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Effect of Nomadic Activities on the Productivity of Arable Crop Farmers in Oyo State, Nigeria

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ABSTRACT

The paper examined the effect of nomadic activities on the productivity of arable crop farmers in Oyo State, Nigeria. A total of 175 respondents were interviewed using structured questionnaire and interview schedule to collect the data used. Analytical tools used were descriptive statistics, probit model, and ordinary least square multiple regression. Descriptive statistics result showed the highest value for farm size (2.1-5.0) hectares (65.1%), Age (21-60) as 73.2%, married (77.1%), educated farmers (98.1%) and primary occupation (59.4%) among others. Farm size, extension contacts, work-hour, kraal proximity, and nearness to nomadic route were probit variables which significantly influenced nomadic invasion among farmers. Multiple regression result for output determinants showed that farm size, quantity of planting materials, number of extension contacts positively affected the output of both farmers with invasion experience and otherwise while the output of non-nomadic experience farmers were further positively affected by work-hours, education and labour while pooled data showed that farm output of all farmers were positively influenced by farm size, planting materials, and extension contacts while about 97% of respondents responded that low yield and high cost remained the prominent resultant effect of cattle invasion among farmers in the study area. Hypothesis tested showed that the relationship between farm output and number of monthly nomadic invasion was significant at 1% level suggesting that quantity of farm output is inversely related to number of cattle invasion of farms. It was therefore recommended that government should provide cattle ranch for farmers, educate the young and old Fulani herdsmen on the need for peaceful co-existence of Nigerians; and, law on the grazing reserve should be amended and improved upon among others. It was nevertheless concluded that farm invasion evidently led to a colossal loss of lives and crops.

Key words: Nomadic invasion, farmers, herdsmen, probit, multiple regression

INTRODUCTION

Conflict between Fulani herdsmen and farmers has become an age-long issue which must be nipped in the bud, if there is going to be a reduction in the prevalence of productivity impeding factors, which had evidently resulted in colossal loss of lives and properties between the two parties. Msuya (2013) stated explicitly some incidences of land use conflict between farmers and pastoralists in some selected sub-Saharan African countries. In Mali, during the clashes in question, 32 deaths recorded, houses and farms and other valuables were destroyed (Blench, 2010). Also recorded was the case of Bukina Faso in 2012 where about 25 of the Dogan farmers were dead and was further recorded that every year; 600 farmer-herder conflicts resulted in death of humans and injury or death of animals. In Ethiopia, farmer pastoralist violent crisis occurred between 1994 and 2002 which claimed 116 deaths and loss of 616 animals while in the Southwest area of Malo town alone, from 1976 to 1999, the erupted attack between the two parties was recorded to have claimed the lives of 1000 farmers; settlements were not left untouched as they were heavily destroyed and cattle were completely looted, while at Tana river in Kenya in 2012, farmers and pastoralists clash resulted in the death of 48 people and 60 cattle to mention but a few.

In Nigeria, the heat generated from these activities has culminated in economic disadvantage to the middle belters and southerners from financial, social and economic point of view. Odjugo (2005) and Majekodunmi *et al.* (2014) narrated explicitly in their study on environment and pastoral-nomadism that up-northern and down-southern Nigeria, a cow goes for N35,000 (aboutUS$233) in Yobe and for about N100,000(about US$667) in Southern cities like Port Harcourt resulting in a margin of N65,000 which is equivalent of marginal of US$434. Also, it was discovered that the age-long brawl has markedly created a social gap between the Fulani and other cattle rearing tribes

in Nigeria and the sub-Sahara Africa in general. In Nigeria, between 2005 and 2010, about 280 death cases were recorded; 7,000 hectares of farms were destroyed, 1300 cattle were lost and 7,000 communities were deserted. In Shaki,Oke-Ogun area of Oyo State and Kwara State, the clashes between nomadic fulanis and arable crop farmers decimated a lot of lives which resulted in the vacation of some settlements, loss of cattle and destruction of arable crop farms which were essentially the source of income for the victims.

Moreover, Okeke (2014) opined that damages frequently done during nomadic activities range from theft of cattle, overgrazing and unsustainable land for farming, loss of fertile lands, destruction of crops, loss of yields, hardening of soils resulting in increased labour in pre-farming activities, destruction of reservoir and source of drinkable water, fights, rape, burning of rangelands, destruction of irrigational facilities to infrastructural damages. The persistence and prevalence of the ugly incidents of the party conflict was reported subsequently by Ingawa *et al.* (1999) as decline in internal discipline and social cohesion, as the adherence to the traditional rules regarding grazing periods and the authority of the traditional rulers is breaking down which he concluded as being exacerbated by increased rent seeking of the formal and traditional authorities in managing resource access. He expressed further that the traditional trek routes, which become favourite cropping sites because of their better soil fertility resulting from the concentration of animal manure from the trekking herds in these areas became attracted to farmers for cultivation. Within the fadama areas, this is worsened by the fragmented nature of the crop plots, which makes prevention of animals straying in the crop plots difficult. Inadequacy of grazing resources, as increasing crop cultivation (and increasing commercialization ofthe crop-residues) and poor management of the existing grazing reserves have resulted in a significant reduction in available livestock feed resources particularly in the Northern States. Moreover the high value crops introduced by NFDP (tomatoes and onions) produce almost no crop-residues for livestock feeding. Finally, the regulation that twenty percent of the Fadama would need to be set aside for grazing has not been adhered to.

This area of study has attracted the attention of researchers in recent time as unprcented loss of lives and property had been incessantly recorded during farmer-herdsmen clashes. Empirical works had been done byscholars in an attempt to provide a policy framework to be adopted by government towards nipping the problem of nomadism in the bud. Among them wereMsuya(2013) work on the farming systems and crop-livestock land use and concensusin which he concluded that there was no way that nomadic activities could be aptly restricted from the entire vegetation in Tanzania. Moreover,Ifatimehin and Tenuche(2009) in their work on Nigeria's changing environment and pastoral nomadism noted clearly that the ways a changing environment has affected pastoral nomadism and how pains and gains from the human activities are being redistributed across spaces in Nigeria discoveredthat, there are conflicts over incompatible land uses as well as those over cultural domination and therefore submitted that, a geographical shift in occurrence of these conflicts has taken place in recent times in a form of southern oscillation which confirmed a case of pastoral intensification and a comprehensive environmental change in Nigeria. Consequent to this is also a study on, conflict between pastoralists and cultivators in Nigeria (Abbas, 2010) who discovered that pastoral-farmer conflict still remains unresolved and all efforts to solve the problem remained botched, up till the present time.

Arising from the foregone, studies highlighted in the foregone are bereft of addressing issues from the points of farm productivity and welfare of arable farmers. Focus on examining the effect of nomadic activities on the productivity of arable crop farmers would be of good advantage in examining the aftermath of nomadic activities on arable crop farms financially, socially and economically and moreso, it would be a viable tool in policy making towards food security among farm households.The main objective of the paper is to examine the effect of nomadic activities on the productivity of arable crop farmers in Oyo State, Nigeria.The specific objectives are to:describe the socioeconomic characteristics of respondents;identify the determinants of nomadic intrusion in arable farmer's farms;examine output determinants among farmers; evaluate the effect of cattle invasion on farmers in the study area. The study hypothesized that there is no significant relationship between the value of farm output and the number of times of nomadic invasions experienced by arable crop farmers in the planting season.

METHODOLOGY

The study area is Oyo State of Nigeria. The headquarters is Ibadan. It is endowed with three distinct vegetation belts: rainforest, guinea savanna and derived savanna. It is located on longitudes 2^0 32'W and 4^0 08'E, and latitudes 7^0 34'N and 8^0 35'N. It is bounded in the North by Kwara state, in the South by Ogun state, and in the East and West by Osun and Ogun/Benin republic respectively. The State has a total land area of 27,249sq km and population of 5,591,589 with 2,809,840 males and 2,781,749 females (NPC,2006). It has 33 local government areas which according to the structure of Agricultural Development Project's structure of operation is divided into four zones: Ibadan/Ibarapa zone(11 LGAs), Oyo zone(4 LGAs), Ogbomoso zone(5 LGAs), and Shakizone(13 LGAs). Diverse tribes dwell in the area with Yoruba as the host while others are: Hausa, Igbo, Fulani, Egede, and Bororo among others(Oyo State

Diary,2012). Moreso, farming is prevalent in the area, some practise it on full-time basis while some on part-time. The mean annual temperature and rainfall are ±26.5^{0}C and 1950mm. The edaphic feature of the soil shows that it is moderately weathered thus retain nutrient even at the upper ground level, hence supports and sustains the cultivation of surface feeder crops and deep-rooted crops such as: maize, sorghum, cassava, yam, melon, cowpea, watermelon and the like.

Primary data were used for this study. Data were collected using structured, pre-tested and validated questionnaire alongside recording devices such as tape recorder, cell-phone e.t.c..

Multistage sampling procedure was used for this study. The first stage was the purposive selection of Oyo State from the South-West Nigeria. This non-probability selection was made based on the fact that, it is one of the most nomadic conflict ravaged states in Nigeria. The second stage was also the purposive selection of four (4) local government areas: Irepo, Surulere, Egbeda and Iwajowa from a total of thirty-three (33) in the state. The rationale behind the choice is the incessant influx of nomadic Fulanis with their herds of cattle, sheep, and goats in the area alongside unabated harrowing experience of farm destruction and loss of lives which had become a recurring decimal. The third stage was the random selection of three(3) vulnerable rural villages from each of the four(4) selected LGAs and lastly, the random selection of fifteen(15) farmers from each of the twelve (12) villages. This brought overall number of sampled respondents to one hundred and eighty(180).

Both descriptive and inferential analytical tools were used in analysing data collected for this study. Descriptive statistics employed ranged from mean, mode, and median, standard deviation to minimum and maximum values. Inferential tools such as probit model and ordinary least square regression. The two tools were used as they were found to be amenable to flexibly analysing cause and effect relationship.

Probit Model

Regression model (normits) for individual or ungroup data was used and expressed thus:

$$Y_i = R_i \beta + \varepsilon_i \quad (1)$$

$$Y_i = (1 \text{ if } Y_i^* \geq 0; 0 \text{ if } Y_i < 0) \quad (2)$$

Y_i^* = Observed dichotomous dependent variable which takes value 1 when arable crop farmer experiences farm nomadic visit and 0, if otherwise.

Y_i = Underlying latent variable that indexes farm nomadic visit.

R_i = Row vectors of the independent variable that affects possibility of farmer experiencing farm nomadic visit.

β = Vector of parameter to be estimated.

ε_i = Error term which assumed to have standard normal distribution.

Drawing from Gujarati (2004), the following explicit function was used for estimation:

$$Y = \beta_0 + \beta_1 R_1 + \beta_2 R_2 + \beta_3 R_3 + ... + \beta_n R_n + \varepsilon_i \quad (3)$$

Where:

Y is a binary response variable defined as:

Y=1; if a farmer experienced farm nomadic invasion

Y=0; if a farmer did not experience nomadic invasion.

X_1 = Farm size(in hectares)

X_2 =Farmers' age(in years)

X_3 = Gender (Male=1; Female=0)

X_4 =Household size (No.)

X_5 =Farming experience (in years)

X_6 = Marital status (Married=1; if otherwise=0)

X_7 = Education (in years)

X_8 =Primary occupation (Farming=1; if otherwise=0)

X_9 =Extension contacts(No.)

X_{10} = Farm fencing (Yes=1; if otherwise=0)

X_{11} =Work hours (No.)

X_{12} = Land terrain (Flat=1; if otherwise=0)

X_{13} = Use of guards (Yes=1; if otherwise=0)

X_{14} = Kraal proximity (Far= 1; if otherwise=0)

X_{15} = Nomadic route location (Near=1; if otherwise=0)

X_{16} = Farm distance (in km)

X_{17} = Farm practice (Mono-cropping=1; if otherwise=0)

Ordinary Least Square (OLS) Multiple Regression Model

The tool was also employed to unveil the cause and effect relationship between modelled dependent and independent variables. The use of the tool is flexible and distinctly expresses the effect of individual dependent variable on the dependent variable. The model can be explicitly expressed thus:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + ... + \beta_n X_n + \varepsilon_i \quad (4)$$

Y = Dependent variable

B_s= Vector of parameters

X_s=Independent variables

ε_i= Disturbance term

Where:

Y = Farm output(in tonnes)

X_1 = Farm size (in hectares)

X_2 = Quantity of planting materials used (in kg)

X_3 = Quantity of fertilizer (in kg)

X_4 = Quantity of agrochemical used (in litres)
X_5 = Amount of credit taken(in Naira)
X_6 = Extension contacts(No.)
ε_i = Disturbance term

Four functional forms (linear, exponential, double log and semilog) were fitted to the data and the lead equation was selected based on the following criteria: Magnitude of co-efficient of multiple determination (R^2) and adjusted(R^2);Level of significance of co-efficients; the relationship of emerging signs with *apriori* expectation among others.

RESULTS AND DISCUSSION

Socioeconomic Characteristic of Respondents

Socioeconomic characteristics of respondents in the study area are presented in Table 1.

Table 1: Socioeconomic Characteristics of Rural Farmers

Variable	Frequency	Percentage
Farm size(in Ha)		
≤2.0	36	20.6
2.1-5.0	114	65.1
>5.0	25	14.3
		Mean=3.2 hectares
Age(in years)		
≤20	17	9.7
21-40	61	34.9
41-60	67	38.3
>60	30	17.1
		Mean= 49 years
Gender		
Male	114	65.1
Female	61	34.9
Household Size		
≤6	64	36.6
7-10	41	23.4
>10	70	40
		Mean= 7
Farming Experience(in years)		
≤10	36	20.6
11-20	56	32
21-30	53	30.3
>30	30	17.1
		Mean= 21.3 years
Marital Status		
Single	5	1.1
Married	135	77.1
Separated	19	10.8
Widowed	16	9.1
Educational Level		
No formal Education	2	1.1
Attempted Primary	41	23.4
Primary	28	16
Attempted Secondary	31	17.7
Secondary	50	28.6
Tertiary	24	13.7
Primary Occupation		
Farming	104	59.4
Artisan	23	13.1
Trading	41	22.4
Civil Service	3	1.7
Politics	4	2.3
Secondary Occupation		
Farming	63	36.6
Atisan	37	21.1
Trading	57	32.6
Civil Service	14	8
Politics	3	1.7
Cooperative Membership		
Member	101	57.7
Non-member	74	42.3
Amount Credit(in Naira)		
≤10,000	10	5.7
10,001-20,000	83	47.4
20,001-30,000	51	29.1
>30,000	31	17.7
		Mean= N37,868.57
Monthly Income(in Naira)		
≤10,000	6	3.4
10,001-20,000	39	22.3
20,001-30,000	42	24
>30,000	88	50.3
		Mean= N22,523.43
Total	**175**	**100**

Source: Field Survey, 2016

Majority (65.1%) of the arable farmers have farm size of between 2.1 and 4.9 hectares which Adubi and Daramola (1996) classified as medium scale while the mean farm size was 3.2 hectare indicating that most farmers in the study area were medium scale. Age of farmers showed that the highest (38.3%) of was recorded for the age range of 41-60 years while the closest, 34.9% was recorded for 21-40 year with the mean age of 49 years. It could be inferred from this that majority of farmers in the study area are still young and agile. Gender of respondents showed the majority (65.1%) are male farmers which suggests that the tedious farm work could be effectively carried out by this gender category. Household size of respondents revealed that the highest (40.0%) was recorded for the range (>10) while this is closely followed by the range (7-10). Invariably, the majority (76.6%) of respondents has more than 7 persons in the household. It could be deduced from this result that,

many farmers in the study area have large household size as compensatory effort to assuage farm labour need in the face of current rural labour paucity due to massive rural-urban drift.

Years of farming experience of respondents showed that the majority (92.3%) clusters within the range of more than 30 years with an average of about 21 years of experience. This result suggests that, most of the farmers have a long year record of being in the farming practice which invariably ensures efficient performance technically and allocatively. Marital relationship is highly cherished in the rural as this informs 77.1% of farmers found to have maritally settled which implies that, married people enjoy cross-fertilization of productive ideas and also helps in procreation for farm labour advantage.

Educational level of respondents showed that farmers with secondary education were most with 28.6% while this was closely trailed by primary education with 23.4% while on the whole, 98.9% of the respondents were found to be literate. It could be concluded from this result that the majority of farmers were educated. This enhances an ample advantage in the area of ease of self-accessing information from both the print and electronic media and quick acceptance of new technology by the respondents. Primary occupation revealed that the majority (59.4%) were farmers while others in the category were 36.6%. This result shows that farming is the primary occupation of the rural people and their source of income while some still engaged in other income generating activities on or off-season.

Cooperative membership revealed that 57% of the respondents are members. This reflects the level of unity, cooperation and the utmost desire of farmers to raise investment capital in their farm business as credit-sourcing formally seems to be uncertain or in some cases attracts high interest rate which reduces the profit margin realized by the respondents. Result on credit acquisition showed that most (47.4%) farmers amount of credit borrowed fell within N10,001-20,000. This implies that most of the farmers still access insufficient loan which may not be enough to purchase basic farm input not to talk of off-setting labour cost which claims 70% of total production cost. Monthly income of respondents showed that 50.3% realize more than N30,000($75)/month and $2.05/day which is considered insignificant and extremely meagre.

Determinants of Nomadic Invasion Experienced by Rural Farmers

Probit estimate for the determinants of nomadic attack among arable farmers is presented in Table 2. Of all the variables modelled, farm size, gender, household size, marital status, years of education, primary education, extension contacts, farm fencing, work hour, use of guards, kraal proximity, nomadic proximity and distance from home were found to possess signs of interest and were found to be significant at the three conventional levels of 1%, 5% and 10% respectively.

Farm size was found to be positively significant at 1% level. A percentage increase in farm size leads to 27.29 percent increase in probability of nomadic attack experienced by arable farmers. This result suggests that large farms that spread across nomadic route or closer to it makes it more vulnerable to nomadic attack.

Gender of farmer has a negative influence on nomadic attack and found to be strongly significant at 1% level. The probability of farm being attacked by nomadic Fulani was found to be high. It could be inferred from this result that, male farmers are less vulnerable to cattle attack than their female counterparts as, women are rarely present on the farm due to unavoidable and overwhelming home chores. Household size was found to be negatively significant at 5% level. A percentage increase in the household size of respondents leads to 6.55% decrease in the probability of nomadic attack on the arable farmers' farm. It could be inferred from this result that, with more number of household members, there is a probability of frequent presence of close watch on the farm especially during the day when active nomadic activities thrive. Marital status of respondents was negatively signed and found to be significant at 5%. This result infers that, marital union among respondents increases procreation which enhances a rise in number of farmers' households. The numerical attribute of household promotes more farm labour which makes constant visits to farm more regular and therefore avert access of nomadic Fulani to farm, and reduce the probability of farm invasion by herdsmen.

Years of education of respondents was positively signed and found to be significant at 10%. A percentage increase in the years of education of farmers leads to 3.79% percentage increase in probability of nomadic attack. It could be inferred from this result that, farmers with more years of education have many other income generating outlets which in many cases prevent constant oversight and supervision of their farms, this creates a loophole for nomadic cattle attack.

Result of the primary occupation of respondents was negatively significant at 5% level. Farming as an occupation was found to decrease the probability of the incident of nomadic attack on farmers' farm. This result suggests that, farming as an occupation necessitates the presence of farmers. Number of extension contact is negatively significant at 1%. A percentage increase in the number of extension contact leads on the average to 22.73% decrease in probability of the number of nomadic attack among arable farmers. It could be inferred from this result that, extension advice to farmers under investigation goes a long way in the reduction in the probability of cattle attack. This may be due to the advice always given to farmers on

Table 2: Probit Result for the Determinants of Cattle Invasion on Rural Farmers' Farm

Variable	Coefficient	Std. Error	Prob. Value
Constant	-0.7397**	0.253	0.003
Farm size(in Ha)	0.2729***	0.0731	0
Farmer's age(in years)	-0.0062	0.0061	0.311
Gender(m=1; f=0)	-0.4678***	0.1664	0.007
Household size	-0.0655**	0.0238	0.02
Farming experience(in years)	0.0002	0.0077	0.976
Marital status(marr=1; others=0)	-0.4965**	0.2347	0.034
Years of education	0.0379*	0.0224	0.092
Prim. Occup(farming=1; other=0)	-0.4661**	0.1967	0.018
Extension contact(No.)	-0.2273***	0.0764	0.003
Farm Fencing(Yes=1;No=2)	-3.2995***	0.3273	0
Work hour(No.)	-0.1711***	0.0435	0
Land terrain(Flat=1; otherwise=0)	0.1592	0.2037	0.435
Use of guards(Yes=1;otherwise=0)	-1.8403***	0.3201	0
Kraal proximity(Far=1; Near=0)	-0.1685***	0.0481	0
Nomadic route proximity(Far=1;Near=0)	-0.5655***	0.0673	0
Distance from home(in km)	0.3798***	0.0266	0.003
Type of farm practice	0.1307	0.1124	0.245
Number of observations =175			
Log likelihood =-112.009			
LR chi2(1) =140.53			
Prob.>Chi2 = 0.0001			
Pseudo R2 =0.0611			

Source: Field Survey, 2016****, **, and * denote level of significance at 1%,5% and 10% respectively*.

Table 3: Determinants of Farm Output of Arable Crop Farmers

Variable	Non Invaded Farm		Invaded Farm		Pooled Estimate	
	Co-eff.	Std Error	Co-eff.	Std Error	Co-eff.	Std Error
Constant	-0.4687	0.226	0.7839	0.478	-0.5756***	0.387
Farm size	0.0653*	0.0386	0.1587*	0.0835	0.1476*	0.0778
Planting mat.(in kg)	0.0259**	0.0117	0.0584***	0.0183	0.3997	0.1082
Fertilizer(in kg)	0.0007	0.0005	-0.0005	0.0009	0.1244	0.0813
Agrochem.(in litres)	0.0081	0.0149	-0.0053	0.0417	-0.0535	0.0857
Ext. contact(No.)	0.0546***	0.0203	0.1198**	0.0509	0.2396***	0.0659
Daily workhours(No.)	0.0473***	0.0175	0.057	0.0514	0.2041***	0.0701
Education(in years)	-0.0397***	0.0122	-0.0193	0.0201	-0.1031*	0.558
Labour(in mandays)	0.0396*	0.0209	-0.0549	0.0515	0.0399	0.0915
No. of observations	78		97		175	
R^2	0.6429		0.2269		0.4081	
Adj R^2	0.6013		0.1557		0.3796	
F-value	15.51***		3.21***		14.31***	

Source: Field Survey, 2016****, **, and * are significant levels at 1%, 5% and 10% levels respectively*

the way out in averting such ill-fated attack.

Farm fencing was found to be negatively signed and significant 1%. A percentage increase in the number of farms fenced leads on the average to 329.99 percentage decrease in the number of nomadic attack. It could be inferred from this result that fenced farms are normally shielded from nomadic onslaught as the cattle even when made attempt are restricted from carrying out their destructive attempt.

The number of work-hours spent on the farm by respondents was negatively signed and found to be positive at 1% level. A percentage increase in the number of work-hours spent by farmers on the farm leads on the average to 17.11% decrease in the probability of the number of nomadic attack. This suggests that the more the numbers of hours spent by a farmer on the farm per day, the more the nomadic Fulani are scared away from the vicinity of the farm.

Distance of farm from farmers' homes was also found to possess sign of interest and very significant at 1% level. A unit increase in the distance of rural farmers to the farm leads on the average to 37.98% increase in the number of cattle attack. It could be inferred from this result that a farmer with farms that are far away from home hardly go to farm on daily basis

The log likelihood and likelihood value of -112.009 and 140.53 showed that the chosen model for the analysis is fit and reliable.

Ordinary Least Square (OLS) Multiple Regression Result for Farm Output Between Non-nomadic Invasion and Nomadic Invasion

The result on the determinants of farm output of the farmers that experienced nomadic attack, those who are otherwise and the pooled (combined) regression estimate is presented in Table 3. The exponential regression result for the farmers without nomadic invasion showed that farm size, planting materials, extension contact, daily work-hours and labour-use were found to be significant and positively signed while only the year of education was found to be negatively significant. A unit increase in the farm size leads to 0.0653 unit increase in farm output. It could be inferred from this result that rural farmers increased farm output through increasing farm size instead of new technology; reason for this may be due to availability of more cultivable lands in the rural. Planting materials was also found to increase farm output among arable farmers. A unit increase in the quantity of planting materials leads on the average to 0.0259 unit increase in the output quantity of farmers. Number of extension contacts was also found to increase the quantity of output of farmers as, a unit increase in the number of extension visits leads on the average to 0.0546 increase in the farm output among farmers. Number of working hours spent on the farm by farmers was found to increase the farm output of respondents. A unit increase in the number of hours spent on the farm by farmer leads on the average to 0.0473 unit increase in the quantity of farm output produced by farmers. Number of years of education was found to increase the quantity of output produced. A unit increase in the number of years of education leads on the average to 0.0397 unit decrease in farm output produced. Number of labour used was found to increase the quantity of farm output. A unit increase in number of labour used on the average leads to 0.0396 unit increase in the quantity of output produced by farmers. About 64 percent of the dependent variable was explained by the modelled explanatory variables while F-value (15.51) was found to be significant at 1%, this suggests that the model used was fit and appropriate.

Multiple regression result for the farmers with nomadic invasion experience was based on linear equation functional form. Of all the dependent variables included in the model, farm size, planting, and number of extension contacts were found to be positively significant at various levels. Farm size was found to increase the quantity of farm output produced among farmers. A unit increase in farm size cultivated by farmers will on the average leads to 0.1587 unit increase in the quantity of farm output produced. Planting materials was also found to increase farm output among farmers in the study area. A unit increase in the quantity of planting materials used by farmers leads on the average to 0.0584 unit increase in the farm output. Number of extension contacts received during the planting season was found to increase the farm output among farmers. A unit increase in the number of extension contacts leads on the average to 0.1198 unit increase in the quantity of farm output produced by farmers under nomadic invasion experience. The coefficient of determination showed that, about 23 percent of the dependent variable was explained by the modelled independent variables. The F-value (3.21) was found to be significant at 1 percent level thus suggesting that the model was fit and appropriate for the analysis.

The pooled regression result showed linear function as the lead equation. The coefficient of determination showed that about 41 percent of dependent variable was explained by the modelled independent variables. The F-value, 14.31 was significant at 1 percent suggesting that the model used was fit and appropriate for the analysis. Farm size, number of extension contacts and work-hours were found to be significant and positively signed while education was found to be negatively significant. Farm size was found to increase the arable farm output significantly. A unit increase in the farm size of respondents leads on the average to about 0.1476 increase in farm output. Number of extension contacts was found to increase the farm output of farmers in the study area. A unit increase in the seasonal number of extension contacts leads on the average to 0.2396 unit increase in farm output. Number of work-hour spent by farmers was found to increase the quantity of farm output produced. A unit increase in the number of work-hours spent on the farm by farmers leads on the average to 0.2041 percent increase in the quantity of farm output produced. Number of years of education was found to reduce the farm output of rural farmers. A unit increase in the number of years of education of respondents leads to 0.1031 unit decrease in the quantity of farm output

produced. This result suggests that, more educated farmers engage in other income generating activities which lead to shared attention among ventures; these put regular farm visits and care at a great disadvantage.

Effect of Nomadic Invasion on Rural Farms

Effect of nomadic invasion on the arable farms is presented in Table 4. Of all the effects highlighted and responded to by farmers, the most was yield reduction/high cost of loss with about 97%. By this, consumption of some vegetative parts of the crops which are photosynthetic may lead to stunted growth and in turn, yield reduction as the plant will not be able to produce the required proportion of the food needed. Soil compaction (94.9%) was also obvious among the prominent consequences of invasion by cattle. The sum weight of trafficking animals on the farmland compacts it with the attendant effect of pores and air reduction which evidently reduce the penetration of plant roots, water percolation reduction and aeration reduction among others. Peace loss (93.7%) and loss of lives (92%) were also of deleterious effect among farmers who are victims of nomadic invasions. Many reported cases of invasions and death of farmers had been done in the affected areas and this has resulted in the partial or total absence of farmers on their various farms which is counter-productive in both the short and long-run. Loss of crop (89.7%) and loss of property (77.7%) were also pointed out to have affected arable farmers in the study area. Both the farm and non-farm property were lost through nomadic invasions which had in no small measure affected their seasonal income.

Table 4: Effect of Nomadic Invasion on Rural Farms

Effect	Frequency	Percentage	Rank
Destruction of crop	157	89.7	5th
Yield reduction/High cost	169	96.6	1st
Soil compaction	166	94.9	2nd
Loss of lives	161	92	4th
Loss of property	136	77.7	6th
Peace loss	164	93.7	3rd

Source: Field Survey, 2016. NB:*Multiple responses

Result of Test of Hypothesis

The test of hypothesis for the significant relationship between the monthly quantity of farm output and the number of times of invasion of cattle on farmers' farm in the study area is presented in Table 5. From the result, the relationship was found to be significant at 1% level and based on this; the null hypothesis was rejected and accepted the alternative which confirmed the existence of relationship between the farm output and the number of nomadic invasions. This result suggests that, the intrusion of cattle on the farm had in no small measure resulted in a colossal damage which in-turn reduced farmers' expected income.

CONCLUSION AND RECOMMENDATIONS

Based on the findings of this paper, it could be inferred that the invasion of cattle in the farmers' farm evidently led to loss of lives and farm output. It could therefore be recommended that:

(i) efforts be further intensified on the delivery of nomadic education to Fulani herdsmen and their entire households;

(ii) farmers should be encouraged to locate their farms at ample distance from nomadic kraal/settlement or route;

(iii) farmers should be educated by extension agents through extending the period of stay on the farm so as to drive away the cattle and the herdsmen from their farms;

(iv) use of day and night guards should be encouraged among rural farmers;

(v) extension services must be increased through employing more extension agents who in turn train farmers on the type of farm practices to adopt in order to avert cattle attack;

(vi) demarcation of grazing route for Fulani herdsmen on their various grazing tracks;

(vii) government should be firm and fair in its resolution and implementation of decisions and;

(viii) laws on the grazing reserve should be amended and improved upon by the legislative arms of government at the state and federal levels.

Table 5: Test of hypothesis

Variable	t-value	df	Mean Diff.	Sig.(P<0.01)	Remark
Farm output	25.114***	174	2.53834		
Number of monthly Invasions.	27.475***	174	5.52571	0	Significant

Source: Field Survey, 2016 N.B: *** denote level of significance @ 1%

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