Journal of Food and Agriculture Research
Vol. 6, No. 1, 2026, pp. 61-74

URL: www.arfjournals.com
https://doi.org/10.47509/JFAR.2026.v06i01.04

Effects of Open Grazing on Production Activities of Arable Farmers in Niger State, Nigeria

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Abstract: This study assessed the effects of open grazing on production activities of arable farmers in Niger State, Nigeria. Multistage sampling technique was used to select 154 registered arable crop farmers for this study. The study showed that the majority of the respondents (71.3%) were married, and their predominant age range were 31 – 40 years (66.9%) with a mean age of 34 years. In terms of educational attainment, (82.8%) of the respondents had formal education while only few had no formal education, with an average mean of 6 years of schooling. The result also showed that farmers are concerned about soil compaction and erosion caused by grazing animals, the need for additional fencing and other protective measures increases production costs and farmers perceive open grazing as a major threat to crop yields due to direct consumption and trampling of crops by livestock were major arable farmers' perception on open grazing activities in the study area. The findings further show that open grazing can lead to conflicts between livestock and wildlife, potentially affecting biodiversity and crop pollination were major effects of open grazing on production activities of arable farmers in the study area. The results also show that, Aids to the victim of herders-farmers conflict to reduce the tendency of reprisal attacks ($\bar{X}$=3.46), Avoid dry season cultivation of crops ($\bar{X}$=3.40) and Help from local leaders to avoid impact of open grazing ($\bar{X}$=3.11) were major effective coping strategies to open grazing activities on arable farmers in the study area. It is therefore recommended that the government should establish and enforce designated grazing zones away from crop fields to minimize soil compaction, erosion, and crop damage.

Keywords: Grazing, production, arable farmers, activities and perception.

Received : 14 March 2026
Revised : 16 April 2026
Accepted : 28 April 2026
Published : 30 June 2026

TO CITE THIS ARTICLE:

Abdullahi A, shuaibu U, Muhammad H U, Jibrin S, Abdulsalam Y & Opakunle Q S 2026. Effects of Open Grazing on Production Activities of Arable Farmers in Niger State, Nigeria. *Journal of Food and Agriculture Research,* 6: 1, pp. 61-74.

1. Introduction

Nigeria's rural culture and economy are firmly anchored in the traditional practice of livestock grazing, especially open grazing. The Fulani pastoralists have a long history of leading a nomadic lifestyle, constantly moving their livestock across large areas in search of water and pasture. However, livestock rearing provides a rich source of protein and income to individuals. Livestock rearing is a dominant practice of Fulani Herdsmen in Nigeria. Iloanya and Chukwuemeka (2020) noted that a typical Fulani herdsman keeps and sustains his herd through open grazing. Open grazing is the act of freely moving in search of pasture and water. It is an obsolete form of pasturing. According to Jooji (2020), open grazing is the age-old practice of roaming about with animals in open fields, plains and nearby bushes in search of pasture or food for the animals. However, Jooji (2020) averred that it is mostly practiced in Nigeria by Fulani herders who move for days on foot with their herds from the north to the more rain-fed southern parts of the country pasturing their flock as they go. It is the practice of moving livestock around bushes for pasture. According to Chukwuemeka, *et al.* (2019), open grazing is the practice whereby cattle are herded by taking them round in large numbers to feed in open spaces and uncultivated grasslands in a migratory or nomadic style. Madube *et al.* (2019), asserted that grazing abounds across Nigeria due to variation in climate. The differences in weather conditions between North and other parts of Nigeria compel herdsmen to move their cattle to different regions of the country in search of pasture. While driving cattle across regions sometimes the destruction of crops occurs and becomes a source of crisis between farmers who claim customary right over land and herdsmen who are regarded as strangers (Akuul and Kizito, 2019).

Farmers' displacement is a serious setback to crop production in Niger State. The practice of open grazing has resulted in the struggle for control of resources and contributes to incessant conflicts among herdsmen and farmers. Olaojo *et al.* (2020), maintained that the conflict between the Fulani herdsmen and the farmers usually arise when the former invade community farmland with their cattle and graze unrestricted both on cultivated and uncultivated land thereby destroying valuable food and cash crops which are the mainstay of the host communities. In addition, they hinder traffic flows,

endanger human and vehicular road users, exacerbate city congestion, and most often, cause fatal road mishaps. More so, Igbokwe-Ibeto *et al.* (2021), stressed that local farmers hardly can cultivate at their full capacity due to fear of being attacked and killed by the rampaging Fulani herdsmen who engage in open grazing. This seems to have contributed to food shortages due to the abandonment of farmlands and destruction of crops among the arable crop farmers.

The need to provide arable crops and animals to meet the growing demand due to population increase necessitates the opening up of more land that is arable. Agricultural production in any country requires an enabling environment to reach its maximum potential. Sustainable development in agriculture, among other things, demands a peaceful co-habitation of producer communities. It is only through cooperation that local communities could implement a sustainable common pool of resource conservation and management strategies (Mohammed and Abdul, 2020).

2. Methodology

The study was conducted in Niger State, Nigeria. Niger State is in the North-central part of Nigeria and lies between Longitude 3^0 40 " and $7^0$40 " East and Latitude $8^0$20 " and $11^0$20 " North of the equator (National Bureau of statistics (NBS), 2018). However, the total population in the State are over 5,556,200 people. National Population Commission of Nigeria (NPCN, 2016) from 2016 population census. But, going by the annual population growth rate of 3.5 percent in Nigeria, the population of Niger State was projected to be 6,334,068 people (NPCN, 2016) in the year 2020. Niger State shares common boundaries to the North with Zamfara State, to the North-East with Kaduna State, and to the South- East with the Federal Capital Territory (FCT) (NBS, 2018). The land area is about 76,363 square kilometres at a density of 72.76/square kilometres (NBS, 2018), with varying physical features like hills, lowlands, rivers and ample vegetation; enormously in the Northern Guinea Savannah. There are two separate seasons in Niger State: the dry and rainy seasons, which allow the production of numerous agricultural products. The State experiences average annual rainfall of up to 1,100mm in the North, lasting up to about 120 days and 1,600mm in the South which lasts up to 150 days (NBS, 2018). The highest temperature of

the State is about 340C between March and June (NBS, 2018). In this study Multistage, sampling technique was used to select 154 registered arable crop farmers from the study area. Data were collected using semi-structured questionnaires and analysis was conducted using descriptive statistics such as frequency, percentage count, and mean.

3. Result and Discussion

3.1. Socio-economic Characteristics of the respondents

3.1.1. Age of the respondents

The result in Table 1 shows that about 66.9% of the arable farmers were between the age brackets of 31-40 years. The mean age of the farmers is 34 years. This implies that the arable farmers are young and still in their active productive age, thereby constituting a readily available labor force for crop production. Hence, arable farming practices may be carried out with some relative ease. This result is in line with the result of Ahmed *et al.* (2020) who reveals that the majority (61.4%) of the farmers are between the ages of 31-50 years with an average of 33 years.

Sex of the respondents: Table 1 also revealed that majority (78.3%) of the farmers were males while male farmers accounted for only 21.7%. This implies that arable farming practices are mostly dominated by men in the study area as a result that arable crop farming practices are labor intensive. This result also disagrees with the findings of Nenzhelele *et al.* (2019) who reported that more than half (52.6%) of the farmers were female that carry out various farming activities in the production of cereals crop than their male counterpart.

3.1.2. Marital status of the respondents

However, majority (71.3%) of the respondents were married. This implies that most of the respondents are actively involved in arable crop production to cater for the household needs as a result that married respondents have family to cater for and the tendency for improving in farming activities to provide food for the family is relatively high. This result substantiates with the findings of Oli *et al.,* (2020) who pointed out that married persons were more involved in farming activities due to higher food demand in the household.

Table 1: Socio-economic characteristics of respondents

Variable	*Frequency*	*Percentage*	*Mean*
Age			
Less than 30 years	36	22.9	34 years
31-40 years	105	66.9	
41-50 years	11	7.0	
Above 50 years	5	3.2	
Sex			
Male	123	78.3	
Female	34	21.7	
Marital status			
Widow	26	16.6	
Divorce	5	3.2	
Single	14	8.9	
Married	112	71.3	
Formal education			
Yes	130	82.8	
No	27	17.2	

Source: Field Survey, 2024.

3.2. The arable farmers' perceptions on open grazing

The results in Table 2 shows the arable farmers perception on open grazing activities in the study area. However, the result shows that farmers are concerned about soil compaction and erosion caused by grazing animals ($\underline{X}$=3.14), the need for additional fencing and other protective measures increases production costs ($\underline{X}$=3.11), farmers perceive open grazing as a major threat to crop yields due to direct consumption and trampling of crops by livestock ($\underline{X}$=3.07) and repeated crop damage can threaten the livelihoods of farmers, leading to financial instability ($\underline{X}$=3.02) were ranked in the top four major arable farmers' perceptions on open grazing activities in the study area.

With respect to soil compaction and erosion caused by grazing animals which was ranked first with a mean of ($\underline{X}$=3.14) shows that soil compaction occurs when the weight and movement of grazing animals press down on the soil, reducing its porosity. This can lead to several negative outcomes, including poor water infiltration, reduced root growth, and diminished soil aeration. Erosion, on the other hand, can be exacerbated by the removal of

vegetation cover by grazing animals, which leaves the soil more vulnerable to wind and water erosion. However, increase cost of production due to additional fencing and other protective measures which was rank second with a mean of ($\underline{X}$=3.11) indicates that open grazing necessitates the implementation of measures to protect crops, such as the construction of fences and other barriers. These protective measures are essential to prevent livestock from accessing and damaging crops.

Table 2: Arable farmers' perception on open grazing

Perception statements	*SA (%)*	*A (%)*	*D (%)*	*SD (%)*	*WM*	*Rank*
Farmers are concerned about soil compaction and erosion caused by grazing animals	65(41.4)	54(34.4)	33(21.0)	5(3.2)	3.14	1st
The need for additional fencing and other protective measures increases production costs	79(50.3)	38(24.2)	19(21.4)	21(31.4)	3.11	2nd
Farmers perceive open grazing as a major threat to crop yields due to direct consumption and trampling of crops by livestock	80(51.0)	39(24.8)	8(5.1)	30(19.1)	3.07	3rd
Repeated crop damage can threaten the livelihoods of farmers, leading to financial instability	86(54.6)	14(8.9)	32(20.4)	25(15.9)	3.02	4th
The risk of crop damage from grazing discourages farmers from investing in their fields	76(48.4)	19(12.1)	42(26.8)	20(12.7)	2.96	5th
Many farmers develop a distrust of herders, believing that herders do not respect property boundaries and farming activities	83(52.9)	14(8.9)	25(15.9)	35(22.3)	2.92	6th
Open grazing often leads to conflicts between farmers and herders	65(41.4)	37(23.6)	28(17.8)	27(17.2)	2.89	7th
Farmers who suffer crop losses due to open grazing often demand compensation or restitution from herders or the government	64(40.8)	18(11.5)	42(26.8)	33(21.0)	2.81	8th
Livestock pollute water sources used for irrigation	81(51.6)	27(17.2)	22(14.0)	27(17.2)	2.72	9th

Source: Field survey, 2024. SA=strongly agree, A=agree, D=disagree, SD=strongly disagree.

Furthermore, open grazing as a major threat to crop yields due to direct consumption and trampling of crops by livestock was ranked third with a mean of ($\underline{X}$=3.07) this implies that farmers perceive open grazing as a significant threat to crop yields primarily due to the direct consumption and trampling of crops by livestock. When animals graze openly, they can eat young plants and trample over fields, causing physical damage to the crops. This agrees with Nenzhelele *et al.* (2018) who showed that the direct damage to crops by livestock trampling on young plants and compacting soil results in reduced yields and lower overall productivity.

More so, repeated crop damage can threaten the livelihoods of farmers, leading to financial instability with a mean of ($\underline{X}$=3.02) indicates that the cumulative effect of repeated crop damage due to open grazing can be devastating for farmers. The continuous threat and actual incidents of crop destruction disrupt farming activities and reduce the predictability of harvests. Repeated crop damage threatens the livelihoods of farmers by creating financial instability. Farmers rely on consistent and predictable crop yields to manage their finances, repay loans, and support their families. When crop yields are compromised, it can lead to financial losses, debt accumulation, and in severe cases, threaten the overall viability of the farming operation.

3.3. The effects of open grazing on production activities of arable farmers

The results in Table 3 shows the effects of open grazing on production activities of arable farmers in the study area. However, the result shows that, Open grazing can lead to conflicts between livestock and wildlife, potentially affecting biodiversity and crop pollination ($\underline{X}$=3.26), Livestock can introduce pests and diseases to crops, which can be difficult and costly to manage ($\underline{X}$=3.25), Livestock may compete with crops for water and nutrients, impacting crop growth and yield ($\underline{X}$=3.17) and Grazing can reduce plant diversity, affecting the overall health of the ecosystem and its services to agriculture ($\underline{X}$=3.12) were ranked in the top four major effects of open grazing on production activities of arable farmers in the study area.

Open grazing can lead to conflicts between livestock and wildlife, potentially affecting biodiversity and crop pollination was ranked first among the major effect of open grazing on production activities with a mean of ($\underline{X}$=3.26) which implies that open grazing can lead to direct interactions between livestock and wildlife, often resulting in competition for resources and habitat disruption. This interaction can negatively affect biodiversity and the ecological balance of the area. The presence of livestock in wildlife habitats can disturb native species, leading to decreased biodiversity. This reduction in biodiversity can impact crop pollination, as many pollinators are wildlife species whose habitats are disrupted by grazing. A decline in pollinator populations can adversely affect crop yields and overall

agricultural productivity. Additionally, conflicts between livestock and wildlife can lead to increased predation on livestock, prompting retaliatory actions from farmers that further harm wildlife populations.

Livestock can introduce pests and diseases to crops, which can be difficult and costly to manage was ranked second with a mean of ($\underline{X}$=3.25) this implies that livestock can be carriers of various pests and diseases that can easily transfer to crops. These pests and diseases can spread rapidly, especially in open grazing systems where livestock move freely between different areas. The introduction of pests and diseases to crops can result in significant agricultural challenges. Managing these issues often requires increased use of pesticides and other control measures, which can be both difficult and costly. Bukari and Kuusaana, (2021) also showed that outbreaks of diseases can cause severe crop losses, directly affecting farmers' incomes and food security. More so, avoiding dry season cultivation of crops was ranked second with a mean of ($\underline{X}$=3.40) which implies that avoiding dry season cultivation is a strategy employed by farmers to reduce the risk of crop damage from grazing livestock. During the dry season, grazing resources such as pasture and water become scarce, prompting herders to move their livestock closer to cultivated areas in search of food. The finding of Adesoji and Justin, (2019) also showed that by refraining from planting crops during the dry season, farmers minimize the chances of their fields being grazed upon by livestock. This strategy reduces the likelihood of crop destruction and the resulting economic losses. Help from local leaders to avoid impact of open grazing was ranked third with a mean of ($\underline{X}$=3.23) which shows that local leaders play a pivotal role in mediating conflicts and facilitating cooperation between herders and farmers. Their involvement is critical in implementing and enforcing regulations related to grazing activities.

Livestock may compete with crops for water and nutrients, impacting crop growth and yield was ranked third with a mean of ($\underline{X}$=3.17) implying that livestock grazing in areas close to crop fields can lead to competition for vital resources such as water and soil nutrients. Both crops and livestock require these resources for growth and productivity. Competition for water and nutrients can adversely affect crop growth and yield. Crops may suffer from reduced access to these essential resources, leading to stunted growth,

Table 3: The effects of open grazing activities

Variables	*SA (%)*	*A (%)*	*D (%)*	*SD (%)*	*WM*	*Rank*
Open grazing can lead to conflicts between livestock and wildlife, potentially affecting biodiversity and crop pollination	78(49.7)	55(35.0)	11(7.0)	13(8.3)	3.26	1st
Livestock can introduce pests and diseases to crops, which can be difficult and costly to manage	103(65.6)	12(7.6)	21(13.4)	21(13.4)	3.25	2nd
Livestock may compete with crops for water and nutrients, impacting crop growth and yield	70(44.6)	45(28.7)	42(26.5)	0(0)	3.17	3rd
Grazing can reduce plant diversity, affecting the overall health of the ecosystem and its services to agriculture	60(38.2)	60(38.2)	34(21.7)	3(1.9)	3.12	4th
Crop damage and reduced yields can lead to significant economic losses for farmers, impacting their livelihoods and food security	87(55.4)	14(8.9)	34(21.7)	22(14.0)	3.05	5th
Farmers may reduce fallow periods to prevent grazing, impacting soil recovery and future crop yields	80(51.0)	27(17.2)	21(13.4)	29(18.5)	3.04	6th
Overgrazing can lead to land degradation, reducing the long-term productivity of arable land	57(36.3)	61(38.9)	24(15.3)	15(9.6)	3.01	7th
Manure and urine from livestock can contaminate water sources used for irrigation, affecting crop health	73(46.5)	20(12.7)	41(26.1)	23(14.6)	2.91	8th
Livestock can spread weed seeds through their hooves and manure, leading to increased weed infestations in crop fields	70(44.6)	31(19.7)	20(12.7)	36(22.9)	2.86	9th

Source: Field survey, 2024. SA=strongly agree, A=agree, D=disagree, SD=strongly disagree

lower productivity, and poor-quality yields. This competition can be especially severe during periods of drought or in regions with limited water and nutrient availability. This agrees with Ahmed *et al.* (2020) who revealed that farmers may need to invest in additional irrigation and fertilization due to resource competition between herders-farmers conflict, further increasing production costs and potentially leading to resource depletion and environmental degradation.

However, grazing can reduce plant diversity, affecting the overall health of the ecosystem and its services to agriculture with a mean of ($\underline{X}$=3.12) shows that grazing activities can lead to a decrease in plant diversity within the ecosystem. Livestock often prefer certain plant species over others, leading to selective grazing and a reduction in the variety of plant species. Diverse plant communities provide various ecosystem services, such as soil stabilization, water filtration, and habitat for beneficial insects and other organisms. When plant diversity declines, these services are compromised, negatively impacting agricultural productivity and sustainability.

3.4. The effectiveness of coping strategies to open grazing activities

The results in Table 4 shows the effectiveness of the coping strategies to open grazing activities in the study area. However, the result shows that, Aids to the victim of herders-farmers conflict to reduce the tendency of reprisal attacks ($\bar{X}$=3.46), Avoid dry season cultivation of crops ($\bar{X}$=3.40), Help from local leaders to avoid impact of open grazing ($\bar{X}$ =3.23) and Creation of routes for cattle rearing to prevent trespassing on farmlands ($\bar{X}$ =3.11) were rank top four major effective coping strategies to open grazing activities on arable farmers in the study area.

Aids to the victim of herders-farmers conflict to reduce the tendency of reprisal attacks rank first with a mean of ($\bar{X}$ =3.46) which shows that, providing aid to victims of herders-farmers conflicts is essential for addressing immediate needs and reducing the likelihood of retaliatory violence. Conflicts between herders and farmers often result in property damage, loss of livelihoods, and injuries or fatalities. Offering support to victims can help rebuild trust and foster peaceful coexistence between herders and farmers. Aid can come in various forms, such as financial compensation, legal assistance, and rehabilitation programs.

Table 4: The coping strategies to the problem of open grazing

Effectiveness of the coping strategies	*SA (%)*	*A (%)*	*D (%)*	*SD (%)*	*WM*	*Rank*
Aids to the victim of herders-farmers conflict to reduce the tendency of reprisal attacks	103(65.6)	12(7.6)	21(13.4)	21(13.4)	3.46	1st
Avoid dry season cultivation of crops	107(68.2)	18(11.5)	20(12.7)	12(7.6)	3.40	2nd
Help from local leaders to avoid impact of open grazing	92(58.6)	22(14.0)	31(19.7)	12(7.6)	3.23	3rd
Creation of routes for cattle rearing to prevent trespassing on farmlands	52(33.1)	13(8.3)	48(30.6)	44(28.0)	3.11	4th
Forming of farmers group organizations	73(46.5)	20(12.7)	41(26.1)	23(14.6)	3.10	5th
Orientation of herders and farmers on the need to embrace peace in the practice of grazing and farming	40(25.5)	37(23.6)	65(41.4)	15(9.6)	3.07	6th
Early planting and harvesting	79(50.3)	32(20.4)	21(13.4)	25(15.9)	3.05	7th
Enacting open grazing prohibition law	63(40.1)	21(13.4)	35(22.3)	38(24.2)	2.93	8th
Used of local security agency	45(28.7)	42(26.8)	67(42.7)	3(1.9)	2.82	9th
Establishment of modern ranch for cattle rearing	55(35.0)	28(17.8)	25(15.9)	49(31.2)	2.56	10th

Source: Field survey, 2024. SA=strongly agree, A=agree, D=disagree, SD=strongly disagree.

By addressing the needs of affected individuals and communities, the risk of reprisal attacks diminishes, promoting stability and cooperation. With the support of local leaders, communities can develop and enforce agreements that delineate grazing areas and farming zones. This helps prevent livestock from straying into crop fields and causing damage. Local leaders can also mediate disputes, provide a platform for dialogue, and promote awareness about sustainable grazing practices. Their influence and authority are instrumental in fostering a sense of community and shared responsibility, leading to more effective management of open grazing activities and enhanced social cohesion.

Furthermore, creation of routes for cattle rearing to prevent trespassing on farmlands with a mean of ($\bar{X}$=3.11) shows that establishing designated routes for cattle rearing is a proactive measure to prevent livestock from trespassing onto farmlands. These routes, also known as cattle corridors or grazing pathways, provide a structured way for herders to move their livestock without encroaching on cultivated areas. The creation of cattle routes helps to clearly separate grazing areas from farmland, reducing the likelihood of conflicts and crop damage. This strategy requires careful planning and collaboration between herders, farmers, and local authorities. It involves mapping out routes, securing the necessary land, and potentially constructing infrastructure such as water points and resting areas for livestock. This agrees with the findings of Adeoye, (2020) who showed that creating livestock pathways reduces conflicts between farmers and herders over resources.

4. Conclusion

The result concludes that there is unfavorable arable farmers' perception on open grazing activities in the study area which shows that farmers are concerned about soil compaction and erosion caused by grazing animals and the need for additional fencing and other protective measures increases production costs as the most farmers' perception on open grazing activities. The result also concludes that, Aids to the victim of herders-farmers conflict to reduce the tendency of reprisal attacks and avoid dry season cultivation of crops were the most effective coping strategies to open grazing activities in the study area. Therefore, it was recommended that arable farmers should

be offered financial assistance or subsidies to farmers for the installation of fences and other protective measures. Additionally, provide technical guidance on cost-effective methods to safeguard crops from livestock, reducing the burden of increased production costs and protecting farmers' livelihoods from repeated crop damage.

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