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Original Research Article

Resource-based induced conflict and socio-economic effects on crop and cattle farmers in Nigeria

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Abstract

This study investigated the socio-economic effects of crop and cattle farmers' natural resource-based conflicts in Osun State, Nigeria. A total of 228 crop and cattle farmers were sampled in six communities (Ila, Faje, Esa-Oke, Esa-Odo, Patara and Adana), using a multistage sampling procedure. The data were analysed using both descriptive and inferential statistics such as Pearson Product Moment Correlation (PPMC), Chi square and independent t-test (at $\alpha_{0.05}$). Majority (73.7%, 100%) of crop and cattle farmers, respectively, were male. Accessibility of natural resources and damage/stealing of crops were identified as major causes of the conflicts. Crime and criminality, and poor training on conflict prevention and resolution were rated as major constraint to conflict resolution. Sustainable land management practices and alternative fodder production for crop and cattle farmers, respectively, were identified as major climate smart training needs to mitigate conflicts. Reduction in quality of social relationships and interruption in education of children for crop farmers; and displacement and reduction in quality of social relationships for cattle farmers were the major social effects suffered. Reduction of agricultural outputs and inability to repay loan were the most common economic effects suffered by the respondents. Causes of conflict, farm/herd size and years of respondents' experience significantly related with overall socio-economic effects, while constraints to conflict resolution mechanisms ($t = -2.672$, $p = 0.008$), methods of conflict resolution ($t = -6.649$, $p = 0.000$) and socio-economic effects ($t = 3.317$, $p = 0.008$) differed among the respondents. Furthermore, the effect of the conflict was more severe among the crop farmers than among cattle farmers. Based on these new findings it is essential that a coordinated effort between religious institutions, the government, and non-governmental organisations give the ongoing efforts more momentum and include convincing herders to consider other options for producing livestock under ranching system for a more effective and sustainable livelihood practices.

Keywords: natural resources; accessibility; conflict; urbanisation; migration; livelihood; Osun State.

INTRODUCTION

Rural communities in most African countries including Nigeria depend basically on agro-based enterprises for their livelihoods (Olaiya, 2019). Furthermore, crop and livestock farming agro-based enterprises provide the means of livelihood and economic sustenance for the majority of the rural population of Nigeria. Obioha (2008) outlined the impact created by crop and cattle farmers who are the main agricultural practitioners, through their efforts in meeting the nutritional needs of the country and thus contributing to food security. Similarly in line with this report, Olutegbe and Ogungbaro (2020) noted that both practitioners in the past enjoyed a symbiotic relationship such that cattle dung are used as organic manure to fertilise the farmers' land in exchange for grazing rights. Meanwhile, this

enabling environment between producer communities then created a socio-economic development and sustainable food production, in terms of food safety and security. However, Ajibefun (2017) expressed that this desirable situation between crop and cattle farmers changed face, and it appears there was never record of any understanding between both parties in the past, as conflicts have dominated discourses of their relations and production activities.

It is expected that agricultural production activities of farmers and agropastoralists are determined by availability and accessibility of natural resources. Natural resources according to the World Trade Organisation (2010) are stocks of materials or resources that can be found in the natural environment that are limited but of economic goals, which are capable in production or consumption, either in the raw state or after minimal amount of processing. These resources may include renewable resources (land, water, and forest etc.) and depletable resources (minerals, metals, oil, diamond etc.), although Berger (2003) considered that pastures, woody vegetation, land and water resources are taken as a common property resource. However, given its importance, access to and availability of these resources is critical to ensure real and long-lasting improvements in livelihood practices, specifically for vulnerable societies such as cattle farmers, gatherers and crop farmers that are prone to instability and conflicts due to climate change effects (Barume, 2014).

Unfortunately, in the event of dryness in the Northern Nigeria and the available opportunity of the coastal zone to have a prolonged rainy season with high soil retention, cattle farmers are left only with the alternatives to migrate southward in search of pasture and water for their herds. This gave rise to an increased demand or population pressure on the land which has resulted into increased competition, degradation of land and shifting cultivation, thereby inducing various land conflicts. The use of land for urbanisation, demand for large areas of land for investment, and the development of markets, however, make land limited and scarce for agricultural production. Consequently, Genyi (2017) expressed that the expansion of agricultural activities into pasture lands by farmers due to loss of initial lands to urbanisation, sand mining activities, climate change and the expansion of grazing activities into the cropping lands result in the occurrence of conflicts between farmers and cattle farmers. Olutegbe and Ogungbaro (2020) noted that conflicts which was only characterised by sustainment of wounds during the early days, has in the recent years degenerated to loss of human lives. While it can be argued that the conflicts are capable of demonstrating high potential to cause civil unrest, insecurity, and food crisis particularly in rural communities where most of the conflicts are localised, with serious consequences on their livelihoods, however, the extent to which the conflict has on the socio-economic effect has been sparsely reported and stands as basis on which the study was conducted. The socio-economic effect is defined as the changes occurring in person's position in the social hierarchy based on their income, wealth and occupational prestige (Akinbile, 2007). For the purpose of this study, it has been defined as changes which occur in farming or herding as a means of livelihoods. These changes may take different dimensions ranging from position an individual occupies, participation in the group, cultural and material possession, as well as financial security, reflecting from the group which has experienced mayhem in terms of crop damage, sexual harassment, displacement and loss of houses and properties. The study therefore investigated the socio-economic effects of the affected farmers and cattle farmers with the following specific objectives pursued: examine the socio-economic characteristics and how significantly related with socio-economic effects; identify the causes of conflicts and statistical relationship with socio-economic effects; examine the constraints mitigating conflict resolutions and how significantly related constraints are to socio-economic effects; describe the training needs for effective peaceful coexistence and how significantly related with socio-economic effects; and assess the socio-economic effect of crop and cattle farmers' natural resource-based conflicts.

Hypotheses of the study

$H_0$1 – There is no significant relationship between the socio-economic characteristics of the respondents and socio-economic effects of conflicts

$H_0$2 – There is no significant difference between the constraints of respondents and the socio-economic effects

$H_0$3 – There is no significant difference between methods of conflict resolution among respondents and the socio-economic effects

$H_0$4 – There is no significant difference between training needs of respondents and the socio-economic effects

$H_0$5 – There is no significant difference between socio-economic effects of crop and cattle farmers

MATERIALS AND METHODS

The study was carried out in Osun State in South-Western Nigeria. The state has its capital in Osogbo and is dominated by the Yorubas, although there are numerous migrants in the rural areas, mostly from east, either working as labourers or farming on their own account. The state has 3,416,956 dwellers (NPC, 2006) and has a land area of about 9,251 km^2. The vegetation is derived savanna in the north and degraded secondary forest in the south, reflecting an annual rainfall of 800–1200 mm per year. Osun State is bounded in the north by Kwara State, in the east partly by Ekiti State and Ondo State. It is located on coordinates 7°30'N 4°30'E. A multistage sampling procedure was used to select crop and cattle farmers for the study; using Agricultural Development Programme (ADP) Zones. The first stage involved purposive selection of one block each with perennial herder–farmer conflict in each of the three zones (Osogbo, Ife/Ijesha and Iwo). This was due to the frequency of crop–cattle farmer conflicts in recent years; each block contains 8 cells. The second stage involved a ramdom selection of 6 cells from 24 cells which are Ila, Faje, Esa-Oke, Esa-Odo, Patara and Adana. In the third stage, 24, 10, 36, 24, 28 and 30 crop farmers were selected from each of Ila, Faje, Esa-Oke, Esa-Odo, Patara and Adana cells, respectively, using proportionate sampling to size which gave a total of 152 crop farmers. Cattle farmers were also selected using the same cells as crop farmers, though the method deployed was cluster sampling technique. This was due to the nature of cattle farmer's settlement pattern, economic and source of livelihoods and their grazing location. This was followed with random selection of 18, 5, 11, 10, 17 and 15 cattle farmers from the selected clusters in Ila, Faje, Esa-Oke, Esa-Odo, Patara and Adana, respectively, making a total of 76 cattle farmers. The total number of respondents was two hundred and twenty-eight (228) comprising one hundred and fifty-two crop farmers and seventy-six cattle farmers. Qualitative data were also sourced from Focus Group Discussion (FGD) and the use of Key Informant Interviews (KII). Socio-economic effect was measured under two main domains of social effects and economic effects, using a subjective rating approach of a three-point rating scale, where 0 indicates no effects and 2, very severe effects, with mean score of each item computed. A total of 12 and 7 statements represent each domain, respectively; and the mean score computed was used as the benchmark for categorising respondents into high or low socio-economic effects due to conflicts.

The respondents were asked to indicate what they perceive to be the major causes of crop–cattle farmers conflicts as well as the frequency of occurrence of each of the causes indicated with a three-point scale of always, occasionally and never with scoring of 2, 1 and 0, respectively. The means of each of the score were derived. Statements with mean above grand mean were regarded as commonest perceived causes whereas statements with mean below grand mean were regarded as the most unlikely perceived causes of herder-farmer conflict.

Respondents were asked to indicate the constraints faced in resolving conflicts in their locality on a 3-point scale of very severe, severe and not a constraint with the scoring 2, 1 and 0, respectively. Constraints with mean equal and above grand mean score were categorised as high, while constraints with mean below grand mean were categorised as low constraints. Respondents were asked to indicate their specific areas of training needs for effective conflict resolution by ticking not in need = (0), slightly in need (1), seriously in need (2). Training need means above the grand mean score were categorised seriously in need whereas training need mean below grand mean score were categorised as slightly in need.

The data were analysed using both descriptive such as means, percentages and inferential statistics: Pearson Product Moment Correlation (PPMC), Chi square and independent t-test (at $\alpha_{0.05}$). The Chi square and PPMC were used to determine the relationship between the independent variables and socio-economic effects of the respondents due to conflicts, while the independent *t*-test was relevant to this study since crop and cattle farmers were both parties involved in conflicts and were of different ethnic background and livelihood activities. Therefore, it was important to test with respect to the views each group share in line to methods, training needs and constraint to conflict resolution mechanism. Statistical Package for the Social Sciences (SPSS) was used to analyse the data.

Model specification

In order to investigate the resource-based induced conflict and socio-economic effects on crop and cattle farmers in Osun State, Nigeria. The mathematical model is specified as follows:

1. Pearson Product Moment Correlation (PPMC) is given as:

$$r = \frac{N\sum XY - \sum X * \sum Y}{\sqrt{\left[N\sum X^2 - \left(\sum X\right)^2\right] * \left[N\sum Y^2 - \left(\sum Y\right)^2\right]}}$$

where:

r = Pearson Product Moment Correlation

N = Number of paired scores

X = Score of crop farmers
Y = Score of agropastoralists
XY = The product of the both scores of crop and cattle farmers
Σ = Summation

2. Independent t – test (t) is expressed as:

$$t = \frac{(\bar{x}1 - \bar{x}2)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

where:
t = test of difference
$\bar{x}1$ = mean of the sampled crop farmers
$\bar{x}1$ = mean of the sampled agropastoralists
S_1^2 = Standard deviation of the sampled mean of crop farmers
S_2^2 = Standard deviation of the sampled mean of cattle farmers
N_1 = Sample size of crop farmers, which is 152
N_2 = Sample size of agropastoralists, which is 76
$\sqrt{}$ = Square root

3. Chi square is given as:

$$\chi^2 = \Sigma (O - E)^2 / E$$

χ^2 = Chi square
O = Observed sample of crop farmers and cattle farmers
E = Expected sample of crop farmers and cattle farmers
Σ = Summation

RESULTS AND DISCUSSION

Table 1 reveals that the mean age of crop farmers surpassed that of cattle farmers, being in consonance with the finding of Ofuoku and Isife (2009) who reported that younger men were more involved in nomadic life because it requires much movement and thus good stamina. It is believed that maturity is associated with age. Therefore, the older the respondent becomes, the less likely is he expected to be involved in conflict. Majority (36.5%) of the farmers had less than 2 hectares, 24.3% had more than 8 hectares of farm land whereas cattle farmers had no farm land. Our data on the mean household size as shown in Table 1 are consistent with Adurogbangba (2014) who shows that 61.6% of farmers and 65.0% of pastoralists have household size between 5 and 9. A recent study by Dimelu et al. (2016) also revealed average household size of 11 persons for cattle farmers. Both crop and cattle farmers had a large household size which may have resulted from the need for family labour with the consequence of more dependent family members. Table 1 also reveals that the mean herd size for cattle farmers was 13 ± 10.22 whereas farmers had none. The mean experience was 21 ± 15.39 years and 26 ± 14.35 years for farming and herding, respectively. Majority (73.7%) of the farmers were male, and 26.3% were female. The table also reveals that all the cattle farmers were male. This agrees with the findings of Olaleye et al. (2010) which revealed that male farmers are more involved in both farming and herding activities. That cattle herding is a male-dominated enterprise is evident fromour findings and is consistent with the results of Adam et al. (2015) and Gurung (2006)

Table 1. Distribution showing the socio-economic characteristics of respondents

Variables	Crop farmers n = 152		Cattle farmers n = 76	
	%	Mean /SD	%	Mean /SD
Age		54 ± 14.17		42 ± 13.46
<20	0.0		6.6	
21–30	3.3		21.1	
31–40	19.7		25.0	
41–50	23.7		21.1	
51–60	16.4		17.1	
61–70	23.7		9.2	
>70	13.3		0.0	
Household size		7 ± 3.65		10 ± 5.65
1–5	29.6		28.9	
6–10	53.3		31.6	
11–15	13.8		34.2	
16–20	2.6		2.6	
>20	0.7		2.6	
Farm size		4 ± 3.88		
<2	36.2		0	
3–4	23.0		0	
5–6	13.8		0	
7–8	2.6		0	
>8	24.3		0	
Herd size				13 ± 10.22
<10	0		59.2	
11–20	0		27.6	
21–30	0		9.2	
>40	0		3.0	
Years of experience		21 ± 15.39		25 ± 14.35
<10	36.2		28.9	
11–20	31.6		19.7	
21–30	15.1		15.8	
31–40	5.3		26.3	
41–50	2.0		9.2	
>50	9.9		0	
Sex				
Male	73.7		100.0	
Female	26.3		0.00	

Source: Field survey, 2019.
SD = Standard Deviation, % = Percentage

Table 2. Distribution of respondents' frequency of occurrence of perceived causes of conflict

Causes	Farmers n = 152				Herders n = 76			
	%			Mean	%			Mean
	N	O	A		N	O	A	
Accessibility of natural resources (Land, water and pasture)	0.7	5.3	94.1	1.93	0.0	9.2	90.8	1.91
Damage / stealing of crops	1.3	5.3	93.4	1.92	0.0	39.5	60.5	1.61
Low awareness of stock route	71.1	15.1	13.8	0.43	47.4	15.8	36.8	0.89
Ethnic rivalry	38.8	44.1	17.1	0.78	73.7	14.5	11.8	0.38
Farm fragmentation	30.9	38.2	30.9	1.00	15.8	61.8	22.4	1.07
Deliberate hostility among party	38.8	44.7	16.4	0.78	52.6	36.8	10.5	0.58
Indiscriminate bush burning	9.2	11.2	79.6	1.70	28.9	15.8	55.3	1.26
Depleting soil fertility	78.3	15.8	5.9	0.08	78.5	9.2	11.8	0.33
Lack of grazing/farming customs	77.0	16.4	6.6	0.30	75.0	17.1	7.9	0.33
Poor conflict prevention mechanism	34.9	34.2	30.9	0.96	27.6	64.5	7.9	0.80
Neglect of grazing reserves	62.5	4.6	32.9	0.70	67.1	26.3	6.6	0.39
Expansion of settlement	52.0	24.3	23.7	0.72	19.7	71.1	9.2	0.89
Cattle poisoning	46.7	34.2	19.1	0.72	44.7	25.0	30.3	0.86
Cattle rustling	96.7	0.7	2.6	0.06	63.2	18.4	18.4	0.55
Grand mean				**0.86**				**0.85**

Source: Field survey, 2019.
N = Never, O = Occasionally, A = Always, % = Percentage

that all respondent cattle farmers were male. Having female farmers may be due to the possibility that women inherit farms but are involved in less laborious activities on the farm. It is believed that socio-cultural factors limit most Fulani women not to take cattle herding as an occupation, perhaps as a consequence of purdah.

As evident from the findings, both crop farming and cattle herding seems to be a male-dominated enterprise in the study area. Table 2 reveals that the major causes of conflicts as commonly shared by crop and cattle farmers were accessibility of natural resources (land, water and pasture) ($\bar{x}$ = 1.93) and ($\bar{x}$ = 1.91), damage and/or stealing of crops ($\bar{x}$ = 1.92) and ($\bar{x}$ = 1.61), indiscriminate bush burning ($\bar{x}$ = 1.70) and ($\bar{x}$ = 1.26), and farm fragmentation 1.00) and ($\bar{x}$ = 1.07) for crop and cattle farmers, respectively. It is instructive to note that neither of both groups did consider ethnic rivalry, deliberate hostility by other party, depleting soil fertility, little respect to traditional grazing/farming customs, neglect of grazing reserves and cattle rustling as major causes of conflicts in the study area. However, competition for resources (land, water and pastures) was identified as the major cause of the conflicts among the groups. This finding agrees with that of Blench (2004) that the competition for land, water, and vegetation by pastoralists and farmers coupled with scarcity or dwindling of resources and adverse climatic challenges all act as precipitant in pastoralist-farmer conflicts. Similarly, Adebayo and Olaniyi (2008) reported grazing on harvested crops, theft of crop farmers' produces by cattle farmers and pulverisation of soil, among others as causes of conflict between crop and cattle farmers. Also, a recent study by Adeyeye (2018) revealed that obvious problems relating to land and water use and crop damage trigger these disputes between crop and cattle farmers. This also corroborates the view of the discussants at the FGD session in Gaa Ojonla that *"whenever our cattle stray and damage crops, we pay compensation but farmers inflate the extent of damage they suffered. It is troublesome to cattle farmers who refuse compensation for crop farmers..."* Also, the participants at the FGD session among farmers in Esa-Odo community pointed accusing fingers on herders: *"... the practice of the cattle farmers is to burn vegetation during dry season because they believe fresh pasture will be generated. In the process of burning, the fire spreads into our farms causing destructions to crops. Crop farmers also practice bush burning but we supervise it and also do fire tracing to prevent fire spreading into adjoining farm..."*

The major conflict resolution methods as identified by both crop and cattle farmers in Table 3 were intervention by herder–farmer leaders ($\bar{x}$ = 1.96), intervention by law enforcement agents ($\bar{x}$ = 1.79) and ($\bar{x}$ = 1.63), intervention by Osun State conflict task force ($\bar{x}$ = 1.22) and ($\bar{x}$ = 1.87), and dialogue between the parties involved ($\bar{x}$ = 1.07) and ($\bar{x}$ = 1.46) for crop and cattle farmers, respectively. It is also to be noted that crop farmers mostly made use of intervention by traditional leaders ($\bar{x}$ = 1.23) as a means of resolving conflicts. This finding is in consonance with Diallo (2001), who reported that herders will pay up if they are

Table 3. Distribution showing methods of conflict management

Methods of conflict management	Crop farmers n = 152				Cattle farmers n = 76			
	%			Mean	%			Mean
	N	O	A		N	O	A	
Intervention by herder/farmer leaders	1.3	1.3	97.4	1.96	1.3	1.3	97.4	1.96
Intervention by traditional leaders	24.3	28.3	47.4	1.23	18.4	72.4	9.2	0.91
Courts verdicts	47.4	52.6	0.0	0.53	7.9	88.2	3.9	0.96
Dialogue between parties involved	32.9	27.6	39.5	1.07	9.2	35.5	55.3	1.46
Intervention by Osun State Conflict task force	16.4	44.7	38.8	1.22	2.6	7.9	89.5	1.87
Intervention by law enforcement agents	4.6	11.8	83.6	1.79	5.3	26.3	68.4	1.63
Intervention by Local government officials	90.8	5.3	3.9	0.13	55.3	25.0	19.7	0.64
Alternative Dispute Resolution	44.1	27.0	28.9	0.85	22.4	38.2	39.5	1.17
Intervention by NGOs	64.5	32.2	3.3	0.39	21.1	73.7	5.3	0.84
Grand Mean				**1.02**				**1.27**

Source: Field survey, 2019.
N = Never, O = Occasionally, A = Always, % = Percentage

Table 4. Distribution showing the constraints to conflict resolution among crop and cattle farmers

Constraints	Cop farmers n = 152				Cattle farmers n = 76			
	%			Mean	%			Mean
	NAC	S	VS		NAC	S	VS	
Crime and criminality	31.6	32.9	35.5	1.04	50.0	28.9	21.1	0.71
Low level of awareness of peace keeping techniques	56.6	15.8	27.6	0.71	36.8	61.8	1.3	0.64
Poor training on conflict prevention and resolution	46.7	25.0	28.3	0.82	30.3	60.5	9.2	0.79
Eco-political Interest	65.8	8.6	25.7	0.60	68.8	6.6	6.6	0.20
Fight and claims of supremacy	59.2	29.6	11.2	0.52	6.8	32.9	5.3	0.43
Inherited beliefs and cultural influences	82.9	15.1	2.0	0.19	76.3	17.1	6.6	0.30
Government laxities	62.5	16.4	21.1	0.59	69.7	22.4	7.9	0.38
Religious influence	78.3	19.7	2.0	0.24	93.4	1.3	5.3	0.12
Land tenure	35.5	38.2	26.3	0.91	67.1	13.2	19.7	0.53
Grand Mean				**0.63**				**0.46**

Source: Field survey, 2019.
NAC = Not a Constraint, S = Severe, VS = Very Severe, % = Percentage

responsible for the damage and the farmers' demands were reasonable, but not otherwise. If the parties could not reach consensus, one of them usually solicited the intervention of local chiefs, local council or court. Adurogbangba (2014) also reported that most of the respondents of his study indicated an intervention by law enforcement agencies, dialogue and local community leaders as means of conflict resolution. It also corroborates the stand of the Sarkin Fulani of Osun State during IDI, saying: *"we usually have meetings with the state government representatives and other people including farmers' representatives who are members of the Osun State task force on farmer-herder conflict and give feedbacks to herders through their various leaders…"*

Table 4 reveals that the major constraints to conflict resolution among the crop farmers were crime and criminality ($\bar{x}$ = 1.04), land tenure ($\bar{x}$ = 0.91), poor training on conflict prevention and resolution ($\bar{x}$ = 0.82) and low level of awareness of peace keeping techniques ($\bar{x}$ = 0.71), whereas that of cattle farmers were poor training on conflict prevention and resolution ($\bar{x}$ = 0.79), crime and criminality ($\bar{x}$ = 0.71), low level of awareness of peace keeping techniques ($\bar{x}$ = 0.64) and land tenure ($\bar{x}$ = 0.53). Both groups believed that eco-political interest, fight and claims of supremacy, inherited beliefs and cultural influences, government laxities, religious influence are not constraints to conflict resolution.

The major trainings needed among crop farmers as shown in Table 5 for sustainable and climate smart agriculture were sustainable land management practices ($\bar{x}$ = 1.96), improved farming practice ($\bar{x}$ = 1.95), zero bush burning ($\bar{x}$ = 1.76), and local fencing technique ($\bar{x}$ = 1.55), whereas that of cattle farmers were alternative fodder production (Napier grass and others) ($\bar{x}$ = 1.72), improved herding practice ($\bar{x}$ = 1.67), sustainable land management practices ($\bar{x}$ = 1.63) and zero bush burning

Table 5. Distribution showing the training needs by crop and cattle farmers

Training needs	Crop farmers n = 152				Cattle farmers n = 76			
	%			Mean	%			Mean
	NIN	SIN	SEIN		NIN	SIN	SEIN	
Sustainable and climate smart agriculture								
Sustainable land management practices	1.3	1.3	97.4	1.96	6.6	23.7	69.7	1.63
Improve farming/herding practice	1.3	2.0	96.7	1.95	2.6	27.6	69.7	1.67
Alternative fodder production(Napier grass and others)	52.0	10.5	37.5	0.86	5.3	17.1	77.6	1.72
Zero bush burning	11.8	0.7	87.5	1.76	28.9	9.2	61.8	1.33
Local fencing technique	4.6	35.5	59.9	1.55	60.5	19.7	19.7	0.59
Water harvesting technique	49.3	40.1	10.5	0.61	53.9	36.8	9.2	0.55
Grand mean				**1.45**				**1.25**
Conflict Prevention and Management								
Socio-economic rights of herders and farmers	48.7	19.7	31.6	0.83	1.3	23.7	75.0	1.74
Alternative Dispute Resolution (ADR)	30.5	3.9	65.8	1.36	9.2	51.3	39.5	1.30
Trans-cultural dialogue	51.3	7.2	41.4	0.90	10.5	40.8	48.7	1.38
Negotiation and mediation	51.3	7.2	41.4	0.90	13.2	42.1	44.7	1.32
Resilience–relevance techniques (crop and cattle farmers field school)	52.0	35.5	12.5	0.61	25.0	42.1	32.9	1.08
Spotting Early Warnings and Early Response	44.7	20.4	34.9	0.90	17.1	76.3	6.6	0.89
Reporting	3.9	42.8	53.3	1.49	17.1	63.2	19.7	1.03
Grand Mean				**1.00**				**1.25**

Source: Field survey, 2019.
NIN = Not in Need, SIN = Slightly In Need, SEIN = SEriously In Need, % = Percentage

Table 6. Distribution showing the socio-economic effect of crop and cattle farmers

Socio-economic effects	Crop farmers n = 152				Cattle farmers n = 76			
	%			Mean	%			Mean
	NA	S	VS		NA	S	VS	
Socio effects								
Displacement	9.9	46.1	44.1	1.34	3.9	63.2	32.9	1.29
Reduction in quality of social relationship	1.3	7.9	90.8	1.89	0.0	74.2	27.6	1.28
Constraints in mobility	67.1	24.3	8.6	0.41	85.5	9.2	5.3	0.20
Impairment/ disabilities	91.4	5.3	3.3	0.12	68.4	14.5	17.1	0.48
Increased in cult related activities	92..8	3.9	3.3	0.11	88.2	7.9	3.9	0.16
Interruption in education of children	11.2	32.9	55.9	1.45	53.9	31.6	14.5	0.61
Marginalisation	69.1	26.3	4.6	0.35	11.8	69.7	18.4	1.07
Stigmatisation	70.4	23.7	5.9	0.36	27.6	52.6	19.7	0.92
Rape	96.7	2.6	0.7	0.04	94.7	2.6	2.6	0.08
High drugs intake	94.7	1.3	3.9	0.09	97.4	2.6	0.0	0.03
Acquiring of weapons/Arms	94.1	2.6	3.3	0.09	96.1	1.3	2.6	0.07
Death	94.7	1.3	3.9	0.09	93.4	3.9	2.6	0.09
Grand mean				**0.53**				**0.52**
Economic effects								
Reduction in agricultural output of farmers/herders	1.3	1.3	97.4	1.96	2.6	22.4	75.0	1.72
Loss of house and properties	92.8	3.9	3.3	0.11	69.7	23.7	6.6	0.37
Inability to repay loan	3.3	5.9	90.8	1.88	2.6	31.6	65.8	1.63
Migration of labour	0.0	9.2	90.8	1.91	7.9	30.3	61.8	1.54
Reduced access to land	85.5	6.6	7.9	0.22	18.4	61.8	19.7	1.01
Reduction in household resources	3.3	15.8	80.9	1.78	9.2	67.1	23.7	1.14
Infrastructural damages	16.4	39.5	44.1	1.28	88.2	6.6	5.3	0.17
Grand Mean				**1.31**				**1.08**

Source: Field survey, 2019.
NA = Not at All, S = Severe, VS = Very Severe, % = Percentage

($\bar{x}$ = 1.33). Similarly, for effective conflict resolution, farmers have identified training needs on reporting ($\bar{x}$ = 1.49) and alternative dispute resolution (ADR) ($\bar{x}$ = 1.36), whereas herders have identified training needs on socio-economic rights of herders ($\bar{x}$ = 1.74), trans-cultural dialogue ($\bar{x}$ = 1.38), negotiation and mediation ($\bar{x}$ = 1.32) and ADR ($\bar{x}$ = 1.30).

Table 6 reveals that severe social effects among crop farmers were reduction in quality of social relationships ($\bar{x}$ = 1.89), interruption in education of children ($\bar{x}$ = 1.45) and displacement ($\bar{x}$ = 1.34), whereas severe social effects among cattle farmers were displacement ($\bar{x}$ = 1.29), reduction in quality of social relationships ($\bar{x}$ = 1.28), marginalisation ($\bar{x}$ = 1.07), stigmatisation ($\bar{x}$ = 0.92), and interrupted education of children ($\bar{x}$ = 0.61). When a conflict between the two resource users occurs, especially in a symbiotic relationship such as crop and cattle farmers, where each user depends on one another for an existence, it affects the mutual trust, dependence and business activities for enhanced crop and livestock production, thereby causing either side to view the other with contempt and some level of suspicions. This is in line with the stand of a participant during a session of Focus Group Discussion (FGD) among cattle herders at Kara in Iwo community; he revealed as follows: "*… We are excluded from developmental interventions thus being marginalised, also we suffer stigmatisation by host communities labelling us as kidnappers despite that we are also at risk of being kidnapped…*". Similarly, the severe economic effects suffered were reduction in agricultural output ($\bar{x}$ = 1.96) and ($\bar{x}$ = 1.72), migration of labour ($\bar{x}$ = 1.91), and ($\bar{x}$ = 1.54), inability to repay loan ($\bar{x}$ = 1.88) and ($\bar{x}$ = 1.63), and reduction in household resources ($\bar{x}$ = 1.78) and ($\bar{x}$ = 1.14) for crop and cattle farmers, respectively. This implies that reduction in output and income of crop farmers are a result of destruction of crops by cattle and indiscriminate bush burning. Many farmers lost part or the whole of their crops. Cattle farmers suffered loss of output due to cattle poisoning and inability to access enough pasture for their herds.

Table 7 shows that crop farmers had a high ($\bar{x}$ = 15.74) socio-economic effect due to conflict compared to cattle farmers ($\bar{x}$ = 13.855). This finding reveals that majority of crop farmers suffer more social and economic effects of conflict which agrees with Adisa (2011) in a similar study revealing that the farmers experience more losses than the herdsmen. Also Adurogbangba (2014) reported that majority of farmers suffer more losses from farmer-pastoralist conflicts, especially the economic loss. In a recent study, Ajibefun (2017) revealed that farmers' perception of social and economic effects of conflict was higher compared to cattle farmers.

The relationship between variables as shown in Table 8 revealed that there is a significant relationship between the years of experience for crop farmers (r = 0.117, p = 0.040), cattle farmers (r = –0.257, p = 0.025) and their socio-economic effects. This implies that the higher the number of years of experience the higher the socio-economic effect on crop farmers whereas the higher the number of years of experience in cattle farmers, the lower the effect. The findings from this study corroborate with Olutegbe and Ogungbaro (2020) who posited that many years of experience will enable both crop and cattle farmers to acquire skills over time in different livelihood activities and better understanding of conflict resolution mechanisms in various communities. It could also be deduced that crop and cattle farmers with so many years of experience already know how to manage the effect of the conflict. The relationship between the farm (r = –0.113, p = 0.046)

Table 7. Categorisation of respondents according to socio-economic effects due to conflict

Socio-economic effects	Farmers n = 152 %	Herders n = 76 %	Mean	
			Farmers	Herders
High	62.5	34.2	15.474	13.855
Low	37.5	65.8		

Source: Field survey, 2019.

Table 8. Pearson Product Moment Correlation analysis showing the relationship between variables and socio-economic effects of conflict

Variables	Crop farmers n = 152		Cattle farmers n = 76	
	r-value	p-value	r-value	p-value
Farm/ Herd size	–0.113	0.046	–0.098	0.002
Years of experience	0.117	0.040	–0.257	0.025
Perceived causes of conflicts	0.291	0.000	0.556	0.000

Source: Field survey, 2019.
r-value = Correlation coefficient, p-value = Probability coefficient

Table 9. Chi-square showing the relationship between marital status and socio-ecomic effects of conflicts

Variable	Crop farmers n = 152			Cattle farmers n = 76		
	χ^2	Df	p-value	Sχ^2	Df	p-value
Marital status	0.159	2	0.047	0.142	1	0.044

Source: Field survey, 2019.

Table 10. Independent *t*-test analysis between variables and socio-economic effects of conflicts among crop and cattle farmers

Variables	Respondents' category	N	Mean	SD	t-value	Df	p-value
Constraints	Crop farmers	152	5.605	4.408	2.672	226	0.008
	Cattle farmers	76	4.105	2.30			
Methods of conflict resolution	Crop farmers	152	9.165	2.076	–6.649	226	0.000
	Cattle farmers	76	11.447	3.052			
Training needs	Crop farmers	152	15.678	6.296	–0.685	226	0.451
	Cattle farmers	76	16.237	4.673			
Socio-economic effects	Crop farmers	152	15.474	3.710	3.317	226	0.000
	Cattle farmers	76	13.855	2.938			

Source: Field survey, 2019.
SD = Standard Deviation, N = Number of respondents sampled, *t*-value = *t*-test value, df = degrees of freedom, p-value = Probability Coefficient

and herd size (r = –0.098, $p = 0.002$) implies that the smaller the cattle herd size or farm size, the more socio-economic effects suffered among crop and cattle farmers, whereas the higher the frequency of causes of conflicts among crop farmers (r = 0.291, $p = 0.000$) and cattle farmers (r = 0.556 and $p = 0.000$), the more the socio-economic effects suffered.

Table 9 reveals that a significant relationship exist between marital status (r = 0.159; $p = 0.047$) and the socio-economic effect of the conflict on the crop farmers in the study area. In the same vein, there exists a significant relationship between marital status (r = 0.142; $p = 0.000$) and the socio-economic effect of the conflict on the cattle farmers. The findings from this study are in line with Kehinde (2011) who reported in a similar study that majority of the respondents from both groups have at least one dependent, making them economically liable, hence a greater tendency to challenge all kinds of occupational threats.

Table 10 shows a significant difference between crop and cattle farmers' constraint to conflict resolution mechanism (t = 2.672, $p = 0.008$), methods of conflict resolution (t = –6.649, $p = 0.000$) and overall socio-economic effects (t = 3.317, $p = 0.000$). This implies that the constraint, method of conflict resolution and overall socio-economic effects of conflicts on crop and cattle farmers differs. It was only training needs that was not significant (t = –0.685, $p = 0.451$). This may be due to low literacy level among the respondents and associated with lack of improved knowledge which predispose them to pay less attention to certain information, organise and interpret the content of the training needs in order to reduce conflicts. The mean values for constraints (crop farmers = 5.605, cattle farmers = 4.105), methods of conflict resolution (crop farmers = 9.165, cattle farmers = 11.447) and overall socio-economic effects (crop farmers = 15.474, cattle farmers = 13.855) suggest that crop farmers were more at risk of the socio-economic effects than cattle farmers. This could be because constraints to effective conflict resolution mechanisms were more severe among crop than cattle farmers, however it could mean that cattle farmers employed more coping strategies than crop farmers. This study agrees with that of Ajibefun (2017) who revealed that crop farmers' perception of social and economic effects of conflict was higher compared to herders.

CONCLUSION AND RECOMMENDATION

The study concludes that socio-economic consequences of crop–cattle farmers' natural resource-based conflicts are imminent. We found that crop farmers feel the socio-economic effects of the conflicts more than the cattle farmers, however, the perceived causes of farmer-herders' natural resource-based conflicts in the study area are not different. Respondents indicated intervention by herders and farmers' leaders, and crime and criminality as the most commonly used method of conflict resolution and most severe constraints to conflict resolution, respectively. Crop and cattle

farmers' conflicts have persisted for decades and the various strategies adopted by both groups have brought little or no progress in lowering the tide and impacts of the conflicts. It is important for both groups to adopt coping measures such as sustainable and climate-smart agriculture and conflict prevention and management strategies, for a more effective and sustainable livelihood practices. The study therefore recommends that government at all levels should explore better involvement of indigenous resource user groups in policies relating to natural resource management and utilisation. There is need for proper re-orientation of the essence of social interactions and socio-economic rights of crop and cattle farmers through sensitisation using individual and mass communication with the aid of national orientation agency, extension agents, and radio programmes.

CONFLICT OF INTEREST

The authors declared no conflicts of interest with respect to research, authorship and publication of this article.

ETHICAL COMPLIANCE

The authors have followed the ethical standards in conducting the research and preparing the manuscript.

REFERENCES

Adam Y. O., Ptretzsch J., Dietrich D. (2015): Land use conflicts in Central Sudan: perception and local coping mechanisms. Journal of Land Use Policy 42: 1–6.

Adebayo O. O., Olaniyi O. A. (2008): Factors associated with pastoral and crop farmers conflict in derived savanna zone of Oyo State, Nigeria. Journal of Human Ecology 23: 71–74.

Adeyeye O. J. (2018): Agricultural practices and development in Nigeria: yesterday, today and tomorrow: an unpublished print, pp. 3–14.

Adisa R. S. (2011): Land use conflict between farmers and herdsmen – implications for Agricultural and rural development, department of agricultural extension and rural development, University of Ilorin, Ilorin, Nigeria, 55 p.

Adurogbangba B. (2014): Socioecomic effect of farmer-pastoralist conflict on agricultural extension service delivery in Oyo State, Nigeria. Unpublished MSc. thesis, submitted to the Department of agricultural extension and rural development, University of Ibadan

Ajibefun M. B. (2017): Social and economic effects of the menace of Fulani herdsmen crises in Nigeria. Journal of Educational and Social Research 8: 138–145.

Akinbile L. A. (2007): Standardization of socio-economic Status (SES) scale for farm families in south west Nigeria. Journal of Social Sciences 14: 221–227.

Barume A. K. (2014): Land rights of indigenous peoples in Africa. ISBN 978-87-92786-40-1. Online access at www.iwgia.org/en/resources/publication.

Berger R. (2013): Conflicts over natural resources among pastoralists in Northern Kenya: a look at recent initiatives in conflict resolution. Journal of International Development 15: 245–247.

Blench R. (2004). Natural resource conflict in North-Central Nigeria: a handbook. Mandaras, Mallam Dendo Ltd Cambridge, U. K. 162 p., ISBN 0-9544730-2-7

Diallo Y. (2001): Conflict, cooperationand integration: A West Arican example (Côte d'lvoire). Max Planck Institute for Social Anthropology Working Papers 22. http://hdl.handle.net/11858/00-001M-0000-0011-9ED2-8. Accessed 2021.

Dimelu M. U., Salifu E. D., Igbokwe E. M. (2016): Resource use conflict in agrarian communities, management and challenges: A case of farmer-herdsmen conflict in Kogi State, Nigeria. Journal of Rural Studies 46: 147–154.

Genyi G. A. (2017): Ethnic and religious identities shaping contestations for land based resources: the tiv-farmers and pastoralists conflicts in central Nigeria until 2014. Journal of Living Together 4: 126–151.

Kehinde E. A. (2011): Socioeconomic and environmental factors influencing conflict between crop producers and pastoralists In Kabba-Bunu local government area of Kogi State, Nigeria. Unpublished Ph.D. Thesis, department of agricultural economics and rural sociology, Ahmadu Bello University, Zaria, 146 p.

Obioha E. E. (2008): Climate change, population drift and violent conflict over land resources in North Eastern Nigeria. Journal of Human Ecology 23: 311–324.

Ofuoku A. U., Isife B. I. (2009): Causes, effects and resolution of farmers-nomadic cattle herders conflicts in Delta State, Nigeria. International Journal of Sociology and Anthropology 1: 49–55.

Olaiya K. A. (2019). Socio-economic effects of farmers-herders' natural resource-based conflict in Osun state, Nigeria. Unpublished MSc. Thesis, Submitted

to the Department of Agricultural Extension and Rural Development, University of Ibadan.

Olaleye R. S., Odutola J. O., Ojo M. A., Umar I. S., Ndanitsa M. A. (2010): Perceived effectiveness of conflict resolution methods for improved farmer-pastoralist relationship in Chikun local government area of Kaduna State, Nigeria. The Nigerian Journal of Rural Extension and Development 3: 54–58.

Olutegbe N. S., Ogungbaro O. O. (2020): Efficacy of the Ekiti State anti grazing law: key stakeholders' perspectives. Afrika Focus 33: 118–225. https://doi.org/10.21825/af.v33i2.17580

World Trade Organization (2010): Trade in natural resources. Geneva: World Trade Organization Publishing Cambridge, U.K., pp. 82–83. ISBN: 0-9544730

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