable by poor farmers; for instance, modern methods of treatment using acaricide, pour-on preparation, slow-release implants, and premunization are viable, though only on a small scale. Cost, scarcity, and difficulty of application that requires some literacy prevent the pastoral Fulani from using these methods.

Therefore, indigenous strategies should be encouraged the more among cattle herdsman in order to reduce cost of production, so that cattle and its products would be affordable for the consumers.

RECOMMENDATIONS

- Research should find ways of identifying, collecting and validating indigenous methods of pest control in cattle farming.

- Such information must be stored in a form that is retrievable for use and or reference by future generations.
- Farmers should show interest in promoting all aspects of indigenous knowledge application and utilization, especially for treating cattle using local herbs, proper cattle feeding, mechanism of preventing pests and diseases in order to improve, output reduce cost and increase profit margin.
- Promising indigenous methods of controlling cattle tick in the study areas could be encouraged by training, sensitization on the benefits through exchange visits, field day exhibitions, radio programmes, and production of books on indigenous technical knowledge and study tour to other parts of the country.

Finally, indigenous knowledge should be balance with modern technology,, in order to solve the problems of domestic food demand deficits, increasing production of meat to provide adequate protein in diets.

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