

Impact of COVID-19 Pandemic on Animal Husbandry: A Review

S. G. Patil¹ and N. A. Patel²

Principal, Shantiniketan Kanyashala, Sangli¹

Assistant Professor, Vivekanand College (Autonomous), Kolhapur²

Abstract: *The COVID-19 pandemic across the world had different effects of the disease on almost all countries, various industries, and numerous economic sectors that in term were often managed in different ways. At the global level of quarantine and lockdowns to cope with the COVID-19 pandemic, the whole of humanity has been faced with various problems, food insecurity being one of them. This review highlighted the impact of the COVID-19 virus on the animal husbandry sector. Dairy, meat, poultry, aquaculture, and others (insects) are the segments of the animal husbandry industry. Animal husbandry plays a very vital role economy of many countries. The globe, almost all countries have forced the closure of schools, restaurants, malls, shops, and markets, limitations on public gatherings and travel resulted in decreased demand for animal products. Lockdown restricts movement and disrupts national and international trade routes is holding back farmers' access to breeding materials and replacement stocks. This can hit hard to sales for input providers. Pandemic has adversely affected livestock production, animal feed supply chain, skilled workforce, and products from animal husbandry.*

Keywords: Animal husbandry, COVID-19, pandemic, etc.

REFERENCES

- [1] Simianer H. & Reimer C. "COVID-19: a "black swan" and what animal breeding can learn from it." Animal Breeding Group, Center of Integrated Breeding Research, University of Goettingen, Goettingen, DE 2021: 57 - 59.
- [2] Taubenberger JK. & Morens DM. "1918 influenza: the mother of all pandemics." Emerging Infectious Diseases 12 (2006): 15-22.
- [3] Dawood FS., Iuliano AD., Reed C., Meltzer MI., Shay DK., Cheng PY., et al. "Estimated global mortality associated with the first 12 months of 2009 pandemic influenza A H1N1 virus circulation: a modelling study." The Lancet Infectious diseases 12 (2012): 687 - 695.
- [4] FAO. Mitigating the impacts of COVID-19 on the livestock sector, policy brief developed by FAO's Animal Production and Health Division. 2020.
- [5] Ehrlich P. The Population Bomb. New York: Sierra Club-Ballantine Books, 1968.
- [6] Pingali PL. "Green revolution: Impacts, limits, and the path ahead." Proceeding of the National Academy of Sciences, U.S.A. 109 (2012): 12302 - 12368.
- [7] UN. "World Population Prospects 2019: Highlights (ST/ESA/SER.A/423)." 2019. Rome: United Nations, Department of Economic and Social Affairs, Population Division.
- [8] FAO IFAD UNICEF, WFP, WHO. "The State of Food Security and Nutrition in the World 2017: Building Resilience for Peace and Food Security." 2017. <<http://www.fao.org/3/a-i7695e.pdf>>.
- [9] Ritchie H., & Roser M, Micronutrient Deficiency, 2019. <https://ourworldindata.org/micronutrient-deficiency_source=scribd>.
- [10] Vale B., Lopes A P. Fontes Md., et al. "Bats, pangolins, minks & other animals - villains or victims of SARS-CoV-2? ." Veterinary Research Communications 45 (2021): 1 - 19.
- [11] Tazerji SS., Duarte PM., Rahimi P., Shahabinejad F., Dhakal S., Malik YS., et al. "Transmission of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) to animals: An updated review." Journal of Translational Medicine 18 (2020): 1 - 11.

- [12] IBPES. Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, eds E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo Bonn (Germany: IPBES secretariat). 2019. <<https://ipbes.net/global-assessment>>.
- [13] IPCC. Special Report on Climate Change and Land., eds P. R. Shukla, J. Skea, E. C. Buendia, V. Masson-Delmotte, H.-O. Pörtner, D. C. Roberts, et al. (Geneva: Intergovernmental Panel on Climate Change). 2019.
- [14] UNEP. Emission Gap Report 2019. Nairobi: United Nations Environment Programme. 2019. <<https://wedocs.unep.org/bitstream/handle/20.500.11822/30797/EGR2019.pdf?sequence=1&isAllowed=y>>.
- [15] Sigsgaard T. & Balmes J. “Environmental effects of intensive livestock farming.” *American Journal of Respiratory and Critical Care Medicine* 196 (2017): 1092 - 1093.
- [16] Smit LAM., & Heederik D., “Impacts of intensive livestock production on human health in densely populated regions. 1, 272–277.” *GeoHealth* 1 (2017): 272 - 277.
- [17] Laborde D., Martin WJ., Swinnen J., & Vos R., “COVID-19 risks to global food security.” *Science* 2020: 500 - 502.
- [18] Baptista J. et al. “Impact of the COVID-19 Pandemic on the Welfare of Animals in Australia.” *Frontiers in veterinary science* 7 (2021): 1 - 9.
- [19] Marchant-Forde JN. & Boyle LA. “COVID-19 Effects on Livestock Production: A One Welfare Issue.” *Frontier in Veterinary Science* 7 (2020): 1-16.
- [20] Good K. As COVID-19 Slows Meat Processing, Meat Shortages a Growing Concern; Livestock Producers Face Tough Choices. 2020. <<https://farmpolicynews.illinois.edu/2020/04/as-covid-19-slows-meat-processing-lives>>.
- [21] Huffstutter PJ. U.S. Dairy Farmers Dump Milk as Pandemic Upends Food Markets. 2020. <<https://www.weforum.org/agenda/2020/04/dairy-milk-pandemic-supply-chains>>.
- [22] Barrett R. Wisconsin Farmers Forced to Dump Milk as Coronavirus Slams a Fragile Dairy Economy. 2020. <<https://www.jsonline.com/story/money/2020/04/01/coronavirus-forces-dairy-farmers-dump-milk-wisconsin-covid-19/5108609002/>>.
- [23] Gupta SD., Hoque MA., Fournié G., & Henning J., “Patterns of Avian Influenza A (H5) and A (H9) virus infection in backyard, commercial broiler and layer chicken farms in Bangladesh.” *Transboundary and Emerging Diseases* 68 (2021): 137 - 151.
- [24] Singh G. The lockdown has brought many pig production businesses to a complete halt as the movement of animals comes under government restrictions. 2020. <<https://www.thepigsite.com/articles/times-are-tougher-than-ever-for-pig-farmers-in-indias-covid-19-lockdown>>.
- [25] Millet S., De Smet S., Knol E., Trevisi P., Vigors S., Van Meensel J., “How two concurrent pandemics put a spoke in the wheel of intensive pig production.” *Animal Frontiers* 11.1 (2021): 14 - 18.
- [26] McEwan, K., Marchand L., Shang M., Bucknell D., “Potential implications of COVID-19 on the Canadian pork industry.” *Canadian Journal of Agriculture Economics* 68.2 (2020): 201 - 206.
- [27] Hafez HM. & Attia YA. “Challenges to the poultry industry: Current perspectives & strategic future after the COVID-19 outbreak.” *Frontiers in Veterinary Science* 7 (2020): 1 - 16.
- [28] Hamid MA., Rahman MA., Ahmed S., Hossain KM., “Status of Poultry Industry in Bangladesh and the Role of Private Sector for its Development.” *Asian journal of Poultry Science* 11.1 (2017): 1 - 13.
- [29] Høg E., Fournie G., Hoque MA., Mahmud R., Pfeiffer DU., Barnett T., “Competing biosecurity and risk rationalities in the Chittagong poultry commodity chain. Bangladesh.” *Biosocieties* 14.3 (2019): 368 - 392.
- [30] Hafez HM., Attia YA. , Bovera F., El-Hack MEA., Khafaga AF., & de Oliveira MC., “Influence of COVID-19 on the poultry production and environment.” *Environmental Science and Pollution research International* 28.33 (2021): 44833 - 44844.
- [31] BBC News. Coronavirus: Why Canada dairy farmers are dumping milk. 06 04 2020. <<https://www.bbc.com/news/world-us-canada-52192190>>.
- [32] Drury C. Coronavirus: Dairy farmers throwing thousands of litres of milk away as demand dries up in lockdown. 09 04 2020. <<https://www.independent.co.uk/news/health/coronavirus-dairy-milk-farmers.html>>.
- [33] Jin X. Difficult to sell milk during the pandemic: Dairy farmers in 13 provinces are dumping milk. 10 02 2020. <<http://finance.ifeng.com/c/7tx80Sw0zTK> (in Chinese)>.

- [34] Li S. Correlation analysis of the COVID-19 pandemic's impacts on the dairy industry. 15 05 2020. <<https://wiki.antpedia.com/-2366059-news> (in Chinese)>.
- [35] Marshall A. Why farmers are dumping milk, even as people go hungry. 23 04 2020. <<https://www.wired.com/story/why-farmers-dumping-milk-people-hungry>>.
- [36] Hambardzumyana G. & Gevorgyan S. "The impact of COVID-19 on the small and medium dairy farms and comparative analysis of customers' behavior in Armenia." *Future Foods* 5 (2022): 1 - 7.
- [37] Skerritt J. & Hirtzer M. Dairy cows are being sent to slaughter as demand for milk plummets. 08 05 2020. <<https://time.com/5834062/dairy-cows-slaughtered/>>.
- [38] Weersink A., von Massow M., McDougall B., "Economic thoughts on the potential implications of COVID-19 on the canadian dairy and poultry sectors." *Canadian Journal of Agriculture Economics* 68 (2020): 195 - 200.
- [39] Qingbin W., Chang-quan L., Yuan-feng Z., Kitsos A., Cannella M., Shu-kun W., Lei H., "Impacts of the COVID-19 pandemic on the dairy industry: Lessons from China & United States and policy implications." *Journal of integrative agriculture* 19.12 (2020): 2903 - 2915.
- [40] Thejesh S., Das A., Gururaj M., Khalandar S., Somasekaran S., Muniandy S., "Economic impact of COVID-19 pandemic on dairy farmers of Karnataka." *Indian Journal of Animal Sciences* 92.1 (2022): 126 - 131.
- [41] Avtar R., Singh D., Umarhadi DA., Yunus AP., Misra P., Desai PN., Kouser A., Kurniawan TA., Phanindra K., "Impact of COVID-19 Lockdown on the Fisheries Sector: A Case study from three harbors in Western India." *Remote Sensing* 13 (2021): 183.
- [42] Elleby C., Domínguez I.P., Adenauer M., Genovese G. "Impacts of the COVID-19 pandemic on the global agricultural markets." *Environmental and Resource Economics* 76 (2020): 1067 - 1079.
- [43] Hussain S., Hussain A., Ho J., Sparagano OA., Zia UUR., "Economic and social impacts of COVID-19 on animal welfare and dairy husbandry in Central Punjab, Pakistan." *Frontiers in Veterinary Science* 7 (2020): 1 - 5.
- [44] Ulrich L., Wernike K., Hoffmann D., Mettenleiter TC., Beer M., "Experimental infection of cattle with SARS-CoV-2." *Emerging Infectious Diseases* 26.12 (2020): 2979 - 2981.
- [45] Zhu N., Zhang D., Wang W., Li X., Yang B., Song J., Zhao X., et al. "China novel coronavirus investigating and research team. A novel coronavirus from patients with pneumonia in China, 2019." *New England Journal of Medicine* 382.8 (2020): 727 - 733.
- [46] Ashour HM., Elkhatib WF., Rahman M., Elshabrawy HA., "Insights into the recent 2019 novel coronavirus (SARS-CoV-2) in light of past human coronavirus outbreaks." *Pathogens* 9.3 (2020): 186.
- [47] Dai M., Li H., Yan N., Huang J., Zhao L., Xu S., Wu J., et al. "Long-term survival of SARS-CoV-2 on salmon as a source for international transmission." *The Journal of Infectious Diseases* 223.3 (2021): 537 - 539.
- [48] Liu P., Yang M., Zhao X., Guo Y., Wang L., Zhang J., Lei W., Han W., et al. "Cold-chain transportation in the frozen food industry may have caused a recurrence of COVID-19 cases in destination: Successful isolation of SARS-CoV-2 virus from the imported frozen cod package surface." *Biosaf Health* 2.4 (2020): 199 - 201.
- [49] Han S., Roy PK., Hossain MI., Byun KH., Choi C., Ha SD., "COVID-19 pandemic crisis and food safety: Implications and inactivation strategies." *Trends in Food Science & Technology* 109 (2021): 25 - 36.
- [50] Ramsden N., & Harkell L., India exempts aquaculture from lockdown with extension expected. 13 April 2020. <<https://www.undercurrentnews.com/2020/04/13>>
- [51] EUR-Lex. "Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions a new Circular Economy Action Plan for a cleaner and more competitive Europe." 2020. EUR-Lex. <<https://eur-lex.europa.eu/legal-content/EN/TXT>>.
- [52] Mahdy MA., Younis W., Ewaida Z., "An overview of SARS-CoV-2 and animal infection." *Frontiers in Veterinary Science* 7 (2020): 596391.
- [53] Hobbs EC. & Reid TJ. "Animals and SARS - CoV - 2: Species susceptibility and viral transmission in experimental and natural conditions, and the potential implications for community transmission." *Transboundary and Emerging Diseases* 19 (2020): 531 - 545.
- [54] Saitone TL. & Sexton RJ. "Agri-food supply chain: evolution and performance with conflicting consumer and societal demands." *European Review of Agriculture Economics* 44 (2017): 634-657.
- [55] CDC. Food Safety and Coronavirus Disease 2019 (COVID-19). 2020. <<https://www.cdc.gov/foodsafety/newsletter/>>

- food-safety-and-Coronavirus.html>.
- [56] Mardones FO., Rich KM., Boden LA., Moreno-Switt AI., Caipo ML., et al. “The COVID-19 Pandemic and Global Food Security.” *Frontiers in Veterinary Science* 7 (2020): 1 - 8.
- [57] Bondad-Reantaso MG., Mackinnon B., Bin H., Jie H., Tang-Nelson K., Surachetpong W., et al. “Viewpoint: SARS-CoV-2 (the cause of COVID-19 in humans) is not known to infect aquatic food animals nor contaminate their products.” *Asian Fisheries Science* 33 (2020): 74 - 78.
- [58] Deeh PBD., Kayri V.,Orhan C., Sahin K.,. “Status of Novel Coronavirus Disease 2019 (COVID-19) and Animal Production.” *Frontiers in Veterinary Science* 7 (2020): 1 - 12.
- [59] Hashem NM., González-Bulnes A., Rodríguez-Morales AJ.,. “Animal welfare and livestock supply chain sustainability under the COVID-19 outbreak: An overview.” *Frontiers in Veterinary Science* 7 (2020): 582528.
- [60] Seleiman MF., Selim S., Alhammad BA., Alharbi BM., Juliatti FC., “Will novel coronavirus (Covid-19) pandemic impact agriculture, food security and animal sectors?” *Bioscience Journal* 36 (2020): 1315 - 1326.
- [61] Quinn C. China Suspends U.S. Poultry Imports After Coronavirus Outbreak at Tyson Plant. 22 June 2020. <<https://foreignpolicy.com/2020/06/22/china-tyson-poultry-imports-after-mass-coronavirus-tonnies-germany-russia-nuclear-kiribati>>.
- [62] Uddin MM., Akter A., Khaleduzzaman ABM., Sultana MN., Hemme T., “Application of the Farm Simulation Model approach on economic loss estimation due to Coronavirus (COVID-19) in Bangladesh dairy farms—strategies, options, and way forward.” *Tropical Animal Health and Production* 53 (2021): 1 -12.
- [63] Gortázar C. & de la Fuente J. “COVID-19 is likely to impact animal health.” *Preventive Veterinary Medicine* 180 (n.d.): 105030.
- [64] Biswal J.,Vijayalakshmy K., Rahman H.,“Impact of COVID-19 and associated lockdown on livestock and poultry sectors in India.” *Veterinary World* 13 (2020): 1928 - 1933.
- [65] Shirsath PB., Jat ML., McDonald AJ., Srivastava AK., Craufurd P., Rana DS., et al. “Agricultural labor, COVID-19, and potential implications for food security and air quality in the breadbasket of India.” *Agricultural Systems* 185 (2020): 102954.
- [66] Mottaleb KA., Mainuddin M., Sonobe T., “COVID-19 induced economic loss and ensuring food security for vulnerable groups: Policy implications from Bangladesh.” *PLoS One* 15 (2020): <https://doi.org/10.1371/journal.pone.0240709>.
- [67] Sanchez-Sabate R. & Sabate J. “Consumer attitudes towards environmental concerns of meat consumption: A systematic review.” *International Journal of Environmental Research and Public Health* 16.7 (2019): 1220.
- [68] Middleton J., Reintjes R., Lopes H., Meat plants—a new front line in the covid-19 pandemic. 2020. <<https://www.bmj.com/content/bmj/370/bmj.m2716.full.pdf>>.
- [69] WHO, “COVID-19 & Food Safety: Guidance for Food Businesses: Interim Guidance” 2020.
- [70] Desai AN.& Aronoff DM.“Food safety and COVID-19. *JAMA.* (2020) 323:1982.” 2020.
- [71] van Doremalen N., Bushmaker T., Morris DH., Holbrook MG., Gamble A., Williamson BN., et al. “Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1.” *The New England Journal of Medicine* 382 (2020): 1564 - 1567.
- [72] McCarthy R. & Danley S. “Map: COVID-19 Meat Plant Closures.” 2020. <<https://www.meatpoultry.com/articles/22993-covid-19-meat-plant-map>>.
- [73] Douglas L. Covid-19 Shows No Sign of Slowing Among Food-System Workers. 2020. <<https://thefern.org/covid-19-shows-no-sign-of-slowing-among-food-system-workers>>.
- [74] Patil NR., & Peter T., “National Fishworkers Forum’s (NFF) Communication with Minister of State for the Ministry of Fisheries, Animal Husbandry & Dairying, Government of India.” 2020. National Fishworkers Forum. <<https://nffindia.org/wp/category>>.
- [75] Jamwal N. Lockdown Enforced When They Were at Sea—So More Than a Lakh of Fishers Now Wait in Deep Waters. 2020. <<https://en.gaonconnection.com/lockdown-enforced-when-they-were-at-sea-so-lakhs-of-fishers-now-wait-in-deep-waters>>.

- [76] Vohra S. India's Lockdown Has Put 16 million Fisherfolk Out of Business. Here's How They're Coping. 2020. <<https://scroll.in/article/959062/indias-lockdown-has-put-16-million-fisherfolk-out-of-business-heres-how-theyre-coping>>.
- [77] Roshan M. "A Study of Migrant Fishers from Andhra Pradesh in the Gujarat Marine Fishing Industry; International Collective in." International Collective in Support of Fishworkers (2017): 1 -50.
- [78] Khakhariya N. "25K Fishermen Stranded in Boats in Gujarat Coasts." 2020. <<https://timesofindia.indiatimes.com/city/rajkot/25k-fishermen-stranded-in-boats-in-guj>>.
- [79] Satheesh S. Indian Fishermen Stranded at Ports Amid Coronavirus Lockdown. 26 04 2020. <<https://www.aljazeera.com/news/2020/4/26/indian-fishermen-stranded-at-ports>>.
- [80] Domańska-Blicharz K., Woźniakowski G., Konopka B., Niemczuk K., Welz M., Rola J., et al. "Animal coronaviruses in the light of COVID-19." Journal of Veterinary Research 64 (2020): 333 - 345.
- [81] Orion Market Research Private Limited. "Impact of COVID 19 on the Global Animal Husbandry Market ID: 5013478." 2020.
- [82] Roberts JR., Souillard R., Bertin J., "Avian diseases which affect egg production and quality." Nys Y., Bain M., Van Immerseel F., Improving the safety and quality of eggs and egg products. Cambridge, UK: Woodhead Publishing Limited, 2011. 373 - 393.
- [83] Qiu W., Rutherford S., Mao A., Chu C., "The pandemic and its impacts." Health, Culture and society 9 (2011): 1-11.
- [84] "World Health Organization. Implementation of the International Health Regulations (2005). Report of the Review Committee on the Functioning of the International Health Regulations (2005) in Relation to Pandemic (H1N1) 2009" 2011. http://apps.who.int/gb/ebwha/pdf_files
- [85] World Health Organization. WHO Director-General's Statement on IHR Emergency committee on Novel Corona virus (2019-nCoV). n.d.
- [86] World Health Organization. Novel Coronavirus – China. 21 September 2020.