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Indigenous Foot and Mouth Disease Control Methods among Nomadic Cattle Fulanis in Adamawa State, Nigeria

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ABSTRACT:

This study analyzed the indigenous foot and mouth disease control methods among nomadic cattle Fulani herders in Adamawa State, Nigeria. Primary data were collected by the use of semi-structured questionnaire administered to randomly selected 363 respondents. Data collected were analyzed using percentages, frequency distribution and regression analysis. Result of the analysis of socio-economic characteristics of respondents showed that majority were above 40 years of age (87.9%), 94.5% were married and only 16.5% acquired formal education. On the average there were eight persons per household and about 80% of the respondents had more than 24 years of cattle herding experience. Twenty eight control methods were identified to be in practice among the respondents. Result of the regression analysis between socio-economic characteristics of the respondents and use of indigenous foot and mouth disease control methods showed that coefficient of age was positive and significant at 1% level, while household size and experience were positive and significant at 5% level. Deforestation and concealment of indigenous control methods by the custodians among others were found to be the constraints against the utilization of indigenous foot and mouth control methods. The study concluded that indigenous control methods were well established and practice among herders who are well experienced and knowledgeable. It is recommended that laws banning bush burning and indiscriminate tree felling be re- enforced in order to preserve indigenous herbs to avert possible extinction. There is a greater need for extension workers and services to be strengthened so as to incorporate the indigenous methods used by the herders.

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1. INTRODUCTION

Foot and mouth disease (FMD) is a highly contagious viral infectious disease of cattle, sheep, goats and pigs (Encarta, 2009). The importance of the disease in small stock such as sheep and goats is largely as carriers of the disease to cattle. It can also affect wild animals, especially buffalo, which act as significant, host and in which the disease is generally much milder than in cattle. The disease can be transmitted through saliva, ruptured vesicles and blisters on the tongue and feet of the infected animal or discharge from the nose and through coughs (Martinez-Salas, *et al*., 2008). Meat, milk and semen from infected animals can spread infection. The disease can also be spread by ticks and human beings through movement from infected premises to susceptible areas.

FMD is widely considered an important economic disease and the single biggest global threat to trade in livestock and livestock products. The 2001 epidemic of virulent strain of FMD in Europe led to the culling of millions of animals (Boyde, 2007). Another outbreak in United kingdom in 2007 and South Korea in 2011 also led to loss of billions of dollars' worth of livestock as a result of animal culling. For example, the 2011 outbreak of the disease in South Korea led to the culling of nearly 3.5m animals, costing over

US 2.64 billion dollars. But nomadic cattle raising Fulani people in Adamawa State do not kill their infected cattle. For them, the disease is so common among their herds and has become a part of everyday life. It occurs almost every time most especially during rainy season with minimal loss of life. Because the disease occurs infrequently in Europe, the farmers' response is quickly to eliminate infection by killing the infected animals and so avoid long term financial losses caused by public fears of tainted meat. The Fulani people, however, consider their cattle as more than simply financial assets but it also serve as index of social prestige (Ikhatua, 2000). A man and his herd are bound together in relationship defined by centuries of culture and survival in a harsh environment. Pastoralist people, their traditional economy are based on nomadic herding of cattle from water hole to water hole and from one pasture area to another. This is the crucial difference between the European approach to livestock and the Fulani approach.

The nomadic Fulanis rely on natural remedies (indigenous methods) that exist within their natural world order for both prophylaxes and cures of their cattle ailments. These remedies are developed within their community through observation and real life experiences over a period of time, communicated orally from one generation to the other with the ultimate aim of moulding their thought for the sole purpose of ensuring survival and progress. Adamawa State and indeed national animal protein supply were sustained through this considerable wealth of knowledge that the local people developed (Usman, 2010). The state is endowed with vast and readily available indigenous materials that have been used by cattle herdsmen. Therefore, ignoring these local knowledge systems by the development workers will constraint the cattle industry and result into waste of huge amount of time and resources.

1.1. Objectives of the Study

The main objective of this study was to analyze the indigenous methods of FMD control among nomadic cattle Fulani herders in Adamawa State, Nigeria. The specific objectives were to identify the socio-economic characteristics of the respondents; investigate the various indigenous control methods of FMD in the area; ascertain the relationships between socio-economic characteristics of the respondents and the use of indigenous control methods for FMD and identify the constraints to the use of indigenous control methods of FMD in study area.

2. METHODOLOGY

2.1 The Study Area

The study was conducted in Adamawa State, Nigeria. The state is located in North – eastern part of Nigeria. It lies between latitudes 7^0 and 11^0 N of the equator and longitudes 11^0 and 14^0 E of the Greenwich meridian (Adebayo and Tukur, 1999). It occupies a land area of about 42,159 km^2 and has an altitude of about 185.9 meter above sea level. The study area has a population of 3,168,101 persons (NPC, 2006) and estimated population as at 2014 based on the 2.9 percent yearly increment according to United Nations Fund for Population Activities (UNFPA) - Nigeria (2010) stands at 4,038,208 people. Adamawa state has an annual average rainfall of 759 mm and mean annual temperature of 34.6^0C.

The state is one of the principal livestock producing states in Nigeria. Livestock Census Figure of 1991 shows that the state has over 2.5 million cattle (Adamawa State Ministry of Agriculture, 1991). The estimated cattle population as at 2013 stands at 3,090,903 heads of Cattle, based on the one percent yearly increment. Over 90% of the total population of livestock in the state are owned and herded by the Fulani pastoralists, most of whom are nomadic or semi-settled (Fricke, 1993).

2.2 Sampling Technique

Seven out of the 21 Local Government Areas of Adamawa State were purposively selected based on the concentration of registered members of *Mi-yetti* Allah cattle breeders association in the areas. The list of the 199,346 registered members was obtained from the officials of the association within the Local Government Areas selected which was used as sampling frame. Based on the list of the association, respondents were randomly selected proportionate to the number of registered members from each of the seven local government areas using Taro Yamane's formula as adopted by Kalpana (2011). The formula is expressed as;

$n = N/1+N (e)^2$

Where; n = number of respondents; N= Population of the study and e = error

In all, 400 respondents were randomly selected from the population of 199,436. However, out of the 400 questionnaires administered, 363 (91.0%) questionnaires were retrieved and used for the study. 2.3

Analytical Techniques

Frequencies and percentages were used to analyze the socio-economic characteristics of the respondents; various indigenous FMD control methods; and constraints to use of indigenous FMD control methods by the respondents in study area.

Multiple regression analysis was employed to ascertain the relationship between socio-economic characteristics of the respondents and the utilization of indigenous FMD control methods. The model was explicitly stated as:

$Y= b_0+b_1X_1+b_2X_2+b_3X_3+b_4X_4+b_5X_5+b_6X_6+b_7X_7+b_8X_8+b_9X_9+U$

Where;

Y=Utilization of indigenous FMD control methods (proxy by the level of indigenous control methods used)

X_1= Farmer's Age (years)

X_2 = Educational level (proxy by number of years spent in school)

X_3= Household Size (Number)

X_4= Years of experience in herding

X_5 = Number of contact with extension agent per year

b_{1-5} = Regression coefficients

U = Stochastic error

3. RESULTS AND DISCUSSION

3.1 Socio-economic Characteristics of the Respondents

The socio-economic characteristics of the respondents are presented in Table 1. The result showed that none of the respondents is below 30 years of age. About 60% of the respondents were above 49 years. The result is in line with the findings of Mahmud (2011), who reported that none of the respondents was below 30 years of age in a study conducted on medicinal plants used in livestock ailment in Torro, Bauchi State, Nigeria.

The result in Table 1 also reveals that majority (94.5%) of the herdsmen were married, 1.4% widowed and 4.1% single. The high proportion of married respondents may be because marriage is a respected institution in the culture of the Fulani nomadic pastoralists and that is why they marry at tender age. According to Yisa (2013), marriage bestows social status on people, brings recognition and makes individuals to be considered as responsible.

Household size of the respondents reveals that 46.5% of the respondents have family size of between 6-10 persons while only 15.2% have between 11- 15 persons as members of their family. The result show that there was an average house hold size of 8, which is below African rural average house hold size of 10 (Timothy, 2012). This could be because most of the respondents' sons or daughters marry before the age of 30 years and become independent.

The study showed that only 16.5% of the respondents had formal education (out of which 8.5% had primary, 6.6% secondary and 1.4% attained tertiary education) while 83.5% of the respondents have no formal education (Table 1). From the result, it can be seen that there is high level of informal education among the herdsmen. This may not affect the utilization of the indigenous FMD control methods as most of educated herders preferred using modern methods of livestock treatment. Usman (2010) opined that western education brings enlightenment and exposure to different sources of information on modern veterinary medicine and also tend to transform herders' management practices to modern one.

Table 1: Demographic Characteristics of the Respondents (n = 363)

Socio-economic variable	Frequency	Percentage (%)
Age (years)		
30 – 39	44	12.1
40 – 49	103	28.4
50 – 59	124	34.2
> 59	92	25.3
Marital status		
Married	343	94.5
Single	15	4.1
Widowed	5	1.4
Household size		
1 – 5	139	38.3
6 – 10	169	46.5
11 – 15	55	15.2
Educational qualification		
No formal education	303	20.0
Primary	31	22.2
Secondary	24	10.3
Tertiary level	5	16.9
Herding experience (years)		
< 25	72	19.8
25 - 34	107	29.4
35 – 44	112	30.8
45 - 54	51	14.0
>54	22	6.0
Extension Contact		
Once a month	14	3.9
Once in 2 months	5	1.4
Once in 6 months	68	18.7
Once a year	103	28.4
Not at all	173	47.7

Source: Field Survey, 2014

About 31% have 35 - 44 years experience and 20% have more than 45 years herding experience. This result shows that respondents are highly experienced in cattle herding Experience brings more knowledge and specialization that increased herders' rationality in the use (acceptance) or rejection of a method or technology. According to Ogunbameru (2001), consistency and continuity in the use of technology by farmers is a reflection of the level of acceptance of that technology. Result of the extension visits to the respondents shows that about 48% of the respondents did not had any extension visit, while 18.7% had 2 visits in a year and only 3.9% had up to 12 visits in a year. About 4.0% that indicated a visit in every month are herdsmen that are close to Local Government headquarters and they had to personally call the extension workers to their herds.

3.2 Indigenous Control Methods of FMD by Respondents

Indigenous control methods of FMD practiced by the respondents were in Table 2. When a cow exhibits the symptoms of FMD; mucous dropping from mouth, fever, blisters on the teats and between the toes, they are isolated and treated with a paste made of *Lawsonia inermis* leaves. The leaves are grind to powder, mixed with ash and water. The paste is applied to the affected parts (Table 2). The disease can also be treated with cattle urine, boil with dried stem bark of *Adansonia digitata* tree and use to wash the affected parts. *Sorghum bicolar* roots when burnt

together with seeds of *Balanites aegyptiaca* to ash, then soaked in water and sieve, the sieved liquid is used to wash the affected parts. Oil extract from seeds of *Vitellaria paradoxa* mixed with honey is also applied to affected parts. The mixture is not a cure for the disease, but it helps to relieve pain and aid the recovery. After the treatment, the animal is quarantined for up to a month, then returned to the field.

When rarely, an infected animal is about to die, it is slaughtered and the meat is sold for human consumption because, unlike the European public, Fulani cattle herders understand that this brings no risk to consumers. Animals with FMD are deliberately selected by Fulani herders to markets. They slaughter the cow to sell the meat rather than kill a healthy animal

3.3. Relationship between Socio-economic Characteristics of the Respondents and the Use of Indigenous Control Methods

The socio-economic characteristics influencing the use of indigenous controls of FMD by the respondents were presented in Table 3. Linear function was selected as the lead equation based on the coefficient of determination (R^2), and the statistical significance of the estimated regression coefficients. The adjusted R^2 is 0.94, which means that 94% of the variation was explained by the various independent variables. The result in Table 3 shows that coefficient of age (X_1), were positive and statistically significant at 1% level. This implies that as the herder's age increases, the more the tendency of the respondent to adhere to the use of indigenous FMD control methods. This could be because older people may have tendency of being strict on the use of the methods. This assumption stems from the fact that older people may be less adventurous and less favourably disposed towards trying new things, as opposed to younger ones (De-Bono, 1993).

The coefficients of household size (X_3) and experience (X_4) were positively and significantly related to the use of indigenous FMD control methods at 5% level. The interpretation of this result is that, the higher the number of members of household of a respondent, the more the tendency of them using indigenous FMD control methods. This may be because members of the household may have the opportunities of getting new ideas from different sources as a result of interacting with different people. The positive and significant relationship of years of experience implies that, as the herders experience increases, so also their knowledge on control methods and their ability to make use of the methods. Experience brings more familiarity and perfection with the practice, which could encourage their adherence to these methods

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Educational level (X_2) and Extension visits (X_5) were not statistically significant with use of indigenous control methods. The no- significance of educational level could be because, formal education is a challenge to the indigenous control methods as most of those using the methods did not attain western education or had low level of education. Oyedokun and Oladele (1999) asserted that western education improves awareness by enabling indigenous people to comprehend the procedures in formulation and use of modern veterinary practices there by making them not practicing traditional methods.

Name of herbs	**Part used**	**Method of preparation**	**Method of administration**
Sorghum bicolar	Roots	Burnt together with Seeds of *Balanites aegyptiaca* to ash, then soak in water and sieve, used the sieved liquid to wash the affected parts	Topical
Acacia nilotica	Seed	Boil together with common table salt wash the affected parts	Topical
Acacia nitolica	Seed	Soak in cow urine for 24 hours, wash the affected parts	Topical
Habiscus sabdarifa	Leaves	Pound and soak in water was affected parts	Topical
Zea mays + Pennisetum glaucum	Grain	Grind with grains of *Pennisetum glaucumu* (Bulrush millet) to flour soak in water, allow to ferment, then give the brew to drink. While hooves are wash with potash morning & evening	Oral and Topical
Allium sativa + Allium cepa	Bulb	Grind and mix with poultry droppings wash affected parts	Topical
Lawsonia inermis	Leaves	Grind to powder mix with ash & water, then rob	Topical as paste
Leptadenia hastata (formally L. lancifolia)	Leaves	Boil allow to cool, drink and wash parts	Oral and Topical
Khaya senegalensis + Ziziphus spina-christi	Leaves	Boil allow to cool, drink and wash parts	Oral and Topical
Ziziphus Mauritania	Leaves	Boil allow to cool, drink and wash parts	Oral and Topical
Balamites aegyptiaca	Fruits	Boil allow to cool	Oral
Adansonia digitata	Stem bark	Boil and wash affected parts	Topical
Mimosa pigra	Stem bark	Boil and wash affected parts	Topical
Khaya senegalensis + Ziziphus Mauritania	Stem bark	Boil and allow to cool, wash parts & drink	Oral and Topical
Piliostigma reticulatum	Leaves	Boil and wash affected parts	Topical
Jetropha curcas	Whole plant	Boil and wash affected parts	Topical
Khaya senegalensis	Stem bark	Grind to powder put to affected parts	Topical
Sesamum indicum	Plant	Burnt to ash mix with water apply to parts	Topical
Citrus aurantifola	Leaves	Dry, grind to powder wash parts	Topical
Prosopis Africana	Leaves	Boil to drink and wash parts	Oral and Topical
Parkia biglobosa	Stem and leaves	Boil, then wash affected parts	Topical
Vitellaria paradoxa	Seeds	Oil extract mix with honey apply to parts	Topical
-	Horney	Honey mix with monkey droppings apply to parts	Topical
-	Chicken	Stew made from chicken apply to parts	Topical
-	Cow	Cow urine use to wash affected parts	Topical
-	Potash	Powder apply to affected parts	Topical
-	Chicken eggs	Left over egg (un-hatch egg), mix with feeds	Oral
-	-	Isolate affected animal, clean affected parts and keep in dry area	-

Table 2: Indigenous FMD Control Method
Source: Field Survey, 2014

Table 3: Result of the Regression Analysis

Variable	Coefficient	Standard error	T-value
Age ($X_{1)}$	1.194	0.121	9.863***
Education ($X_{2)}$	0.064	0.070	0.913^{NS}
Household Size (X_3)	0.270	0.115	2.346**
Experience (X_4)	0.663	0.325	2.040**
Extension Visits (X_5)	0.081	0.145	0.560^{NS}
Constant	0.836		
R^2	0.96		
Adjusted R^2	0.94		
F-ratio	4.19		

Source: Computed from Field Survey, 2014

*** = Significant at 1%; ** = Significant =at 5%; NS= Not significant

Table 4: Constraints to Utilization of Traditional FMD Control Methods

Methods	*Frequency	Percentage
Deforestation	93	98.9
Lack of Government recognition		
Western education	90	95.7
	72	76.6
Concealment of knowledge	94	100

Source: Field Survey, 2014

***Multiple responses**

The non-statistical significance of extension visit could be due to the low number of extension agents compare to number of farmers (1:17,500). The problem is compounded by small number of existing extension agents who dedicate most of their time to crop farmers than cattle herders. According to Bamaiyi (2009), many herders come across extension workers only when there is a major epidemic that the government is trying to contain with or the government is launching a vaccination campaign.

3.4 Constraints to Utilization of Indigenous FMD Control Methods by Respondents

Problems that inhibit utilization of indigenous FMD control methods by the respondents are presented in Table 4. About 99% of the respondents complained of deforestation. This could be as a result of population increase which results to clearing of forest for housing, farms and other human activities. Martin *et al.* (1981) revealed that natural habitats of many valuable plants were been lost to other land uses or been degraded as a result of population pressure. Lack of government recognition was reported by 95.7% of the respondents. Unlike modern veterinary medicine where there are research centers, veterinary clinics and other logistics support, indigenous knowledge people have no support, assistance or recognition from government. All (100%), the respondents complained of concealment of indigenous knowledge by the indigenous people. Mostly traditional people share the knowledge only to their trusted children.

4. CONCLUSION AND RECOMMENDATION

Based on empirical evidence of the study, the following conclusions were drawn: Indigenous FMD control methods were found to be well practiced among adult people that are well experienced and knowledgeable on the control methods. It is therefore rational and easy for the herdsmen to practice indigenous FMD control methods on their herds. These traditional methods face the risk of

disappearing due to increasing livelihood changes, environmental degradation and concealing of the knowledge by the custodians. The knowledge system can be used as a foundation for the development of cattle production and also serve as a source of pride to the herdsmen.

There is the need for the re-enforcement of laws by the government on banning bush burning and indiscriminate tree felling in order to preserve indigenous herbs. There is also need for sensitization and mobilization of relevant stakeholders by Miyetti Allah Cattle Breeders Association to establish Farmer - Field Schools to bring herders from different locations to understudy a specific problem using their knowledge thereby documenting the practices so as to avoid extinction.

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