Direct and indirect influence of coronavirus on livestock production management

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Abstract

The pandemic is not new in the history of humanity. The pandemic called COVID-19 disease has a great impact on the actions and activities of humanity and consequently on the Environment. Food demand and thus food security are greatly affected due to mobility restrictions, reduced purchasing power and with a greater impact on the most vulnerable population groups. The COVID-19 crisis has threatened the livestock production, food security and nutrition of millions of people, many of whom were already suffering. This review paper highlights these effects and proffered solutions to the problems.

Keywords: Pandemic, Threatened, Livestock, Vulnerable and Lockdown

Influence directe et indirecte du coronavirus sur la gestion de la production animale

Résumé

La pandémie n'est pas nouvelle dans l'histoire de l'humanité. La pandémie appelée maladie COVID-19 a un grand impact sur les actions et les activités de l'humanité et par conséquent sur l'environnement. La demande alimentaire et donc la sécurité alimentaire sont fortement affectées en raison des restrictions de mobilité, de la réduction du pouvoir d'achat et d'un impact plus important sur les groupes de population les plus vulnérables. La crise du COVID-19 a menacé la production animale, la sécurité alimentaire et la nutrition de millions de personnes, dont beaucoup souffraient déjà. Cet article de synthèse met en évidence ces effets et propose des solutions aux problèmes.

Mots clés: pandémie, Menacée, Bétail, Vulnérable et Confinement

Introduction

Background of Corona Virus Disease (Covid-19)

In December 2019, there was an outbreak of pneumonia of unknown origin in Wuhan, Hubei province, China. The outbreak was epidemiologically linked to the Huanan seafood wholesale market selling many species of live animals. (www.labmanager.com 2020). The disease rapidly spread to other parts of china, resulting in an epidemic throughout china with subsequent increase in number of cases globally. This was reported to the WHO China office on 31 December 2019. On 7th January 2020, the World Health Organization (WHO) named the virus the

2019 novel coronavirus (2019-n CoV). (WHO, 2020). On 3rd January 2021, a novel member of enveloped RNA beta coronavirus was identified in samples of Broncho alveolar lavage fluid from patients with the pneumonia in Wuhan. The virus was subsequently confirmed as the cause of the disease by the Chinese Centre for Disease Control and Prevention (china CDC). Coronaviruses are a large family of RNA viruses that infect birds and many mammals including humans. These viruses cause illnesses that range from common cold to more severe respiratory diseases and rarely gastroenteritis. (WHO 2020). Coronavirus disease (COVID-19) is caused by an emerging strain of coronavirus

(SARS-Cov-2) that has not been previously identified in humans, belonging to the same family of viruses responsible for severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS), for which zoonotic and person- to-person transmission have been confirmed. Person-to-person transmission has been established between people who are in close contact with one another (within about 2 meters /6 feet), primarily via respiratory droplets. Droplet transmission occurs when respiratory droplets generated via coughing, sneezing or talking contact susceptible mucosal surfaces, such as the eyes, nose or mouth. (Yang X. *et al*, 2020). Transmission may also occur indirectly via contact with contaminated fomites with hands and then mucosal surfaces. Respiratory droplets are large and are not able to remain suspended in the air thus they are usually dispersed over short distances. The most common symptoms of COVID-19 are fever, tiredness, dry cough and shortness of breath or difficulty breathing (WHO, 2020; CDC, 2020) According to available reports (WHO, 2020; Yang *et al.*, 2020; Zhou *et al.*, 2020), some patients may have aches and pains in joints or muscles, repeated shaking with chills, nasal congestion, runny nose, sore throat, diarrhea, and loss of smell and taste in some cases. In severe cases, COVID-19 can be complicated by acute respiratory disease syndrome, sepsis and multiple organ failure (Yang. *et al.*, 2020). Most COVID-19 patients (85 percent) experience mild or uncomplicated illness, approximately 14 percent develop severe disease requiring hospitalization and 5 percent will require intensive care (The Novel Coronavirus Pneumonia Emergency Response Epidemiology Team. 2020).

COVID-19 and its effects on the nations agriculture

Livestock production is an important part of the national economy and an integral

component of state and local economies (Stanford report, 2020). The production of livestock, as well as other commodities, causes ripple effects throughout the economy in the form of employment; production in allied industries; taxes paid to local, state and federal governments; indirect impacts from purchases of input supplies; and induced impacts from household spending throughout the state (Thornton *et al.*, 2006). Livestock systems occupy about 30 percent of the planet's ice-free terrestrial surface area and are a significant global asset with a value of at least \$1.4 trillion. (Steinfeld *et al.*, 2006). The livestock sector is increasingly organized in long market chains that employ at least 1.3 billion people globally and directly support the livelihoods of 600 million poor smallholder farmers in the developing world (Thornton *et al.*, 2006). Livestock are important in supporting the livelihoods of poor farmers, consumers, traders and laborers throughout the developing world. The greatest impact of livestock in sustainable development designed to help the poor is enhancement of livestock-production systems. Animal diseases are crucial constraints in this: the animals of poor people are particularly vulnerable to disease because of the expense, absence or unsuitability of animal-health and production inputs. (FAO 2010). The livestock sector is estimated to account for about 40% of global agricultural output value and two-thirds of the 600 million livestock keepers worldwide are women, so the current situation compromises their economic empowerment (Thornton *et al*, 2002, Salmon *et al*, 2020). Globally, farm animals contribute about 13% of calories and 28% of protein demands directly by providing meat, milk, and eggs, in addition to their contribution to crop production through conferring transport and manure (FAO, 2020). Prior to Covid-19, Nigeria's agricultural sector have been affected by

several challenges ranging from drought and flooding occasioned by climate change and widespread instabilities including the Boko Haram crisis, cattle rustling in the North, farmer-herder clashes in the South and middle belt (Harrison A.I. 2020). Globally, the COVID-19 pandemic has had a direct impact on food systems through changing the food supply-demand system, and an indirect influence through decreasing purchasing power and the capacity of food distribution and marketing, and increasing healthcare tasks (Poudel *et al.*, 2020). COVID-19 has had a substantial impact on many sectors at global, regional and national levels, including the livestock sector (FAO, 2020; G20, 2020). Economic forecasts project a 0.7% fall in global economic growth in 2020 (2.4% in 2020 vs. 2.9% in 2019) as a result of disruptions to many production and industrial supply chains (Schmidhuber *et al.*, 2020). All these elements will evoke differentiated impacts, putting many people at risk of poverty and food insecurity. As a result, many economic activities and industrial sectors have been negatively affected by the COVID-19 outbreak, of which the livestock sector and related industries are among the most impacted (Poudel *et al.*, 2020, Gortázar *et al.*, 2020).

COVID-19 influence on livestock production

Available evidence suggests that the virus is predominantly between people through respiratory droplets and close contact, but there are also examples of transmission between humans and animals. Several animals have been in contact with infected humans such as minks, dogs, domestic cats, lions and tigers have tested positive to SARS-coV-2. (WHO, 2020). The lockdown and other restrictive actions taken to control the outbreak of the COVID-19 pandemic have negatively impacted the livestock sector, particularly the dairy and meat industries, and related processes (Seleiman

et al., 2020, Galanakis *et al.*, 2020). As it is expected, the sudden restriction on human activities and the economic crisis has affected farming and veterinary services, and therefore, affect animal health (Gortázar *et al.*, 2020). The COVID-19 outbreak has negatively disrupted activities related to livestock welfare. The sudden restrictions on the activities of farmers, workers, and veterinary professionals has led to insufficient applications of daily routine farming work. Such a situation limits a close monitoring of animal requirements and health status and thus impedes the right intervention to tackle any rising problems (source). Under such conditions, many farmers have taken to overstocking their animals, which increases crowding related-stress and devastates the immune system functions. Thus, the risk of animal disease prevalence has highly increased, affecting the welfare and productivity of stocking animals. Some farmers have had to cull their animals or to apply measures which conflict with animal welfare, such as inducing abortion and slaughtering, to decrease the population of animals inside their farms and to limit the excess production of animal products (meat and milk).

The actions taken in many countries, such as lockdown, travel restrictions and border controls, have resulted in unintended or negative consequences for the livestock sector. The negative impacts are listed as follows;

- Difficulty moving live animals and animal products like milk, meat and eggs to markets.
- Restrictions potentially limiting seasonal border crossings (transhumance) with ruminant.
- Restricted capacity to purchase necessary production inputs.

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- Restricted access to labour and professional services.
- Reduced availability of livestock feed due to movement restriction and closure of feed factories,
- Led to a more than 20% hike in the price of animal feed,
- Decreased the use of artificial insemination and veterinary services,
- Decreased the supply of veterinary drugs and increased their cost by 15–20%,
- Reduced the amount of milk produced in the country,
- Lowered the prices of dairy products such as raw milk (by 21 %), butter (by 16%) and local cheese (by 127%),
- Reduced the supply and demand for beef animals, and
- Disrupted the livestock extension system because extension personnel are unable to visit and train farmers, and provide artificial insemination and veterinary services.

These difficulties have led to a decrease in processing capacity for animal products, as well as loss of sales and slowdown of market activity.

Environmental impacts of COVID-19 on livestock

The lockdown was an opportunity for the

environment to improve in air quality. During the lockdown period due to restricted domestic activities, there were less industrial activities and less vehicle movement; the air pollution significantly decreases due to vehicular traffic being shut down in the lock down period; level of carbon concentration goes down. Among all the pollutant PM_{2.5} reduced significantly in most of the regions (Sharma *et al.*, 2020). Around 43% decreased of PM_{2.5} indicates the decrease in carbon emission from limited traffic and 31% decreases of PM₁₀ indicated the minimum re-sediment of dust particles caused by restricted works during lockdown period compared to the previous year (Sharma *et al.*, 2020). Humans were not the only beings affected by the pandemic. Animals too, both wildlife and some domestic animals have been known to be affected by the pandemic through transmission from caretakers. (Nature news, 2020). Some of the veterinary activities regarding preventative vaccination against pre-existing diseases would be suppressed during the lockdown (Gortázar and de la Fuente, 2020). In addition to this, the indirect effects such as increased wildlife-livestock contacts, no population control or extended on-farm stays of stock will trigger the incidence of transmissible animal pre-diseases like African swine fever (ASF) (O'Neill *et al.*, 2020)

Mitigating the effects of COVID-19 on livestock production management

The COVID-19 pandemic is directly affecting food systems through impacts on food supply and demand, and indirectly through decreases in purchasing power, the capacity to produce and distribute food, and the intensification of care tasks (Jeremy N *et al.* 2020). The pandemic has impacted negatively on the actions and activities of humanity; agriculture is not outside this impact. The COVID-19 crisis threatens the livestock production, food security and

nutrition of millions of people, many of whom were already suffering (Amanuel B. 2020).

To inhibit the impacts of covid-19 on livestock production, guarantee continuity of livestock production and improve supply chain and animal health activities in Nigeria, the following practices are essential:

1. Establishment of production safety nets, which includes new or resupplied feed reserves, special permits to transport drivers allowing animal feed distribution in remote areas and waivers for agri-food system operations to keep inputs flowing.
2. Provide guidelines for COVID-19 control and prevention along the supply chains to protect value chain actors and their families;
3. Promote group collection and delivery of milk to processing companies.
4. Implement practical biosafety and biosecurity measures to prevent human contamination with COVID-19 on the farm.
5. Develop, endorse and implement policies to mitigate impact of COVID-19 on livestock production and value chains.
6. Communicate with suppliers (e.g. feed, consumables) and professional service providers (e.g. veterinarians, mechanics, milk collectors) to find solutions to secure supplies, inputs and services.
7. Help small- and medium-sized businesses mitigate short-term COVID-19 impacts via dedicated financial facilities (e.g. temporary tax relief, dedicated emergency loan programmes, direct stimulus

payments, tax exemptions etc).

Conclusion

The nation-wide lockdown is the only preventive measure to control community transmission of COVID-19 even between man and animals since it was observed that behavioral changes of wild animals, birds, butterfly, pets and street animals indicate the interference of human activities on lives of natural creatures. The COVID-19 pandemic has directly affected food systems through impacts on food supply and demand, and indirectly through decreases in purchasing power, the capacity to produce and distribute food, and the intensification of care tasks. While observing the above measures, taking extra measures to reduce the spread of covid-19, maintenance of biosecurity practices that prevent the spread of any animal-to- animal and animal-to-human disease should be observed. Since there were no cases reported for the transmission of COVID-19 from livestock animals to humans, it is highly recommended that farmers continue to rear, keep, care and maintain their livestock.

References

- Amanuel B. 2020.** Global journal of animal scientific research, 8(3), 32-40 2020.
- Food and Agriculture Organization (FAO). 2020.** Q&A: COVID-19 pandemic – impact on food and agriculture. In: Novel Coronavirus (COVID19). Cited 30 April 2020. <http://www.fao.org/2019-ncov/q-and-a/impact-on-food-andagriculture/en>
- Food and Agriculture Organization FAO. 2020.** Qualitative Risk Assessment on Exposure to SARS-CoV-2 from Domestic Mammals, Wildlife, Birds and Aquatic Species. [online]. Rome. [in preparation]. FAO. 2020. African

- swine fever unprecedented global threat: a challenge to food security, wildlife management and conservation. In: Emergency Prevention System for Animal Health (EMPRES-AH). [online]. Rome. [Cited 30 April 2020]. http://www.fao.org/ag/againfo/programmes/en/empres/FAO_ASF_call_for_action.html
- Food and Agriculture Organization FAO.** *World Livestock 2011–Livestock in Food Security*. Rome: FAO (2011). Available online at: <http://www.fao.org/docrep/014/i2373e/i2373e00.htm> (accessed August 8, 2020).
- Galanakis, C. M. 2020.** The food in systems the era of the coronavirus (COVID-19) pandemic crisis. *Foods*. 9:523. doi: 10.3390/foods9040523
- G20. 2020.** G-20 Surveillance Note. G-20 Finance Ministers and Central Bank Governors' Meetings. [online]. [Cited 30 April 2020]. <https://www.imf.org/external/np/g20/pdf/2020/041520.pdf>
- Gortázar C, de la Fuente J. 2020:** COVID-19 is likely to impact animal health. *Prev Vet Med*. 2020 180:105030. doi: 10.1016/j.prevetmed.2020.105030
- Henriques, M. 2020:** Will covid-19 have a lasting impact on the environment? BBC news. 2020 <http://www.bbc.com/future/article/20200326-covid-19-the-impact-of-coronavirus-on-the-environment> 27 march 2020.
- Nesrein, M. H., Antonio, G. B. and Alfonso, J. R. 2020.** Animal welfare and livestock supply chain sustainability under covid-19 outbreak: overview.
- O'Neill, X., White, A., Ruiz-Fons, F. and Gortázar, C. 2020.** Modelling the transmission and persistence of African swine fever in wild boar in contrasting European scenarios. *Scientific Reports*, 10, 5895.
- Poudel, P. B., Poudel, M. R., Gautam A., Phuyal, S., Tiwari, C. K., Bashyal, N. 2020.** COVID-19 and its global impact on food and agriculture. *J Biol Today's World*. (2020) 9:221. doi: 10.35248/2322-3308.20.09.221
- Price Waterhouse Coopers 2020.** Responding to the impact of Covid-19 on food security and agriculture in Nigeria. <http://www.pwc.com/ng/en/publications>
- Salajegheh, T. S., Magalhaes, D. P. and Rahimi, P. 2020.** Transmission of severe acute respiratory syndrome coronavirus 2 (SARS-coV-2) to animals: an update review. *J Transl Med* 18, 358 (2020). <https://doi.org/10.1186/s12967-020-02534-2>
- Salmon, G. R., MacLeod, M., Claxton, J. R., Ciamarra, U. P., Robinson, T. and Duncan, A. 2020.** Exploring the landscape of livestock 'Facts'. *Glob Food Sec*. (2020) 25:100329. doi: 10.1016/j.gfs.2019.100329
- Serpil, A. and Mehmet, S. A. 2020.** Impact of covid-19 on the food supply chain. Food quality and safety, volume 4, Issue 4, December 2020. Pp 167-180.
- Schmidhuber J, Pound J, Qiao B. COVID-19 2020.** *Channels of Transmission to Food and Agriculture*. FAO (2020). Available online at: <https://doi.org/10.4060/ca8430en> (accessed June 28, 2020).
- Seleiman, M. F., Selim, S., Alhammad, B. A., Alharbi, B. M., Juliatti, F. C. 2020** Will novel coronavirus

- (Covid-19) pandemic impact agriculture, food security and animal sectors □ *Biosci J.* (2020) 23:36. doi: 10.14393/BJ-v36n4a2020-54560
- Sharma, S., Zhang, M., Anshika, G. J., Zhan, H., Kota, S. H. 2020.** Effect of restricted emissions during COVID-19 on air quality in India. *Science of the Total Environment*, 728, 138878.
- Thornton, P. K., Kruska, R. L., Henninger, N., Kristjanson, P. M., Reid, R. S. and Atieno, F. 2002.** *Mapping Poverty and Livestock in the Developing World*. Nairobi: International Livestock Research Institute Available online at:
- Upton, M. 2004.** The role of livestock in Economic Development and Poverty Reduction. AgEcon search. Research in agricultural and applied economics.
- Yang, X., Yu, Y., Xu, J., Shu, H., Xia, J., Liu, H., Wu, Y., Zhang, L., Yu, Z., Fang, M., Yu, T., Wang, Y., Pan, S., Zou, X., Yuan, S. and Shang, Y. 2020.** Clinical course and outcomes of critically ill patients with SARS-CoV2 pneumonia in Wuhan, China: a single-centered, retrospective, observational study. *Lancet Respir Med.* S2213-2600(20)30079-5 [online]. [Cited 30 April 2020] . [https://www.thelancet.com/journals/lanres/article/PIIS2213-2600\(20\)30079-5/fulltext](https://www.thelancet.com/journals/lanres/article/PIIS2213-2600(20)30079-5/fulltext)
- Zhou, F., Yu, T., Du, R., Fan, G., Liu, Y., Liu, Z., Xiang, J., Wang, Y., Song, B., Gu, X., Guan, L., Wei, Y., Li, H., Wu, X., Xu, J., Tu, S., Zhang, Y., Chen, H. and Cao, B. 2020.** Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *Lancet*, 395(10229):1054-1062. (Also available at [https://www.thelancet.com/pdfs/journals/lancet/PIIS01406736\(20\)30566-3.pdf](https://www.thelancet.com/pdfs/journals/lancet/PIIS01406736(20)30566-3.pdf))

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