

CURRENT PERSPECTIVES ON THE STRATEGIC FUTURE OF THE POULTRY INDUSTRY AFTER THE COVID-19 OUTBREAK

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ABSTRACT

The future expansion of the poultry business is hampered by a number of reasons, including chicken immunity, health, and productivity. Major obstacles to the present state of the sector and its strategic future will continue to be consumer confidence, product quality and safety, product kinds, and the introduction and re-emergence of illnesses. Poultry is inextricably related to zoonotic and foodborne illnesses. Foodborne and zoonotic pathogen eradication, elimination, and/or management provide a significant challenge to the chicken business. The risks to the general public's health from eating foods with significant antibiotic residues will also continue to be a major problem. This review's idea of chicken farming goes beyond only thinking about disease prevention. Instead, it will take into account how the immunity, wellbeing, and health of the animals are interconnected. It is crucial to understand that hens are not vulnerable to intranasal SARS-CoV-2 (COVID-19) viral infection. Nevertheless, the COVID-19 pandemic will have an impact on chicken farming's finances, transportation, and consumption. Along with these factors, it will evaluate the maintenance of high environmental security as well as economic, ethical, and social aspects. For the industry to meet consumer demand and guarantee sustainable agriculture, shareholders, veterinarians, farmers, and all other stakeholders in the chain of poultry production need to be more active in the present state and the sector's strategic future. The current evaluation examines these crucial activities as a result.

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INTRODUCTION

The current primary objectives of the poultry business have been disease control, high output, product quality, and affordable production costs. In order to prevent disease transmission and reduce the use of antibiotics, constant efficient and goal-oriented healthcare is required to fulfil per capita consumption and human welfare (1). To combat the ongoing political and social upheaval, address consumer views of animal welfare, secure the safety and security of food, and handle environmental defence challenges are just a few of the initiatives that will be undertaken. Additionally, the rising prices of feedstuffs, and consequently of feeds and diets, continue to be significant problems (2). The emergence of unexpected and novel illnesses as well as new laws in numerous nations will continue to be crucial challenges. Covid-19 was observed in Wuhan city of china (3,4,5,6,62).

LITERATURE REVIEW

The poultry industry's strategic future and consumer perceptions of the quality and safety of animal products are ongoing concerns (3-5). The food chain is a major means of transmission for many foodborne illnesses. According to the research that is currently accessible, Salmonella serovars and Campylobacter spp. are the poultry germs that cause human foodborne illnesses the most often. A new public health issue is the emergence of resistance bacteria as a result of the misuse of antibiotics as growth promoters and medications. A thorough knowledge of how microbial pathogens enter and colonise as well as the conditions that promote or inhibit development for each strain of organism is necessary for controlling zoonotic illnesses and foodborne infections.

The European Council European Commission (EC, 2003) enacted the Act 2160/2003/EC on the control of salmonella and other specific foodborne zoonotic pathogens in November 2003. The adoption of objectives aiming to reduce the prevalence of certain zoonoses at the level of primary production, in broilers, layers, and turkeys, is covered by this directive and a number of protocols. Workers in the food business must have samples obtained and examined for zoonotic and zoonoses agents when the applicable control legislation has been approved. A qualified authority should

also sample the flocks. Due to these directives, there has been a significant decrease in a number of *Salmonella* serovars, including *Salmonella enteritidis* and *Salmonella typhimurium* (7).

METHOD

Drug Resistance and Related Issues

Antibiotic tolerance in people, animals, and particularly bacteria is an issue that is now widely discussed, and it is anticipated to continue to pose a risk to the public's health (12, 13). The public's worry about the safety of animal products and their detrimental effects on human health and natural immunity has grown as a result of the fortification of animals' diets with antibiotics to encourage growth. Due to a better gut ecology that promotes beneficial microbes, antibiotics' effects on the gut flora result in increased digestion and absorption, which increases the availability of nutrients for production. Antibiotics, however, may potentially increase the prevalence of germs that are resistant to their effects. Since January 2006, antibiotics used to "promote growth" in animals raised for food have been prohibited due to the precautionary principle and lessons learned in several European nations. Following the restriction on antibiotics in chicken diet, practical viewpoints based on experience gathered in Europe identified a number of issues: A reduction in animal welfare was seen overall as a result of the decreased growth and feed utilisation, higher footpad dermatitis, and increased ammonia level and damp litter. Additionally, health risks including dysbacteriosis and gastrointestinal problems brought on by clostridial infections rose (14).

Multidrug-resistant bacteria have developed into a significant threat to animals, human health, and effective antibacterial therapy all around the globe. Additionally, the development of new antibiotics does not address the incidence of bacterial antimicrobial tolerance (15). For instance, multi-resistant bacteria like vancomycin-resistant enterococci (VRE) have increased nosocomial infections in people (16). It has been looked into how common VRE is in the flocks of turkeys grown in southwest Germany. Real-time polymerase chain reaction was used to detect the presence of the vancomycin tolerance genes *vanA*, *vanB* (B1/B2/B3), and *vanC* (C1/C2/C3) in isolated enterococci (PCR). In 15 of the 20 (or 75%) examined turkey flocks, VRE was found. In dust samples, enterococci with *van* genes were also found (17).

Protection of Poultry The wellbeing of animals, cleanliness, and illness prevention are now major concerns because to the intense genetic push to increase egg and meat output. Indeed, the wellbeing of animals, their innate immunity, and their ability to tolerate sickness are negatively impacted by the genetic push to increase the productive performance of animals. However, genetic selection happens as a result of better disease prevention, husbandry, and feeding methods (29). The most attainable changes have been a 4 week reduction in market age, improved growth rates, increased breast yield, increased laying rates, and increased daily egg mass. However, there is a great deal of concern that, as a result of the aforementioned selection pressure, major issues with animal care and illness have already begun. Rising selection forces are another obstacle to animals' independence (30).

Studies in the past have suggested that the relationship between the pressures of genetic selection and other environmental and husbandry factors, with a focus on the rate of growth and the blood supply necessary for the development of supporting structures, may negatively affect the health status of animals (31). It is possible to choose birds with decreased heart and lung function and lower cardiopulmonary capacity when compared to standard lines.

Movement of Chicken and Chicken Products

The cost and international mobility of chicken and its products will be impacted by intense production competitiveness and cost variations from across the globe. This phenomena will make it more likely for infections to spread into areas that are supposed to be free of poultry diseases. Despite the fact that SARS-CoV-2 is unrelated to poultry or its products (36, 37), owing to the lockdown and limitations put in place to stop the virus's transmission, it is likely to have an impact on the world's poultry trade.

The fundamental concern for the future of the poultry business globally will continue to be poultry illnesses. Any disease outbreak has the potential to become an epidemic and have a significant negative impact on the international commerce of chicken products. The expansion of the sector and customers' buying power will be significantly impacted by increased feeding costs and raw ingredient prices as well as their availability, especially in the wake of the COVID-19 epidemic. Additionally, as biogas and biofuel production rises, less land will be available for growing crops and raising livestock. This phenomena will make it more difficult for certain nations, like Saudi Arabia, to realise their geopolitical vision for the future. For example, there can be a sharp rise in the price of products and the cost of animal production. Future feed producers must make sure that their products are of a high standard, pathogen-free, and environmentally friendly. Additionally, it is anticipated that climate change and limited water resources would negatively impact the economics of chicken production and the strategic planning needed to fulfil per capita demand in places like Saudi Arabia (5).

Poultry Diseases: Emergence and Re-Emergence

Animal illnesses may arise more quickly and/or be caused by a number of circumstances. These elements influence the structure and growth of poultry farming, intensify production costs and global competitiveness, and expand the transportation of chicken and poultry products across the globe. Increased travel might potentially increase the risk of spreading illnesses to certain areas that are now disease-free (5). Infections that have previously occurred but are currently rapidly spreading in a particular geographic region or within the host range are referred to be resurgent and re emergent infections. Most infectious illnesses and health issues have negative economic effects. Poultry illnesses may be caused by a number of pathogens, either alone (mono-causal), in concert with other microorganisms (multi-causal), or as a result of non-infectious factors.

Weather conditions, sanitary circumstances, housing structure and density, water and feed cleanliness, and poultry farmers' knowledge and qualifications are all non-infectious factors that impact chicken health (31). These elements interact with one another and may either improve or worsen the health of the animals. To guarantee the target production output, poultry producers should provide sufficient nutrition, a suitable habitat, husbandry, and disease control measures (5). To maintain optimum poultry immunity, health, and performance as well as to prevent disease transmission, husbandry must be directed to meet standard raising conditions. Any factor that causes stress has the potential to reduce the ability of poultry to fight illness, make birds more vulnerable to infections, and reduce the efficacy of immunizations. Numerous infectious pathogens, such as bacteria, viruses, parasites, and fungus, contribute to infectious illnesses in poultry and may be disseminated in farms by horizontal and/or vertical transmission (5). Disease transmission immediately after hatching is mostly vertical, particularly when poor hatching circumstances and inadequate cleanliness in the hatchery are present (omphalitis/yolk sac infection). Infections with mycoplasma, aspergillus, *E. coli*, salmonella, pseudomonas, streptococci, staphylococci, encephalomyelitis, and hepatitis may result from this transmission. Another way for several microbes, like the one stated above, to spread is by horizontal (lateral) contact between animals (14).

The Problems Caused by SARS-CoV-2 (COVID-19) Systemic zoonotic illness SARS-CoV-2 has arisen, posing substantial risks to humans. COVID-19, SARS-CoV, and MERS-CoV are all members of the betacoronavirus family. SARS-CoV-2 is an enveloped virus that is very contagious yet is readily eliminated by soap and other household cleaners. There are four categories of coronaviruses: alpha, beta, gamma, and delta. Animals employed for food production are susceptible to a variety of new and ongoing illnesses brought on by coronaviruses (37). Coronaviruses, like infectious bronchitis, negatively impact the hepatic, renal, respiratory, neurological, and intestinal systems and functions of chickens. A lockdown, obstructing transmission routes, and educating the populace to raise knowledge of the illness and reduce trade activity are preventative measures to stop the spread of COVID-19 (40). According to the research, droplets, population density, and direct-indirect interactions may all have an effect on COVID-19 transmission. Nevertheless, further study is necessary.

A worldwide implementation of a global plan is required to contain the current pandemic. There have been several lessons from COVID-19 that are too numerous to list here. The necessity to strengthen natural immunity as the first line of protection and the realisation that the world's health must be seen as a single, interconnected system are possibly the two most crucial lessons. It will take time to create a powerful vaccination that can serve as a long-term cure and/or a targeted antiviral treatment for SARS-CoV-2 (40, 41). Rahman et al. (41) also demanded that there be enough hospital beds as well as more diagnostic beds, diagnostic kits, and educated medical professionals. In order to contain the epidemic or stop the spread of illness, the general public also has to be made aware about SARS-CoV-2. Due to a shortage of diagnostic tools, poor physician training, and a high number of fatalities, including those of medical professionals, nurses, and healthcare workers in 2019, the health system's weaknesses were brought to light in 2019. The advancement of medical education, health care programmes, the battle against poverty, and feeding the hungry all need more effort from the international community. Given our limited understanding of the COVID-19 pandemic and our increasingly linked and complex world, resilience, flexibility, and adaptability are ultimately and absolutely necessary to cope with unanticipated future events and discussions (42).

RESULT

Medical diagnosis

The most widely used methods for regulating and preventing the spread of illness are the diagnosis and treatment of poultry diseases (44, 45, 52). The most recent instance is avian influenza, where early detection of the virus's source and method of transmission enabled the management of the illness and the creation of an effective vaccine (44, 53). Improvements in laboratory testing will provide sensitive, quick, and exact illness diagnosis in a future research, and early interventions will be possible (45–47). Additionally, the industry has saved billions of dollars thanks to the development of vaccinations for IBD and IBV, as well as early versions for the Newcastle disease virus (NDV) and coccidiosis. These vaccines have also improved industrial safety and protected it against disease outbreaks (54, 55). The

COVID-19 epidemic has shown us that the health of the whole planet is interconnected. Therefore, it is imperative to start and continue research in this field to produce quick, precise, and economical diagnostic instruments and kits that may be utilised on farms.

Treatment

A highly effective technique for disease management, eradication, and prevention has long been the treatment of poultry illnesses. Diseases caused by bacteria, fungi, and parasites including cholera, aflatoxin, and coccidiosis are excellent examples (44). Many developing nations with poor hygiene and biosecurity have been able to spend more in the poultry sector because to the treatment of chicken illnesses (54, 55). These investments have enhanced human welfare and will continue to do so while battling poverty, raising family income, and ensuring access to inexpensive food (2). A limited number of veterinary and pharmaceutical products with authorization will be made accessible in the future to treat chickens as food-producing animals (53). Future investigation into the mechanics of harmful bacteria will allow for the exact diagnosis of bacterial illnesses, and treatment will aid in the creation of new medications and equipment that will remove the detrimental effects of pathogens on the health and productivity of animals (55). After the COVID-19 pandemic, treatment procedures for zoonotic diseases and the secondary illnesses they cause, as well as alternative methods, should be created.

DISCUSSION

There is no treatment for viral diseases (56, 57, 58, 59). Antibiotics could help in secondary infection (60,61) As the first line of defence against infectious diseases, strict biosecurity, building and maintaining immunity, and vaccination work to stop the introduction of the illness and its further spread. Global poultry farming has actively chosen for features that maximise chicken production while also enhancing feed efficiency and farm productivity. Disease can cause sever stress (63)

CONCLUSION

The key to enhancing food safety, animal productivity, and ultimately human health is disease management. The following programs to increase animal output and manage the illness are part of Saudi Arabia's National Transformation Program 2020, which is a component of the Kingdom 2030 vision:

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