

Impact of COVID-19 on livestock production and marketing in Nigeria

¹Awoyomi, O. J., ¹Olasoju, M.I., ¹Kehinde, O.O., ¹Adebowale, O.O., Awoyomi, F. S. O.
³Agbajelola, V. I., ⁴Ogugua, A. J.

¹Department of Veterinary Public Health and Preventive Medicine, Federal University of Agriculture, Abeokuta

²Department of Agricultural Economics, University of Ibadan, Ibadan, Nigeria

³Department of Veterinary Parasitology and Entomology, University of Ibadan, Ibadan, Nigeria

⁴Department of Veterinary Public Health and Preventive Medicine,
University of Nigeria, Nsukka, Nigeria



Corresponding author: jojuawoyomi@yahoo.com; +2348034000451

Abstract

The current COVID-19 pandemic has exposed the agricultural value chains in Nigeria to economic uncertainties with the livestock sector at the receiving end of the impact of the accompanying effects. The present study assessed the extent of the impact of COVID-19 pandemic on livestock farmers. A web-based cross-sectional online questionnaire survey was conducted in randomly selected 12 States in Nigeria. Data gathered through the questionnaire included; respondents' demographic characteristics, knowledge and attitude regarding COVID-19 pandemic, extent of impact of the pandemic, farm activities severely affected and mitigation efforts made by the affected livestock farmers. Data obtained were analyzed using descriptive statistics, including frequency count, percentage, mean and confidence interval set at $p < 0.05$. This study revealed that majority (73%) of the livestock farmers were aware of COVID-19 pandemic, 66% practiced intensive farming system while 62% were into poultry production. Knowledge and attitude of livestock farmers regarding COVID-19 revealed that 86% of the respondents believed that COVID-19 did not have a specific drug for treatment, 97% agreed with the principle of hand washing, 70% had hand washing stations on their farms while 59% believed that animals could be infected with the disease. Of the extent of the impact of COVID-19, 42% claimed to have had high blood pressure, 80% lacked funds to run their farms while 27% witnessed the loss of loved ones, 86% of the farmers were severely affected in marketing of their products and services; 72%, 52% and 72% were affected in restocking, farm cleaning and transportation, respectively. As a result of the pandemic, 39% sought for loans and reduced labour, 24% stopped payment of salaries while 23% reduced the quantity and quality of feeds given to their animals. The present study highlighted the devastating effects of the COVID-19 pandemic on the livestock industry in Nigeria. Therefore, concerted efforts to ensure the survival of the livestock industry must be put in place by individuals and the government at large to salvage current situation and emergency preparedness protocol should be put in place in case of future occurrence.

Keywords: COVID-19 pandemic, livestock farmers, industry, impact, Nigeria

Impact de Covid-19 sur la production et la commercialisation du bétail au Nigéria



Résumé

La pandémie Covid-19 actuelle a exposé les chaînes de valeur agricole au Nigéria aux incertitudes économiques avec le secteur de l'élevage à la fin de l'impact des effets ci-joints.

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La présente étude a évalué l'étendue de l'impact de la pandémie de Covid-19 sur les éleveurs. Un questionnaire en ligne transversal en ligne basé sur le Web a été mené à 12 états sélectionnés au hasard au Nigéria. Données recueillies dans le questionnaire incluse; Les caractéristiques démographiques des répondants, les connaissances et l'attitude concernant la pandémie de Covid-19, l'étendue de l'impact de la pandémie, les activités agricoles gravement touchées et les efforts d'atténuation apportés par les éleveurs affectés. Les données obtenues ont été analysées à l'aide de statistiques descriptives, y compris le nombre de fréquences, le pourcentage, l'intervalle moyen et la confiance définie à $P < 0,05$. Cette étude a révélé que la majorité (73%) des éleveurs étaient au courant de la pandémie de Covid-19, 66% ont pratiqué un système agricole intensif, tandis que 62% étaient en production de volaille. Les connaissances et l'attitude des éleveurs d'élevages concernant Covid-19 ont révélé que 86% des personnes interrogées pensaient que COVID-19 n'avait pas de médicament spécifique pour le traitement, 97% d'accord avec le principe de lavage des mains, 70% avaient des stations de lavage des mains sur leurs fermes Bien que 59% croyaient que les animaux pouvaient être infectés par la maladie. De l'ampleur de l'impact de COVID-19, 42% ont affirmé avoir eu une pression artérielle élevée, 80% manquaient de fonds pour gérer leurs fermes, tandis que 27% ont été témoins de la perte de proches, 86% des agriculteurs ont été gravement touchés dans la commercialisation de leurs produits et services; 72%, 52% et 72% ont été touchés dans le réapprovisionnement, le nettoyage de la ferme et le transport, respectivement. À la suite de la pandémie, 39% cherchent de prêts et de main-d'œuvre réduite, 24% ont arrêté le paiement des salaires tandis que 23% ont réduit la quantité et la qualité des aliments d'alimentation donnés à leurs animaux. La présente étude a mis en évidence les effets dévastateurs de la pandémie Covid-19 sur l'industrie du bétail au Nigéria. Par conséquent, les efforts concertés visant à assurer la survie de l'industrie du bétail doivent être mis en place par des individus et le gouvernement en général à la sauvegarde de la situation actuelle et du protocole de préparation aux situations d'urgence devraient être mis en place en cas d'occurrence future.

Mots-clés: Covid-19 Pandémie, élevage, industrie, impact, Nigeria

Introduction

The coronavirus disease (COVID-19) is a highly infectious disease that is caused by the novel coronavirus (CoV) called the SARS-CoV-2, which belongs to the species of the Severe Acute Respiratory Syndrome-related CoVs (SARS-rCoV) of the subgenus *Sarbecovirus* and genus *Betacoronavirus* (Woolhouse *et al.*, 2016; Becker *et al.*, 2019; WHO, 2020). The disease is characterized by a pneumonia-like illness, and was first detected and recorded in a city named Wuhan in China (Lone and Ahmad, 2020; WHO, 2020), and it has thus spread globally since its emergence in 2019; causing widespread damage both in the developed and developing nations globally (WHO, 2020;

Marchant-Forde and Boyle, 2020). In Africa, the first case of COVID-19 Africa was reported on February 15, 2020 in Egypt, while the first case in sub-Saharan Africa was reported on February 27, 2020, in Lagos State, Nigeria. Since then, the virus has spread to other states in the country, with currently over 165,000 confirmed cases and more than 2000 deaths recorded nationwide (WHO, 2020). Globally, fatalities have been increasing gradually, and currently over 157 million cases have been confirmed, including more than 3 million deaths reported to the World Health Organization, WHO (2021). Indeed, COVID-19 pandemic has caused several alterations in human activities and further disruptions in livelihood and access to food

globally, the effects being increasingly stern in developing nations of the world (FAO, 2020a). Meanwhile, the International Food Policy Research Institute (IFPRI) has predicted that an additional 140 million people could fall into extreme poverty, lack, and hunger in sub-Saharan Africa due to the COVID-19 pandemic, suggesting that the pandemic is far more than a health crisis, but also affecting societies, economies and threatening people's lives and livelihood globally (IFAD, 2020). Besides the medical health implications of the pandemic, other vital sectors such as the agricultural value chain, like livestock production and management services are being impacted by the disease because of the cardinal roles that play in nutrition, livelihood, and food security (Bisson and Hambleton, 2020). Fundamentally, livestock production serves as the primary form and source of income, savings, and non-monetary wealth, as well as an important food source for millions of households globally (Mercycorps, 2020). Similarly, the livestock production sector also serves as an important source of high value animal protein for the large majority of the world's population (WHO, 2020b). In Africa, livestock production and marketing form the major livelihood and economic basis for about 75-90% of local economies (Mercycorps, 2020), creating on and off-farm livelihoods for roughly 43 million people across the Horn of Africa (Saitone and Sexton, 2017; Perdijk *et al.*, 2018; Mercycorps, 2020). While the current COVID-19 pandemic has been originally tagged the most challenging crises since world war II and projected to lead to global recession (Lederer, 2020), the current pandemic trend has led most, if not all, countries to shut down the economy, so as to slow down the spread of the virus, however, other aspects of public health, global economies and food supply are being affected. With this sad development, household food security is currently being

threatened (Kurns, 2020; Rahman and Chandra, 2021), and it has exposed the agricultural value chain to economic uncertainties (Lederer, 2020). Although, the global use of public health measures such as social distancing, self-isolation, lockdown, and border closures to reduce the spread of the virus is commendable and effective, however the resulting impact on the economy is nothing to be desired (Ojediran *et al.*, 2021). Since these measures have been instituted, demand and supply of goods has been in shockwaves (FAO, 2020b), as the transportation of people and goods have been severely hampered by movement restrictions (UNCTAD, 2020). In several parts of the world, COVID-19 and its accompanying effects have severely impacted millions of dairy and commercial poultry farms in several parts of the world, as many farms have been shut down or suspended because the burden of continuous losses is unbearable (Marchant-Forde and Boyle, 2020). In some places, animal products have remained unsold for days leading to daily losses in the livestock sector, and as things stand the situation might result in a global food crisis due to the seemingly gradual collapse of the livestock sector (Marchant-Forde and Boyle, 2020). Similarly, the COVID-19 pandemic has equally impacted several sub-sectors including food safety and hygiene issues that are also linked to the management and consumption of the animal products because of the high cost of production, lack of access to feeds and veterinary services (AU-IBAR, 2020; Rahman and Chandra, 2021). The livestock sector in Nigeria, like other African countries is not being spared from the attendant impacts of the present pandemic along the livestock value chain from animal production, trade, transport, processing, marketing of goods, services, feeds and farm inputs as well as the provision of veterinary services. Therefore, there is a

need to evaluate the effects of the COVID-19 pandemic on some of the highlighted subsectors of the livestock industry in the country in order to provide baseline research data and more importantly to suggest to stakeholders and government on how best to lessen the effects on farmers and individuals involved in livestock production, hence this present study has been conducted to that effect.

Materials and methods

Study area

The study was conducted in 12 states in Nigeria comprised of Abia, Ekiti, Enugu, FCT, Kaduna, Kwara, Lagos, Ogun, Ondo, Osun, Oyo, and Sokoto, cutting across five out of six geo-political zones and covered 40 Local Government Areas. Nigeria has six geo-political zones (South-south, South-west, South-East, North central, North east and North-west) with variable climatic conditions, which provide favourable environments for livestock rearing.

Study design/ sample size determination and data collection

The study was designed to gather qualitative information mainly from livestock farmers to assess the extent of impact of COVID-19 on the livestock sector. The respondents were mainly from the poultry, piggy, fishery and cattle sectors. A web-based cross-sectional online questionnaire survey was conducted in randomly selected 12 States in Nigeria (Figure 1) between 11 August, 2020 and 15 October 2020. A structured questionnaire was designed for the purpose of this study.

The questionnaire was divided into five sections, viz: (i) Livestock farmers' demographic characteristics (9 questions), (ii) knowledge and attitude of livestock farmers regarding COVID-19 pandemic (12 questions), (iii) extent of impact of COVID-19 pandemic on livestock farmers (16 questions), (iv) Farm activities severely affected by COVID-19 (6 questions) and (v) mitigation efforts made by the affected livestock farmers (6 questions). The questionnaire was pre-validated and pretested. The responses from the pre-test were not included in the analysed data. The questionnaire was designed in English Language on Google forms software package and deployed through email and other social media platforms (WhatsApp) to livestock farmers. Participation was voluntary based on individual's availability and willingness to participate in the study and everyone was given opportunity to discontinue participation at any stage of the study without prejudice in line with Helsinki Declaration (World Medical Association, 2001).

Data analysis

Data obtained were coded and entered into Microsoft Excel® (Microsoft Corporation, Redmond, WA, USA) spread sheet, and analyzed using Statistical Package for Social Sciences IBM SPSS version 20.0 (SPSS Inco. Chicago, IL, USA). The data obtained were analyzed using descriptive statistics, including frequency count, percentage, mean and confidence interval set at $p < 0.05$.

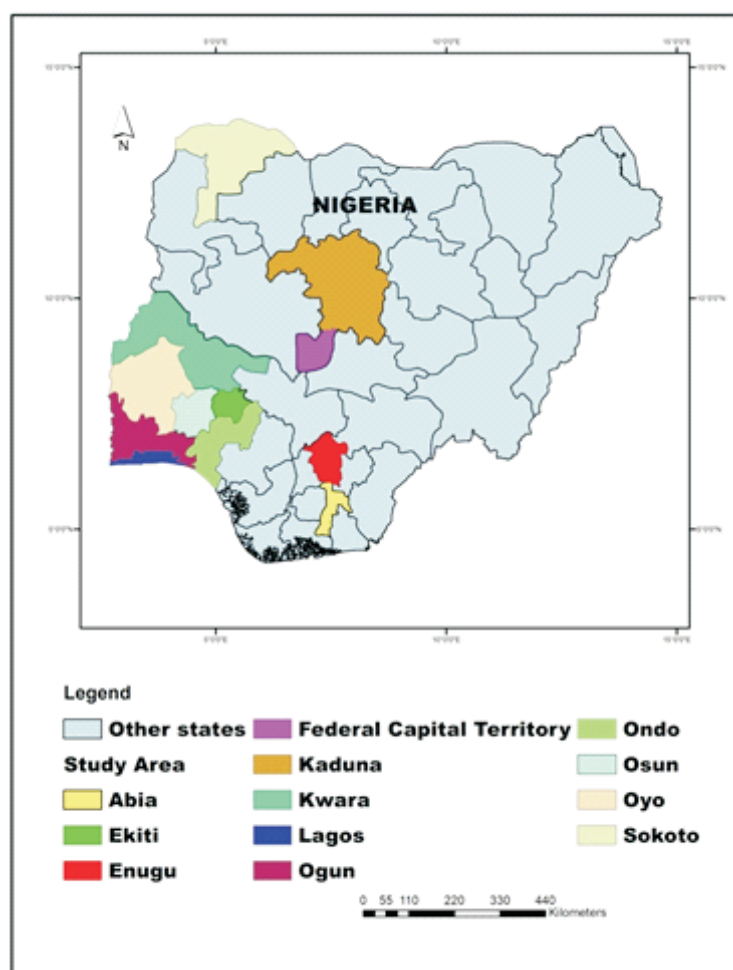


Figure 1: Map of Nigeria showing the study area

Results

Demographic characteristics of respondents

Following the total number (73) of farmers that responded across the 12 states in Nigeria; 56% were male, with majority (40%) between the ages of 31-41 years old. More so, 44% of the livestock farmers practice the profession as their primary occupation, additionally 97% of all the respondents had tertiary education. 78% of the farmers interviewed in this study have been in the livestock industry for at least 15 years, while about 66% practiced intensive farming system of livestock production.

62% of the livestock farmers interviewed were into poultry production while 16% were predominately pig farmers, 14% and 10% of the farmers were into cattle production and aquaculture respectively. The highest numbers of respondents were from Ogun State (37%) (Table 1).

Knowledge and attitude of farmers

From this study, 73% of respondents were aware and also agreed that COVID-19 is real. More so, 75% of all the respondents considered themselves to be at risk of contracting the disease, however only 25% of the farmers interviewed did not think they could be infected with the disease.

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Although 20% of all the respondents were of the opinion that COVID-19 outbreak is just a conspiracy 55% of respondents believed that the infection is a natural disease outbreak. In regards to knowledge of the disease prevention, 86% of the respondents believed that COVID-19 does not have a specific drug for treatment, while 97% of the farmers agreed with the principle of regular hand wash for the prevention of the disease. It is noteworthy

that all (100%) the respondents agreed to the use of face mask in public places for the prevention of the disease, while 85% of farmers noted that they would report at the isolation centres in case they contract the infection. According to the respondents, 70% of them had hand wash stations on their farms. While 93% of respondents do not believe that COVID-19 vaccine exists, 59% agreed that animals can also be infected with the disease (Table 2).

Table 1: Demography of respondents

Demographic characteristics	Variables	Proportions (%)	95% CI
Sex	Male	56 (76.71)	65.3-85.81
	Female	17 (23.29)	14.19-34.65
Age	18-30	9 (12.33)	5.8-22.12
	31-40	29 (39.73)	28.45-51.86
	41-55	28 (38.36)	27.21-50.48
	Above 55	7 (9.5)	3.94-18.76
Primary occupation	Livestock farming	32 (43.84)	32.44-55.95
	Others	41 (56.16)	45.05-67.76
Educational level	Secondary	2 (2.74)	0.33-9.55
	Tertiary	71 (97.26)	90.45-99.67
Marital status	Single	13 (17.81)	9.84-28.53
	Married	59 (80.82)	69.92-89.10
	Widow(er)	1 (1.37)	0.03-7.40
Religion	Christianity	58 (79.45)	68.38-88.02
	Islam	14 (19.18)	10.90-30.08
	Traditional	1 (1.37)	0.03-7.40
Year of experience	>15	16 (21.92)	13.08-33.14
	-	57 (78.08)	66.86-86.92
Years of experience (mean)		10.72 ± 7.46	
System of farm	Extensive farming	12 (16.44)	8.79-26.95
	Intensive farming	48 (65.75)	53.77-76.47
	Large scale farming	13 (17.81)	9.84-28.53
Animal reared	Poultry	62 (100.0)	94.22-100.0
	Piggery	16 (100.0)	79.41-100.0
	Fishery	10 (100.0)	69.15-100.0
	Cattle	14 (100.0)	76.84-100.0

Table 2: Knowledge and attitude of livestock farmers towards COVID 19

Variables	Proportions (%)	95% CI
Is COVID-19 outbreaks real?		
Yes	73 (100.00)	95.07-100.0
Can you contract COVID-19		
Yes	55 (75.34)	63.86-84.68
No	18 (24.66)	15.32-36.14
COVID-19 outbreak is a conspiracy		
Yes	15 (20.55)	11.98-31.62
No	58 (79.45)	68.38-88.02
COVID-19 is a natural disease outbreak		
Yes	40 (54.79)	42.70-66.48
No	33 (45.21)	33.52-57.03
COVID-19 has specific drug for treatment		
Yes	10 (13.70)	6.77-23.75
No	63 (86.30)	76.25-93.23
I agree with principle of regular hand wash for prevention of spread		
Yes		
No	71 (97.26)	90.45-99.67
	2 (2.74)	0.33-9.55
I agree with wearing of face mask while in public places		
Yes	73 (100.00)	95.07-100.0
Peradventure I contract COVID -19 I will report at the isolation centre		
Yes	62 (84.93)	74.64-92.23
No	11 (15.07)	7.77-25.36
I am conscious of COVID-19 wherever I go		
Yes	69 (94.52)	86.56-98.49
No	4 (5.48)	1.51-13.44
I have hand wash stations on my farm		
Yes	51 (69.86)	58.00-80.06
No	22 (30.14)	19.94-42.00
Vaccine is available against COVID-19		
Yes	5 (6.85)	2.26-15.26
No	68 (93.15)	84.74-97.74
Animals can be infected with COVID-19		
Yes	29 (39.73)	28.45-51.86
No	43 (58.90)	46.77-70.29
No Response	1 (1.37)	0.03-7.40

Extent of impacts of COVID 19 pandemic on livestock farmers

According to the respondents, during this outbreak in the study areas, about 67% of livestock farmers were unable to give maximum attention to their livestock, with about 27% of them witnessed the loss of their loved ones. Similarly, 80% of farmers lacked funds to run their farms and businesses during the pandemic, while 69% of them were also being harassed by police officers, hence farmers were adversely

affected by the movement restriction road blockade along farm roads (Table 3). Farmers (74%) found it difficult to access quality feeds, while over 80% of the respondents noted that cost of inputs increased. From our study, 72% of the interviewed farmers claimed to be emotionally stressed, while only 18% could not tell if they were emotionally stressed or not. In fact, 42% of farmers claimed to have had high blood pressure due to the effects of the pandemic on their livestock production.

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Table 3: Extent of impacts of COVID 19 pandemic on livestock farmers

Variables	Proportions (%)	95 % CI
I was unable to give maximum attention to livestock		
Strongly disagree	2 (2.74)	0.33-9.55
Disagree	8 (10.96)	4.85-20.46
Neither agree nor disagree	15 (20.55)	11.98-31.62
Agree	28 (38.36)	27.21-50.48
Strongly agree	20 (27.40)	11.61-39.09
Lost loved ones		
Strongly disagree	13 (17.81)	9.84-28.53
Disagree	12 (16.44)	8.79-26.95
Neither agree nor disagree	28 (38.36)	27.21-50.48
Agree	11 (15.07)	7.77-25.36
Strongly agree	9 (12.33)	5.8-22-12
I lacked funds to run the farm		
Strongly disagree	2 (2.74)	0.33-9.55
Disagree	5 (6.85)	2.26-15.26
Neither agree nor disagree	8 (10.96)	4.85-20.46
Agree	31 (42.47)	30.97-54.59
Strongly agree	27 (36.99)	25.97-49.09
I was unable to sell my products		
Strongly disagree	1 (1.37)	0.03-7.40
Disagree	5 (6.85)	2.26-15.26
Neither agree nor disagree	3 (4.11)	0.86-11.54
Agree	34 (46.58)	34.80-58.63
Strongly agree	30 (41.10)	29.71-53.23
There was harassment by law enforcement officers		
Strongly disagree	4 (5.48)	1.51-13.44
Disagree	5 (6.85)	2.26-15.26
Neither agree nor disagree	14 (19.18)	10.90-30.08
Agree	18 (24.66)	15.32-36.14
Strongly agree	32 (43.84)	32.24-55.95
Most roads linking communities were closed down		
Strongly disagree	2 (2.74)	0.33-9.55
Disagree	4 (5.48)	1.51-13.44
Neither agree nor disagree	7 (9.69)	3.94-18.76
Agree	25 (34.25)	23.53-46.28
Strongly agree	35 (47.95)	36.10-59.96
Restriction of movement		
Strongly disagree	2 (2.74)	0.33-9.55
Disagree	1 (1.37)	0.03-7.4
Neither agree nor disagree	2 (2.74)	0.33-9.55
Agree	28 (38.36)	27.21-50.48
Strongly agree	40 (54.79)	42.70-66.48
It was difficult to get labour for farm work		
Strongly disagree	3 (4.11)	0.86-11.54
Disagree	4 (5.48)	1.51-13.44
Neither agree nor disagree	13 (17.81)	9.84-28.53
Agree	23 (31.51)	21.13-43.44
Strongly agree	30 (41.10)	29.71-53.23

It was difficult to get labour for farm work		
Strongly disagree	3 (4.11)	0.86-11.54
Disagree	4 (5.48)	1.51-13.44
Neither agree nor disagree	13 (17.81)	9.84-28.53
Agree	23 (31.51)	21.13-43.44
Strongly agree	30 (41.10)	29.71-53.23
Theft cases increased		
Strongly disagree	2 (2.74)	0.33-9.55
Disagree	3 (4.11)	0.86-11.54
Neither agree nor disagree	21 (28.77)	18.77-40.55
Agree	23 (31.51)	21.13-43.44
Strongly agree	24 (32.88)	22.33-44.87
Drugs were difficult to access		
Strongly disagree	4 (5.48)	1.51-13.44
Disagree	6 (8.22)	3.08-17.04
Neither agree nor disagree	9 (12.33)	5.80-22.12
Agree	33 (45.21)	33.52-57.30
Strongly agree	21 (28.77)	18.77-40.55
Veterinary services were difficult to access		
Strongly disagree	5 (6.85)	2.26-15.26
Disagree	6 (8.22)	3.08-17.04
Neither agree nor disagree	12 (16.44)	8.79-26.95
Agree	32 (43.84)	32.24-55.95
Strongly agree	18 (24.66)	15.32-36.14
Quality feed were difficult to access		
Strongly disagree	1 (1.37)	0.03-7.40
Disagree	4 (5.48)	1.51-13.44
Neither agree nor disagree	14 (19.18)	10.90-30.08
Agree	30 (41.10)	29.71-53.23
Strongly agree	24 (32.88)	22.33-44.87
Cost of inputs increased		
Strongly disagree	2 (2.74)	0.33-9.55
Neither agree nor disagree	2 (2.74)	0.33-9.55
Agree	18 (24.66)	15.32-36.14
Strongly agree	51 (69.86)	58.00-80.06
Nearness to market		
Strongly disagree	2 (2.74)	0.33-9.55
Disagree	4 (5.48)	1.51-13.44
Neither agree nor disagree	22 (30.14)	19.94-42.00
Agree	35 (47.95)	36.10-59.96
Strongly agree	10 (13.70)	6.77-23.75
I had emotional distress		
Strongly disagree	2 (2.74)	0.33-9.55
Disagree	5 (6.85)	2.26-15.26
Neither agree nor disagree	13 (17.81)	9.84-28.53
Agree	30 (41.10)	29.71-63.23
Strongly agree	23 (31.51)	21.13-43.44

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Farm activities severely affected by COVID-19 pandemic

Eighty six percent of the respondents noted that marketing of their products and services were severely affected, while only 14% of the farmers were not severely affected. Moreover, 56% of respondents also claimed that routine treatment practices were severely affected by the

pandemic, similarly 79%, 52% and 72% of the farmers noted that restocking, farm cleaning and transportation of goods respectively were severely affected. However, waste disposal was not severely affected, as only 36% of the farmers claimed to have difficulty in waste disposal as a result of the pandemic (Table 4).

Table 4: Farm activities severely affected by COVID 19 Pandemic

Variables	Proportions (%)	95% CI
Marketing of products		
Severe	63 (86.30)	76.25-93.23
Not severe	10 (13.70)	6.77-23.75
Routine treatment of livestock		
Severe	41 (56.16)	44.05-67.76
Not severe	32 (43.84)	32.24-55.95
Restocking		
Severe	58 (79.45)	68.38-88.02
Not severe	15 (20.55)	11.98-31.62
Cleaning of farms		
Severe	38 (52.05)	40.04-63.90
Not severe	35 (47.95)	36.10-59.96
Transportation of products		
Severe	57 (78.08)	66.86-86.92
Not severe	16 (21.92)	13.08-33.14
Waste disposal		
Severe	26 (35.62)	24.75-47.69
Not severe	47 (64.38)	52.31-75.25

Mitigation efforts made by the affected farmers

As a result of the pandemic, 39% of respondents sought for loans, while other 39% decided to reduce labour force, while 24% stopped payment of salaries and stipends to employees. 23% of the farmers

reduced staff salaries and 23% decided to reduce both the quality and quantity of feeds served to the animals on their farms, moreover, only 6% of the respondents reacted by increasing the feeding intervals of their livestock to save feeds (Table 5).

Table 5: Mitigation

Variables	Frequencies	Percentage
Seek for loans	39	53.3
Reduce my labour force	39	53.4
Stop payment of employees	24	32.9
Reduce payment of employees	23	31.5
Reduce quantity and quality of feed	23	31.5
Increase time interval of feeding of livestock	6	8.2

Discussion

Livestock farming contributes immensely to the overall food supply (in terms of variety of dairy products such as milk, meat, wool, eggs, fibre, feathers, hides and skins etc.) in both the rural and urban areas of a given society. More so, the industry is a major employer of labour, as it stimulates transactions through the demand for goods and services, as well as economic transformation by contributing to human and financial capital flow (FAO, 2018). However, whenever there is an outbreak of infectious disease, the effects are seen on the different sectors that are directly under the purview of the overall food supply chain, increases in hunger and malnutrition (Burgui, 2020; Sar *et al.*, 2010). Additionally, the resulting difficulties, laws and policies aimed at mitigating the spread might also affect several sectors and arms of the livestock industry and the global economic status. When the disease progresses, the economic situation worsens, while the process of implementation of public health measures (movement restrictions, lock down etc.) become increasingly stringent, labour shortages and farmers find marketing of goods and services difficult and if not almost impossible. The present COVID-19 has had a substantial impact on many sectors at global, regional and national levels, including the livestock sector (FAO, 2020; G20, 2020). Consequent upon this, several countries have taken measures such as lockdown, travel restrictions and border controls, to curtail the global spread of the disease. However, these measures have resulted in unplanned or negative consequences for the livestock industry (FAO, 2020c). The present study highlights several demographic parameters in livestock production in Nigeria, showing that more males were involved in livestock farming than their female counterpart, this observation is in agreement with similar

studies by Oyediran *et al.* (2015) and Ojediran *et al.* (2021), and might be thus due to the fact that the livestock industry is energy demanding, of which the male gender are more often than not available and possess the requisite physical strength and most preferred on the farm to do the work, hence the dominance of the male in the farming profession. Moreso, men seem to be always on the farm and willing to work on the farm as managers and supervisors and are invariably the personnel always readily available to answer to research teams and respond to questionnaire on the farm. Moreover, most of the respondents in the present study were between the ages of 31 to 41 years; this is somewhat similar with the findings of Adebo (2014), Adeola and Adetunbi (2015) and Ojediran *et al.* (2021). The reason might be that, these age group (31-41 years) are quite energetic and active, being in their productive and youthful ages, and due to the peculiarity of the Nigerian system, they form a bulk of the unemployed youth group, hence most might see agriculture and livestock production industry as the only feasible industry they can fit into to make a good and decent living. In this study, interestingly it was observed that most of the livestock farmers who responded, were well learned up to tertiary level of education, this observation was also made in a similar study by Ojediran *et al.* (2021). However, the present study recorded a higher proportion of educated farmers, this might partly be due to the present increases in self-empowerment and self-employment among the Nigerian youths (Oyediran *et al.*, 2015), which might be due to the prevailing economic realities occasioned by the growing unemployment rate in the country. Although, on the other hand, the influx of young creative and learned minds into the livestock industry in Nigeria might be a strong indication for improved farming and management systems in the industry, since

more educated minds are getting involved in the industry. In a contrary and concerned view point however, the reason for this observation might simply just be because most respondents might just be graduates who may not educationally qualified to work in the livestock industry and are not even willing to learn, while probably in the industry just because there is now white-collar job. More so, its noteworthy that the questionnaire was administered online through Google forms, hence for the respondents to fill them, it requires some appreciable level of literacy. In another observation, all of the respondents have been into livestock practices for a minimum of 15 years, this finding is in contrast to a similar study by Ojedianet *al.* (2021) and this therefore is indicative of the fact that, the respondents have much experience and are quite fairly familiar with practices on the farm. While majority of the educated farmers practiced intensive farming in Nigeria (Omoareet *al.*, 2014), the present study also revealed the same opinion among livestock farmers, as more of the farmers are into poultry production, which is more or less agreed to be the most popular and widely patronized aspects of livestock production in Nigeria (Ogunsumi, 2005; 2015), although several fields of livestock production including piggery, dairy and aquaculture are receiving more attention (Ogunsumi, 2015). Pertaining to the knowledge and farmers' attitude, it was observed from the study that all the respondents knew about the COVID-19 pandemic, this is not unexpected as almost all news agencies and media houses brought the awareness to the public, more so coupled with the internet facility accessible by most if not all the farmers considering their literacy levels and academic qualifications. Astonishing however, while majority of the farmers considered themselves to be at risk of the disease, some still did not they could be infected with the

infection, this group of people might probably be those who that are not well educated or informed properly about the infection, or perhaps those some who consider the pandemic an hoax and a conspiracy. It is interesting to note that because of the presence of countless articles on the internet and propagandas about the pandemic, some farmers still hold to the claim that COVID-19 might be a conspiracy theory after all. While some farmers do not believe that it is a conspiracy, some opined that it's a natural disaster (Gibbens, 2020; Hein, 2020). Moreover, it is interesting to note that farmers in these study areas were careful to ensure safety practices on their respective farms, to forestall the spread of the infection to family members, visitors and co-workers. While a greater proportion believed that there is no specific drug to treat the infection, hence they have resorted into ensuring preventive measures are put in place on their farms. Livestock production in Nigeria is mostly the principal source of income and livelihood to most households, so therefore any activities that may hinder or affect the smooth running of the business must be carefully considered, hence even though some farmers may consider the disease a conspiracy and hoax, a large number of them would report themselves to isolation centres if affected, and take the vaccine if it ever exist, and more so protect their animals since they believe that the disease can be transmitted to animals. As a result of the pandemic, various health bodies and government agencies rolled out measures they deemed fit and sanctioned by the WHO to contain the spread and prevent the devastating effects of the disease globally. Unfortunately, however, the livestock industry was grossly and severely affected by these measures; the use of public health measures like physical distancing, household isolation, massive lockdown, and border closures to slow the

spread of the new virus is no doubt working, but not without delivering a significant fall in economic activity. Consequent upon the pandemic, most farmers in the study areas were unable to pay maximum attention to their livestock, law enforcement agencies exploited the opportunity to harass farmers, and even though some states provided exemption documents for some essential workers like health workers and those in the agricultural sectors, farmers were still being harassed and hindered from visiting their farms, sell their products and gain access to feed for their livestock. Furthermore, several agricultural firms took advantage of the situation to increase cost of feed and farm inputs, partly because most of these inputs are not locally manufactured, more so, there is a global movement restriction on international travels and movement, hence sellers are being forced to increase the prices of their goods and services. As a result, the possibility of emotional stress abounds in situation like this, hence some of the respondents reported that they developed high blood pressure, although this claim seems a bit bogus and unconfirmed, it is however important to determine scientifically the direct and erstwhile indirect correlation between the current COVID-19 pandemic and emotional stress in farmers in Nigeria. From this study, the impact of COVID-19 on livestock production is all encompassing, as almost all of farm activities were affected. The respondents observed that the pandemic situation caused severe constraint and reduction in the marketing of products and services, the obvious disturbance and disruption of the logistical channel and drop in demand could affect the sales and prices of animal products, this may be largely due to the social distancing policies of federal and state government and also movement restrictions that reduced the efficiency of the marketing. As a result of restricted access to markets and processing plants,

farmers might have to keep their stock longer on the farm, leading to higher production costs and losses (Bekuma, 2020). Although in most states, the markets were opened, however, since transportation services were impaired because of the restrictions, the efficiency of the industry was hitherto compromised severely. Similarly, the movement restrictions and imposed curfew could have resulted in shortage of labour force and reduced supply of raw materials, feeds or other ingredients and consequent delayed production and supply (Attwood, 2020; FAO, 2020; FAO, 2020; WHO, 2020c). Moreover, the respondents noted that there was reduction in the treatment options available to livestock on the farms resulting in the general reduction in animal health activities. This can also be due to the labour shortage (AVMA, 2020), as a result of the various public health measures like social distancing and movement restriction, there might be a reduced inclination (by hired workers and animal health officers) to work on animal health activities, and carry out essential activities on the farm, because of the stress involved in ensuring regular visits; more so, since the hike in transportation cost, hence periodic and scheduled visits may not even be possible (Bekuma, 2020), therefore, the current situation would most likely lead to disruption in animal disease and surveillance reporting (WHO, 2020c). Additionally, overstocking of animals could become another practice by hired workers who would attempt to maximize their time on the farm (perhaps the visitation frequency would have reduced drastically), hence increase stress and occurrence of animal diseases, which can compromise animal welfare standards. Obviously, the movement restrictions limited farmers' ability to access basic veterinary services and animal health inputs, such as veterinary drugs, vaccines,

disinfectants and supplies and challenges for veterinary and veterinary professionals to visit the farms (Slabodkin, 2020; Herper and Branswell, 2020). The present study also observed that farmers' ability to restock was severely impacted by the current pandemic, since the movement restrictions and disruption of national and international trade routes has impacted access to breeding materials and replacement stocks (e.g. day-old chicks, semen, heifers, piglet and gilts), breeding materials and other important farm accessories (Barrett, 2020; FAO, 2020; CDC, 2020; Weersink *et al.*, 2020). With all these severely affected, the sales of input providers can be compromised, while the disruption of public services (e.g. food safety inspection and animal health extension services), combined with interrupted delivery and use of vaccines and medicines is increasing the likelihood of new epidemics, including those involving animal diseases that cause major livestock losses and outbreaks of diseases (FAO, 2020) transmissible to humans, because of the apparent reduction in testing and diagnosis (Slabodkin, 2020; Herper and Branswell, 2020). While farmers and their livestock were severely hit by the current pandemic, several mitigatory measures are being exploited by farmers, such as application for agricultural loans, some of which the federal government have made provisions for including the Central Bank of Nigeria COVID-19 loan (CBN-NIRSAL, 2021) and others portals, while some could not afford to keep the same work force on the farm pre-COVID era, because of the economic burden of the current pandemic. While other farms have resorted into reduction in salary or outright stoppage of worker's salary, of which the effect will be directly felt on the livestock on the farm through neglect of duty or can even lead to outright closure of the farm, more so, the effect of which will eventually lead to increase in the

staggering unemployment rate in the country. Sadly enough, unhealthy and sharp practices of reduction in both the quantity and quality of feeds are also being employed as a strategy to save cost and reduce further expenses on the farm, while farmers give maintenance feed ration and reduce the feeding interval of their livestock,

Conclusion

The present study highlighted several devastating effects of the current COVID 19 on the livestock industry in some states in Nigeria. The livestock farmers who were the direct players in the industry were severely affected more importantly by the public health measures such as movement restrictions, locked down and curfew instituted in different state of the federation to mitigate the spread of the disease. Additionally, the study observed that most farmer expended more energy and commitment geared at surviving the current pandemic, and some compromised best practices for both humans and animals on the farms.

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