A STUDY ON EFFECT OF CORONA VIRUS DISEASE (COVID-19) ON POULTRY INDUSTRY

काशी हिन्दू विश्वविद्यालय BANARAS HINDU UNIVERSITY

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in

Animal Husbandry and Dairying

(Livestock Production and Management)

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Through: The Head,
Department of Dairy Science and Food Technology,
Institute of Agricultural Sciences,
Banaras Hindu University,
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Dear Sir,

I have great pleasure in forwarding the thesis entitled **"A STUDY ON EFFECT OF CORONA VIRUS DISEASE (COVID-19) ON POULTRY INDUSTRY"** submitted by *Deepak Kumar Yadav,* **I.D. No. 18412AHD004, Enrollment No. 368845,** in partial fulfillment of the requirement for the degree of **Master of Science (Agriculture) in Animal Husbandry & Dairying (Livestock Production & Management),** Department of Dairy Science & Food Technology, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi.

This is to certify that the work has been carried out solely by *Mr. Deepak Kumar Yadav* under my supervision and guidance and his findings and data presented herein are genuine and original to the best of my knowledge and belief and no part of the work has been submitted for any other degree or institution.

Thanking you,

Forwarded

……
(Dr. V. K. Paswan)
Supervisor

Head

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Date:
Place: *Varanasi.* *(Mr. Deepak Kumar Yadav)*

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LIST OF ABBREVIATIONS

%	:	Per cent
°C	:	Degree Centigrade
@	:	At the rate of
ANSA	:	Amino-naphtholsulphonic acid
Avg.	:	Average
BW	:	Body weight
Ca	:	Calcium
CP	:	Crude protein
Cu	:	Copper
DM	:	Dry matter
et al.	:	And other (Latin et alii)
FAO	:	Food and Agriculture Organization
Fe	:	Iron
Fig.	:	Figure
FP	:	Freezing point
g/d	:	Gram per day
GOI	:	Government of India
L	:	Lactose
NDDB	:	National Dairy Development Board
pH	:	Negative logarithm of hydrogen ion
T	:	Temperature

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Chapter I

INTRODUCTION

The poultry industry is the fastest growing field of Indian agriculture among the agriculture-allied industries. The holding of poultry dates back to very early times in the East. As previously described, the original home of the jungle fowl from which the domestic birds descended is known to be India and the neighbouring boring nations. It is said to have spread westwards from India, reaching Greece in 525 BC. These birds were shipped to Palestine after the Iranian invasion, from there they slowly dispersed to other parts of Europe, including Italy, and then managed to reach the British Isles

The multi coloured fowls were the first poultry that the hill tribes and other individuals raised. The fowls in the jungle were very small in size and only laid about 30 eggs a year. With respect to their accommodation, food and disease prevention, little precaution was taken. The first poultry farm for the mission was set up in East, U.P. In 1912, and in December 1912, Lucknow hosted the first poultry fair. In efficiency terms, the tropical breeds were much superior to those of the desi fowls. Up until 1957, poultry farming was largely a backyard project. That year, when the second Five Year Plan was initiated, the first coordinated attempt was made to grow poultry. In order to grow poultry, the government approved Rs 2.8crores. As a base stock, day-old chicks of the White Leghorn and Rhode Island breeds from reputed breeding farms in the USA were imported. All the requisite equipment was also imported with it. In addition, in various parts of the world, 269 poultry extension cum growth centres were set up, each with a unit of 100 layers of improved breeds. Currently, the time between the second and the fourth Five Year Plans was the turning point in the development of the nation's poultry industry

A considerable advance in the poultry industry was reported in the middle and late 1970s. In 1979, the Central Avian Research Institute, Izatnagar, near Bareilly (U.P.) was founded to provide strong research support for both the public and private sectors of the poultry industry. The production of poultry rose to 6,500 million,

broilers to 30 million, and eggs to 13,000 million, up 400 percent, 650 percent, and 50 percent, respectively. Any of the variables that affected the rise and development of the nation's poultry farming were: Small initial cost, short poultry generation interval compared to other livestock, quality chick supply, swift, guaranteed and better returns compared to other livestock species, accessibility of qualified manpower, better understanding and knowledge of improved and science feeding, management and health control systems, simple credit facilities, and nutritional value of poultry.

A thousand years is a comparatively old period for the domestication of chickens. They come from the Red Jungle Fowl (*Gallus Gallus*, Asia's tiny pheasant) and supplied us with eggs, fresh beef, feathers, and some very bad traditional medicines. Domestic ducks are all descended from the lascivious ubiquitous mallard (Anas platyrhychos) and domestic geese from the tame and confiding graylag (Anser anser) which in return for a little corn would have provided meat, eggs and excellent fletching for arrow flights from the moulted wing feathers when the bow was a common weapon. Turkeys originated in Central and North America, and from Mexico to New England the different beautiful colours came from the various subspecies.

As eggs and chicken meat are major and rich sources of protein, vitamins and minerals, poultry has a crucial role in India. Poultry offers rich organic manure and is an important source of income and jobs in the poultry industry for millions of farmers and those active in allied operations. Chicken is India's most commonly accepted poultry. It does not have a religious tabo, unlike beef or pork. Chicken meat costs are cheaper than mutton or goat meat prices. The annual growth trend in the egg industry is 8-10percent and 12-15percent in the broiler industry. India is the fifth largest egg producing nation in the world, with an annual production of 33 billion eggs. It generates 530 million broilers annually, too. Poultry gives jobs to about. 1.5 million People. Just 33 eggs and 630 grams of poultry meat are the annual per capita intake in India. In contrast to the global average of 124 eggs and 5.9 kg of beef, this is much smaller. The National Human Nutrition Committee in India has proposed 180 eggs per capita (about one egg per two days) and 10.8 kg of meat per capita

There was a healthy increase in meat production, from 2.3 million tonnes at the end of the Tenth Five Year Plan (2006-07) to 5.5 million tonnes at the end of the Eleventh Five Year Plan (2011-12). Production of meat at the beginning of the Twelfth Plan (2012-13) was 5.9 million tonnes, which was further increased in 2013-14 to 6.2 million tonnes. Meat development and the country's subsequent growth rate (percent) per year from 1980-81 to 2013-14. In fiscal year 2019, the North Indian state of Uttar Pradesh produced approximately 359 thousand metric tonnes of poultry meat. In spite of a sudden dip in fiscal year 2013, this was an improvement from 178 thousand metric tonnes in fiscal year 2008. Over the calculated time span, the most populous state accounted for over eight percent of the country's poultry meat production.

In the last four decades, poultry production in India has taken a quantum leap from unscientific agricultural activities to a commercial production system with state-of-the-art technical interventions. At the end of the Tenth Plan (2006-07), egg production amounted to 50.66 billion numbers, equivalent to 66.45 billion numbers at the end of the Tenth Plan (2011-012). The overall population of poultry in our country is currently 729.21 million (as per the 19th Livestock Census) and the production of eggs during 2013-14 is around 74.75 billion. The current supply of eggs per capita (2013-14) is about 61 eggs per year. The production of poultry meat is estimated at 2.69 million metric tonnes. As per the Agricultural and Processed Food Products Export Production Authority (APEDA), exports of poultry products are presently at about R566 crore in 2013-14.

China alerted the WHO in December 2019 about the increasing cases of flu-like respiratory disease in Wuhan City, which was later reported to be caused by the latest coronavirus (SARS-Cov2) and later called COVID-19. However, due to this virus' high infectivity and the travel of people across the globe (187 countries), the outbreak did not remain confined to China, but spread worldwide within a quick period of time. Therefore, declared as Pandemic by WHO in March, 2020. The governing authorities of different countries opted for a national shutdown to monitor the spread of the religion, presenting prohibitions on transport, social and religious

meetings, as well as almost all commercial, educational and other non-essential activities. In order to counteract the transmission of the epidemic, lockdown played a crucial role, but caused considerable collateral damage due to the limitations on commercial activities. In the other hand, in addition to generating general interest, social media played an equal part in circulating certain rumors about the demographic dynamics of COVID19.

The first death outside China (of a Chinese man from Wuhan) was recorded in the Philippines on 2 February, in the midst of growing deaths in China. WHO announced a name for the new coronavirus disease on 11 February: WHO declared COVID-19 a pandemic on 11 March, as about 114 countries were affected at the time **(WHO, 2020c)**.

India is a country that is agrarian about 70percent of the Indian population is dependent on agriculture. India's most precious human capital are producers. WHO (2020) announces the emergence of a pandemic of emerging coronavirus infections (COVID-19). The Government of India declared the lockdown of the entire country on 22 March 2020 in order to tackle the virus. Human life can be safe by this strategy. COVID-19 primarily influences individuals and implicitly influences the agricultural production system of India. Different newspapers have found that farmers in the Terai area face a number of problems during the lockdown period. Marketing, labour shortages, drought, among others were the challenges. A cell phone-based survey was conducted on the basis of the issue by registered farmers at the Farm Science Centre, Uttar Banga Krishi Viswavidyalaya in the Cooch Behar District, West Bengal, India, to understand the perception of farmers about the effect of COVID-19 on the agricultural environment, the value chain and the food security system. The analysis was carried out between April 2, 2020, and April 22, 2020. Several measures have been initiated by the Ministry of Agriculture, the Government of India, the ICAR, the ICMR, the NCDC and the Government of West Bengal to monitor COVID-19 and the sustainable agricultural sector, the supply chain and food security. The following are several developments that have been developed in India for farming communities. The coronavirus pandemic (COVID-19) has brought a disruption to human life of

more than 2.5 million infections worldwide up to 20 April 2020. Members from all around the world have come to recognize the situation as a state of emergency. The condition for human beings is not new, there has been a tradition of pandemic diseases such as SARS 1918 H1N1 (2002).

For the unsuspecting poultry industry and farmers, the fear of COVID-19 and the dissemination of misinformation on social media relating chicken to the deadly virus have taken a major toll. Apparently frightened of the information on social media about the virus that emanated in China and spread rapidly to other parts of the world, many people around the country ticked off eggs and chicken from the menu at most homes. "The consumption of chicken has fallen by around 30percent, making the poultry industry and farmers concerned," Part of the Broiler Integration Coordinating Committee Ram Reddy said. Chicken prices have cut down sharply from 80 a kg of live chicken on the farm to 40 a kg with the decline in sales. The cost of production itself is around 75 per kg, much of it expended on bird feed. To eradicate myths about the lethal virus, the poultry industry has coordinated advertising drives and chicken and egg males nationwide**.**

As individuals stay away from eating poultry in fear of covid-19, chicken prices have plummeted from Rs 90 a kg last month to Rs 20 in Mumbai.

People still remain away, after many advertising drives to demolish myths that poultry have anything to do with the dreaded virus. Listed poultry firms such as venky’s (India) ltd. based in Pune and simran firm’s ltd. (sfl) based in Indore are expected to record lower sales in this quarter as business has suffered tremendously. A senior official from venky's was not available for comment in spite of many attempts.

"Poultry prices are poor all the time. The ex-farm broiler price is Rs 10- Rs 15 per kg (production cost Rs 75 per kg) and the ex-farm egg prices are Rs 1.5 per egg (production cost Rs 3.5 per egg). Feed demand and prices are declining on a regular basis due to declines in chicken and egg supply. In the last 2 weeks, the price of key raw materials, such as maize and soybean meal, has fallen more than 10 percent, A

Godrej Agro vet Ltd. spokesperson said. As per a previous report, owing to a lack of appetite for food, the poultry trade in Maharashtra was losing over 10 crore a day.

While there is no clear correlation between chicken and COVID-19, as long as the concern is there, people will stay away from poultry. It would therefore have an effect on poultry companies such as Venky's and SFL and any other business connected to this company. Their sales will be lower in this quarter and the trend has been reflected in their share prices because of this direct effect, Independent stock analyst Ambareesh Baliga stated. Because of the price drop, poultry farmers are suffering the full brunt and there has been no government payout. "The organization has failed totally. Prices have plummeted to around 20 kg and there has been little market. I used to sell 150 birds a day before, now it comes down to a handful,"

Rumors that COVID-19 can be caused by consuming meat have reached the poultry industry. With numerous studies claiming that COVID-19 has little impact on livestock, poultry industries in several cities have taken a hit because of social media speculation.

Keeping these facts in view, the present investigation entitled **"A study on effect of corona virus disease (COVID-19) on poultry industry"** is proposed to be investigated at Varanasi district, during the lockdown period of 2020 with following objectives:

1. Studying the effect of COVID-19 on national and global poultry industry.
2. A case study on Poultry Farmers of Varanasi district to investigate the constraints faced and the effect of COVID-19 on poultry farmers.

Chapter II

REVIEW OF LITERATURE

In this chapter, an attempt has been made to review the work done on "effect of corona virus (COVID19) on poultry industry" of in India as well as world to bring about critical evaluation in these aspects. A large number of scientists have presented their opinions on effect of corona virus (COVID19) on poultry industry. As we know that in initial phase of present epidemic corona virus a rumors were spread that the poultry product causes the corona virus that why a major loss were observed in poultry industry.

WHO, COVID-19 is a coronavirus-induced infectious disease called SARS-CoV-2, which is a respiratory pathogen. On 31 December 2019, WHO first heard about this new virus from cases in Wuhan, People's Republic of China.

Temet M. McMichae *et al.* (2020) found that Coronavirus disease 2019 (Covid-19) patients typically suffer from fever, cough, and shortness of breath within 2 to 14 days after exposure. There were 332,930 confirmed cases of Covid-19 reported globally as of March 23, 2020, and 14,510 deaths have been reported. The World Health Organization announced Covid-19 to be a pandemic on March 11, 2020, in acknowledgment of the pervasive global dissemination of Covid-19.

The Hindu Net Desk reported in March 2020, WHO called it a pandemic. COVID-19 is caused by the SARS-COV2 virus that is thought to have begun in Wuhan's Huanan Seafood Wholesale Market. Covid-19 that has been transmitted from civet cats to humans and MERS-CoV that has been transmitted from dromedary camels to humans are other forms of zoonotic viruses. In mammals, many known corona viruses are circulating. They haven't killed humans yet. It is proposed that this is the possible zoonotic root of COVID-19, based on the vast number of infected people who were exposed to the wet animal market in Wuhan City, where live animals are regularly sold. Efforts were made to look for a host source or intermediate vectors from which the virus may have spread to humans.

Burrell *et al*. (2017) Corona viruses are named for the outer fringe of crown-like envelope proteins. ('*corona'* in Latin), are a family of enveloped RNA viruses.

McCloskey *et al*. (2020) generally, they are pathogenic to rodents and birds and lead humans to have moderate upper respiratory tract infections. Occasionally, they can be spread to a wider human population and can cause extreme respiratory disorders, exemplified in 2003 and 2012 by Extreme Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS) The states, the media, physicians, scholars, actors, police and other community stakeholders called on the public to avoid public events, including athletics, worship rituals, family activities, meetings and school classes, to prevent the global spread of coronavirus infection.

M. Bassetti *et al.* (2020) two species of snakes that could be a potential COVID-19 reservoir were found in initial reports. However, no clear proof of coronavirus reservoirs other than mammals and birds has been given to date.

Hussin A. Rothan *et al*. (2020) COVID-19 genomic sequence analysis revealed 88 percent identity with two corona viruses close to bat-derived extreme acute respiratory syndrome (SARS), suggesting that bats are the most possible link between COVID-19 and humans. Several studies have indicated that a possible route for transmitting COVID-19 infection is person-to - person transmission. This is confirmed by cases within families and among individuals who have not visited Wuhan's wet animal market. Person-to - person infection happens mainly by physical contact or by droplets from an infectious person transmitted through coughing or sneezing. Therefore, the binding between the receptor-binding domain of viral spikes and the cellular receptor, which has been identified as the angiotensin-converting enzyme 2 (ACE2) receptor, has been reported to induce human-to - human transmission of SARS-CoV. Importantly, the sequence of COVID-19 spikes' receptor-binding domain is identical to that of SARS-CoV. This research clearly indicates that the ACE2 receptor is most likely to reach the host cells.

Bett *et al.* (2020) argued that there is a growing occurrence of foodborne zoonotic pathogens (FZP). This is important because pregnant mothers are

comparatively more exposed to respiratory pathogens and serious pneumonia. The first step in viral infection accompanied by fusion with the cell membrane is the binding of a receptor expressed by host cells. It is argued that the primary target of the virus is lung epithelial cells.

Vos *et al*. (2020) there have been continuous risks to public health from outbreaks of FZPs, such as HIV-AIDS (1970s-), SARS (2003), H5N1 (2005-2010), H1N1 (2009), MERS (2008-present), and Ebola (2015). When it comes to food safety, their impacts vary because of the variations in transmissibility and the pathogens' animal hosts. With brief incubation times and high lethality rates, Ebola, MERS, and SARS primarily shocked the food systems in some regions where they spread.

Agricultural production was devastated by damaging agricultural labour forces **(Lopez *et al*. 2006)** and other input factors were hampered **(Gong *et al*. 2020**).

Rural and poor people were forced into food insecurity by declining demand. More than 40 percent of the arable land in affected areas was not harvested after the Ebola outbreak in 2014 **(Fan, 2020)**, and Guinea's rice yield fell by 20 percent **(WB, 2015**). This diseases have also slowed down economic growth **(WB, 2015)** and reduced the buying power of the government in the international food industry.

Vos *et al*. (2020) COVID-19 cannot be grouped into any of the two groups referred to above, none of which has addressed global food security issues. Any individuals assumed at the onset of the pandemic that it would have no effect on the food supplies.

Reardon *et al.* (2020) in heavily populated towns, the disease is thought to be more serious than in rural areas**.** There was no proof of mother-to - child transmission in a small sample performed on women in their third trimester who were reported to be infected with the coronavirus. All pregnant mothers, however, have undergone caesarean sections, so it is uncertain if transmission during vaginal delivery will occur.

Vos *et al*. (2020) Machines with minimal human-to - human relationships will load and ship bulk commodities. Although the overwhelming bulk of food in the world is grown and consumed in the same country, food exchange in and between countries enables supply diversification to minimize vulnerability to food market shocks.

A Mahajan *et al.* (2020), the first case of COVID-19 in India was reported on January, 30 2020 at Thrissur, Kerala, in a student who had returned from China. India has reached the fourth position in the world in the number of confirmed COVID-19 cases and presently has 449,613 confirmed cases and 14,162 deaths as of June 23, 2020, which is really an alarming situation. The only way to prevent this pandemic before an appropriate drug or vaccination is invented is psychological distancing. On March 24, the Prime Minister of India ordered the first national shutdown for 21 days and it was later extended by easing those critical areas until May 3. Later, while the lockout term is extended to June 30, the power to enforce limitations on the evaluation of conditions in the respective states is granted to the states.

Taubenberger JK *et al*. (2006) the planet should not have been shocked by the advent of a novel pandemic disorder. The influenza pandemic in 1918 affected an estimated 500 million people in the last century and killed 17-50 million**.**

Dawood FS, *et al.* (2009) More recently, the 2009 pandemic of swine flu affected some 61 million people and killed an estimated 284,000.

Neumann G, *et al*. (2019) Both pandemics were viral H1N1 influenza diseases and it is perhaps reasonable that the focus was on influenza to forecast possible pandemics, with a Web of Science review for "pandemic AND prediction" finding that "influenza" has been used in 290 out of 415 publications since 2010.

Becker D.J. *et al*. (2019) Latest outbreaks of SARS and MERS, however, have demonstrated that coronaviruses are good candidates for zoonotic spillover spills. All factors of poultry production have struck hard, from local farmers to large integrators, much more than the 2006 avian influenza outbreak. However, these

rumors were counteracted and nullified by systematic actions by state authorities and the industry, such as awareness drives and projects like Chicken Mela. Losses worth Rs. 22500 crores had already occurred by the end of March.

Mayur M, *et al*. (2020) One such example of rumours among many is the possible role of eggs and chicken meat in the spread of COVID-19. Which prompted the dramatic decline in demand for poultry goods from February 2020, i.e. just before the lockout declaration, resulting in the deterioration of poultry economics due to working capital depletion. Furthermore, decreased demand has contributed to the depopulation and disposal of existing poultry stocks by farmers. As for the Indian poultry industry, about 95percent of Indian poultry meat is sold on the wet market and just 5percent is processed for chilling. The shortage of manufacturing facilities has led to its further business downturn. Demand for poultry products has been slowly growing as of mid-May 2020, but still not as predicted by experts. For many poultry-dependent agri-entrepreneurs such as maize and soybean farmers, it has given a tough time as well. They foresee the poultry feed industry as a guaranteed demand for their goods, as maize and soybean contribute to about 75-80 percent of the poultry feed. About 30 to 50 percent of farmers will not be able to survive in such a crisis unless the state offers any financial assistance.

Reardon *et al*. (2020) the agricultural development field, the root of the food system, is being devastated by COVID 19. While the immediate consequences will be felt overwhelmingly after farming several countries have encountered a growing amount of on-farm problems **(UN, 2020).**

Tamru *et al*. (2020) this served to lower profits for farmers and decrease production intentions**.** The outbreak of the COVID-19 pandemic at the beginning of the year had an unforeseen impact on the industry as sustained growth output of 10-12 percent in the market, as observed in the last 3 years, was also predicted during the current year.

Sink *et al*. (2020) Overstocked milk, fruits, animals, and chickens have also been abandoned or killed in developing countries such as the United States. After

rumours on social media connecting chicken consumption with Covid 19, farm-gate chicken prices fell by about 60 percent to an average of about Rs 30/kg in South India from Rs 72.50/kg in January **(The Economic Times, March 2020).**

Jyotsnarani Biswal *et al.* (2020) India is currently the fourth-largest producer of poultry in terms of production. It is estimated that about 3.8 million tonnes of poultry meat has been eaten in the country during the calendar year of 2019, which is priced at about Rs. 85,000 crores in terms of retail price. The country's egg production was estimated at 109 billion eggs at the same time, priced at around Rs. 45,000 crores. It is also understood that India's customers mostly tend to have freshly cut chicken, so about 90 percent of the country's broiler sales are limited to unorganized retail outlets As per the report, 10 lakh broiler poultry farmers and 2 lakh layer farmers were hit by the COVID-19 scare and lockout, and the damages due to the same were projected at Rs. 27,000 crores by the end of April 2020. In some areas, as per the available details, the price of live poultry birds tanked to as low as Rs 10-30 / kg, especially during the first week of lockdown when the poultry farmers were not prepared for such a specific situation of market disconnection.

FAO (2020) and G20 (2020) The ongoing COVID 19 crisis has also impacted the poultry value chains for eggs and broiler meat of local corporations as part of this global environment. This influence undoubtedly disrupted the quantity and quality of the supply of poultry products to customers and had an impact on the production chain at some stages, especially during the partial and full curfew periods. The governmental biosecurity curfew initiatives that threatened the food delivery chain by limiting the movement and distribution of poultry products have triggered the main impact of the crisis. Both the restaurants and the sales after the complete curfew. Sales have been absolutely shut down. As a result, the company's revenues have decreased significantly and the marketing industry has been adversely affected. As the business manager said, the production line was not disrupted by the crisis of SARS-Con-V2 as the company continues to generate its normal production capacity. At global, regional and national levels, COVID-19 has had a significant impact on many industries, including the livestock sector**.**

Hanan Al-Khalaifah *et al.* (2020) Acts conducted in many nations, such as lockdowns, transport bans and border controls, have had an unintentional or detrimental effect on the livestock industry, including, though not limited to, I challenges in transporting live animals and animal goods such as milk , meat and eggs to markets.

CAST (2020) Millions of words have probably been written, in particular, about the effects of the COVID-19 pandemic on the economy and agriculture. Impacts have spread from euthanized cattle, to rotted seeds, beef production delays, supermarkets and retail shops, and unpredictable markets through agriculture**.**

USDA (OCE 2020) The COVID-19 results, especially in livestock agriculture, continue to ripple back and forth across our economy. The chicken / broiler industry is based on this post. The broiler industry has experienced adverse disturbances due to COVID-19, close to other livestock sectors. In February 2020, the USDA predicted a production of 45.8 billion pounds of broiler meat in 2020 and an average annual price of $0.87 per pound**.**

Shoumojit Banerjee, The Hindu (2020) with a 2020 supply estimate of 44.7 billion pounds and an annual average price of $0.704 per pound, the same survey in August 2020 showed major decreases from February. While it is clear that COVID-19 has had a negative effect on the broiler industry as a whole, the industry has characteristics that have had special impact s on the industry and growers in particular. Depending on the food habits in each country, the effect of the rumours will differ across states, he said. Maharashtra has 60percent non-vegetarians, while there are more than 90percent non-vegetarians in some Southern states. Therefore, the effect on the poultry industry would vary naturally from place to place.

Lalatendu Mishra (The Hindu 2020). As households stay away from eating poultry in fear of COVID-19, chicken prices have dropped from Rs 90 a kg last month to Rs 20 in Mumbai. Listed poultry firms such as Venky's (India) Ltd. based in Pune and Simran Firms Ltd. (SFL) based in Indore are expected to record lower sales in this quarter as business has suffered tremendously. "Poultry prices are poor all the

time. The ex-farm broiler price is Rs 10- Rs 15 per kg (production cost Rs 75 per kg) and the ex-farm egg prices are Rs 1.5 per egg (production cost Rs 3.5 per egg). Feed demand and prices are declining on a regular basis due to declines in chicken and egg supply. In the last 2 weeks, the price of key raw materials, such as maize and soybean meal, has fallen more than 10 percent. As per a previous report, owing to a lack of appetite for food, the poultry trade in Maharashtra was losing over Rs10 crore a day. The Union Minister of Animal Husbandry, Dairy and Fisheries admitted that Rs, 500 crore to Rs2,000 crore daily is wasted by the poultry industry. All the allied industries that supply the poultry industry with machinery and feed have also recorded declines in revenue.

M L Melly (The Hindu, 2020) Chairman of the CLFMA (Compound Livestock Feed Manufacturers Association) S.V. Bhave said that demand and consumption of poultry is usually strong in the time before and after Holi and farmers prepare more chickens than normal to raise them accordingly. However, demand dropped drastically due to the coronavirus outbreak, and farmers removed the chicks themselves. As only 25 percent to 30 percent of shops are opened for a short period, 30 percent to 40 percent of birds raised on farms are also not sold on the market. As there is not enough demand due to movement constraints, the production of eggs is also calibrated. Approximately 60percent to 70percent of eggs raised in the Telugu States go to other states, which is not possible now because of lockdown problems**.**

Al Mussell, *et al.* (2020) To prevent a disastrous animal welfare situation and farm-level effects, poultry and livestock slaughter, egg grading / processing, and dairy plant operations must at least be completely funded.

Baba IA, *et al*. (2017) The methods of carcass disposal, even in usual conditions. A possibility of pollution. The second assumption provides researchers with an opportunity to make early diagnoses of urine-based diseases and prompt medical check-ups using urinary miRNAs; the limited population of known urinary miRNAs can not reflect the variety of potential diseases.

Mallin MA, *et al*. (2015). In addition, when pig and poultry industries are mostly clustered in particular geographical regions, killing thousands of animals and birds will produce a new source of waste in habitats already burdened with environmental contamination.

Schmitt K. *et al*. (2020) There are significant environmental consequences involved with the dumping of carcasses on scale. In the houses where they were slaughtered, some poultry producers composted chickens by layering the carcasses with straw and "cooking" them under high heat for about a month in what is obviously an energy intensive operation. In non-purpose built or other "make-shift" style compost facilities, however, it can be difficult to compost carcasses efficiently, resulting in increased GHG emissions.

Collins ER. *et al*. (2020) In comparison, dead chicken compost is distributed on fertilizer-like fields and such ground application raises 'run-off' problems since it is much higher in phosphorus than manure**.**

Newman KL, *et al.* (2020) In comparison, the manufacturing part of farm-to - fork production (including slaughter and packing) is inherently more risky than the sectors of the non-food system. The effect on the poultry sector in India, unlike most economic sectors, was much more pronounced even before the country-wide lockdown was implemented. Due to several other logistical factors, the post-COVID-19 lockdown further decreased meat demand throughout the region.

S. Mahendra Dev *et al.* (2020) Compared to production and logistics, the adverse effect of Covid-19 on agriculture has been significantly less. The initial lockdown, however, has impacted agricultural operations and the required supply chains across many channels: delivery of supplies, harvesting, and procurement, barriers to transport, marketing and refining. Restaurant closures, shipping bottlenecks, etc. decreased demand for fresh food, poultry and fish products, impacting farmers and suppliers**.**

WHO (2020) The Food Protection and Standards Authority of India and the Indian Council for Agricultural Research have shown, according to studies from the World Organization for Animal Health, that there is no known impact of COVID-19 on poultry, fish, or meat. In its study, the World Animal Health Organization said that the virus is primarily spread through human-to - human interaction. As a matter of fact, in any research, poultry has not been shown to be involved in the transmission of corona virus to humans to date, and since more than 35percent of the nutritional value of the food in the daily diet is linked to this sector, any confusion will have a negative effect on these parameters

S. Mahendra Dev *et al.* (2020) Due to misinformation, especially on social media at one point, poultry farmers were badly hit because chickens are the carriers of Covid-19. Millions of small poultry farmers across the country were struggling, particularly in the states of Maharashtra, Karnataka, Orissa and Andhra Pradesh, after sales of these false claims crashed 80 percent. Any of these advances have been overturned since then**.**

Mayur *et al*. (2020) In the other hand, in addition to generating general interest, social media played an equal part in circulating certain rumors about the demographic dynamics of COVID19.

Even before the first case of COVID-19 was registered in the world, rumours of poultry birds as a possible carrier of the widespread social media virus had contributed to lower demand for chicken meat in many parts of the country. Of late, however, the assurance provided by numerous bodies that eating chickens is very healthy may be able to reassure customers to a large degree. In India, knowledge has led individuals to conclude that the initiation of COVID-19 is related to the intake of poultry goods. The outbreak of the virus began in December 2019, however by mid-February, prices of poultry goods began to decline.

M.L. Melly Maitreyi (The Hindu 2020) Chicken intake has declined by about 30 percent, leaving farmers concerned. For the unsuspected poultry industry and farmers, the apprehension of COVID-19 and the dissemination of misinformation

on social media relating chicken to the deadly virus have taken a major toll. Apparently terrified of the reports on social media about the epidemic that emanated in China and spread quickly to other parts of the world, many people around the country ticked off eggs and chicken from the menu at most households. Moreover, any bacteria or virus will be killed by the Indian type of cooking process at hot temperatures. Eggs and chicken are healthy sources of protein, and he suggested that you eat them**.**

Shoumojit Banerjee (The Hindu 2020) Mr. Shetti said that poultry farmers in the Kolhapur district alone, which has around 4,500 poultry farms, have incurred losses in excess of ~15 crore in the last few weeks. As a result of a single rumour connecting poultry to COVID-19, the average wholesale per kg cost of chicken has more than halved, he added. As the losses facing the poultry farmers of Maharashtra continue to grow, state farmers' leaders have called for constructive government intervention to refute rumours relating COVID-19 to poultry. Chicken is sold at half the price of Rs 110 per kg, and sometimes as little as Rs 25-30 per kg. People are turning their backs on chicken, eggs and beef due to some false and misleading rumours. After rumours relating COVID-19 (coronavirus) to poultry have surfaced, Maharashtra's poultry industry has suffered an estimated loss of at least ~150 crore in the past fortnight, authorities said on Thursday. Meanwhile, together with scientists from the National Institute of Virology (NIV), the State Animal Husbandry Department jointly appealed to people not to believe unscientific propaganda. Depending on the food habits in each country, he said, the effect of the rumours will differ across states. Maharashtra has 60percent non-vegetarians, while there are more than 90percent non-vegetarians in some southern states. The effect on the poultry industry would also vary naturally from place to place**.**

Mukherjee *et al.* (2020) Because of misinformation, especially on social media, poultry farmers have been badly hit because chicken are the carriers of COVID-19 and bird flu. The instability of the supply chain has a significant effect on public welfare.

Government of Tamil Nadu (2020) Small farmers have been the victims of these false rumours. Southern states are poultry centres in India, as stated in the beginning of this article, and are therefore largely affected by this rumour. As cases spread in southern India, the rumour led people to stop consuming meat. In Hyderabad and Rangareddy, where most poultry is raised in Telangana, the active cases of COVID-19 are 400 and 16 by 27 April 2020 respectively (Government of Telangana, 2020). In the Namakkal district of Tamil Nadu, the case of COVID-19 is 61 by 28 April 2020, although no connection has been identified between the consumption of poultry products and the transmission of COVID-19, people are beginning to fear the consumption of poultry products, even though the cases of COVID-19 are not as large in India's poultry hub, this has a major effect on people affiliated with the poultry industry.

Mohanty *et al.* (2003). An analysis was carried out to forecast India's demand for egg and poultry meat in 2020. Income elasticities were estimated using National Sample Survey (NSS) data separately for urban and rural areas and were used to project demand between urban and rural areas for each of the five income classes. For the next two decades, the findings indicated a moderately good increase of egg and poultry meat, both in urban and rural areas. Egg intake has been shown to increase at a faster rate than poultry meat, with sales growth almost tripling by 2020. The overall per capita intake of poultry meat over the same time was observed to rise from 0.69 to 1.28 kilogrammes. Overall , the study records an increase in overall consumption of eggs from 34 billion in 2000 to 106 billion in 2020 and an increase in total consumption of poultry meat from 687 million kilogrammes to 1,674 million kilogrammes over the same span of time. (Conroy *et al*. 2005) In India, under new intensive management systems, there are around 60 thousand poultry farms. Although some backyard poultry farming still exists, it is largely unorganised, less economically important, and small-scale.

Joshi *et al*. (2003), The large-scale commercial private sector, which controls approximately 80 percent of the overall Indian poultry production has engineered and

dominated growth in the poultry sector and (Krishna *et al*. 2014) and is concentrated in the southern states of Andhra Pradesh and Karnataka.

M. Nazeeruddin (2020) Industries are divided into 2 groups. 1.) Industries dependent on capital, namely agro-based, forest products, leather and mineral products for live-stock products (fish, aquatic, poultry). 2) Metal and metallurgical, chemical and related manufacturing, clothing products, electrical and electronic products and miscellaneous industries depending on production. So the poultry sector belongs to an industry dependent on capital. It is, however, one of India's fastest developing and most productive sectors. It is also an important portion of the agriculture industry. As farm productivity has risen at a rate of 1.5 to 2 percent each year. In the other side, egg and broiler processing has also risen at a rate of 8 to 10 percent each year. India is the world's 5th biggest producer of eggs and the 18th largest producer of broilers.

Mr. Ram Babu Vedantham (2020) India is the world's third-largest producer of eggs (after China and the US) and the world's fourth-largest producer of chicken (after China, Brazil and the US). In India, egg consumption per capita in the last five years has risen from 30 eggs per annum to 68 eggs per annum. Chicken intake increased from 400 grams per annum to 2,5 kg per annum during the same time. About 240 eggs and 20 kg of chicken per annum are eaten by the adult population in most developing countries. A minimum of 180 eggs and 10 kg of chicken per annum are advised by human nutritionists, which means that the Indian poultry industry is laden with growth opportunities. Poultry is India's most organised livestock market, worth 14.5 billion euros. Nearly every farmer (mostly small) in the value chain has been incorporated. In 2015-16, broiler meat production was 4, 2 million tonnes per annum. Demand has risen by 15-20 percent each year for processed chicken meat. The overall development of layers in India has risen to 80 million eggs per annum. In 2016-17, the intake of feed, including corn and soybeans and pearl millet, was 18 million tonnes. In addition to ensuring manufacturing quality, the manufacturer must focus on the product's nutritional values, adulterants and pollutants. The Central Ministry of Food Processing Industries (MoFPI) and local food inspection authorities

have begun to keep track of the consistency and nutrition production of eggs and chicken in India**.**

Choudhary *et al.* (2017) Despite being a vegetarian country, India is projected to be one of the largest chicken, meat and mutton consuming nations. According to the Sample Registration System (SRS) survey conducted in 2014 by India's Registrar General, roughly 71 percent of people in India are non-vegetarian (Rowland, 2017). According to the National Action Plan for Egg and Poultry 2022, the Indian poultry industry was estimated at Rs 80,000 crore in 2016 and the organised commercial business sector accounts for 80 percent of the overall market share, while the remainder accounts for the unorganised sector. It has been estimated that 729 million small and medium-sized poultry farmers are engaged in contract farming, while 30 million are engaged in backyard farming. The justification for addressing the importance of the poultry sector is that even in a country like India, the population of poultry consumption is growing exponentially. With the exception of India (29percent), Israel (13percent), Australia (2-11.2percent), Sweden (10percent) and Italy (7-10percent), the proportion of vegetarian countries is very limited.

Choudhary *et al.* (2017) from this, one can estimate that non-vegetarian food is eaten by the highest population. Globalisation has had a significant influence on the trend of food intake in India. As stated before, 71 percent of individuals in India eat poultry products and the number is still growing. In non-vegetarianism, Telangana tops the list of 21 major states in the nation (98.8percent men and 98.6percent women), followed by West Bengal (98.7percent men and 98.4percent women) and Andhra Pradesh (98.4percent men and 98.1percent women). Also, these two states (Andhra Pradesh and Telangana) are the main egg and meat producers**.**

Indian Council of Food and Agriculture The industry also faces several obstacles, such as feed costs, shipping, logistics, and insufficient cold storage facilities and, most significantly, its susceptibility to diseases, affecting prices and production in the sector, with a growing trend in the poultry industry in India. Countries announce incorrect cases of bird flu every year, and the authorities spread the message when taking prompt steps to control the infection. Such outbreaks are

also restricted and are easily controlled by the demand for poultry. Poultry production continues to concentrate on improving production through improved feed conversion ratio (FCR) through checking feed mixes, lower mortality rates by superior farm management, and relentless efforts to develop other parameters such as hatchability, average daily weight gain and reduction of selection difference, according to the Indian Council of Food and Agriculture.

Shoumojit Banerjee (The Hindu 2020). The states of Maharashtra regular demand for chicken is 3400-3500 metric tonnes. "The demand for chicken in the state fell precipitously from an average of 3,000 metric tonnes to 2,000 metric tonnes in less than two weeks when these reports began to emerge on social media earlier this month," said Dr. Prasanna Pedgaonkar, general manager at Venky's, India's largest producer of poultry. He said the poultry farmers and the state industry had sustained daily losses of around 10-11 crore over the past fortnight. The figure for poultry consumption in the Province, which had decreased to 2,000 metric tonnes, has risen to 2,400 metric tonnes in the past few days, after corrective steps to rein in the rumours, with explanations from scientists and the Centre's notification that COVID has no connexion to chicken consumption.

Parthasarathi Biswas *et al*. (2020) In January 2020, ex-farm broiler prices in Maharashtra were higher than Rs 72.97 for almost the same month last year, at Rs 75.56 per kg on average. The Indian poultry industry is strongly opposed to allowing any access from the United States to imported chicken meat, especially frozen leg parts. But there is a more urgent issue at hand, with the novel coronavirus arriving from China and causing an estimated $1 billion in damages. Farm gate prices for broiler birds in Maharashtra have plummeted from over Rs 80 per kg to Rs 30-32 levels since early January, led mainly by worries about the consumption of poultry meat presenting a risk of contracting COVID-19 infection**.**

Government of Tamil Nadu (2020) In the Namakkal district of Tamil Nadu, the case of COVID-19 is 61 by 28 April 2020, although no connection has been identified between the consumption of chicken and the transmission of COVID-19, people are beginning to fear the consumption of poultry products, even though the

cases of COVID-19 are not as large in India's poultry hub, this has a major effect on people affiliated with the poultry industry.

The Wire (2020) Around 200 million chicken eggs lie unnecessarily in Namakkal, India's largest poultry centre. As a result, the livelihoods of the nearly 20 million individuals dependent on the national poultry industry have been seriously and adversely affected. Moreover, India is the third-highest producer of eggs and the seventh-highest producer of chicken and meat in the country. Because of the rumours, the latest instability in the supply and demand chain has adversely affected the lives of many.

Effect on price of chicken product

Vishwanath Kulkarni *et al*. (2020) As reports and concerns associated with fresh coronavirus (Covid-19) hit consumption of chicken meat and eggs, resulting in a market collapse, the Indian poultry sector is heading for a crisis. The seriousness of the situation reflects that the farmers suffer a loss of Rs 100-130 on each bird (yielding two kg of chicken). Farm gate prices are Rs 15-35 per kg of live bird in different regions against the cost of production of Rs 80-85 per kg. As a result, to tri m losses, poultry players have begun to cut back on demand. Due to the prevailing situation, industry leaders said, the sectorial losses are estimated at ~1,000 crore a week. It is reported that after reports and false news of chicken being tainted with coronavirus started making the rounds on social media sites such as WhatsApp and YouTube from mid-January, the sector may have suffered a loss of about 7,000 crore. During February, egg manufactures alone lost about 600 crore to the coronavirus scare as farm gate prices dropped to about 2.50 a piece against production costs of about 4. As it is, due to skyrocketing production costs, egg farmers are under immense stress after losing around Rs 4,500 crore in calendar 2019.

Parthasarathi Biswas *et al*. (2020) In January 2020, in Maharashtra, ex-farm broiler prices of Rs 75.56 per kg were on record higher than Rs 72.97 for the same month last year. But they fell to Rs 43.39 / kg in February 2020, as opposed to Rs 69.27 for February 2019. The average rate in the state on Thursday was Rs 32 per kg.

The cost of production for broilers is Rs 75-80 per kg, while prices were at Rs 80-85 until mid-January in most parts of India. That was before coronavirus studies started gaining steam. By February 2, the average declared cost of the Maharashtra Poultry Farmers and Breeders Association had fallen to Rs 69.6 per kg and further to Rs 42.2 on February 10. The loss averages out to Rs 900 crore with monthly sales at 900 crore eggs and unit production cost of Rs 4. If you add broilers and chickens, the industry's loss will be in the range of $1 billion for two months. And this is an absolutely needless and preventable failure. Poultry farms that supply some 15 lakh farmers with day-old chicks weighing 35-40 gm, along with feed, vaccines and medicines. These farmers rear day-old chicks which, over 35-40 days, grow into market-ready birds of 2-2.5 kg**.**

Bloomberg (2020) After the outbreak of COVID-19 in India, poultry goods were heading for a crisis. According to B.S Yadav, managing director of Godrej Agrovet Ltd, one of the leading companies in the poultry industry, India's weekly revenues have fallen to 47 percent when the price decline has fallen by about 60 percent. For every chicken, farmers have a loss of Rs 100-130.

The Hindu (2020) Farm gate prices dropped to Rs 15-35 kg compared to Rs 80-85 per kg for production costs. In order to cope with losses, poultry farmers began to decrease production.

Dahd (2020) This loss was suffered due to the dissemination of disinformation that COVID-19 is caused by the use of poultry products. The above table illustrates how a sudden drop in prices happened after January in the poultry industry. There was a period in time when the number of cases of coronavirus surged. By mid-February, the egg producers alone had lost Rs 600 crore, selling it at a price of Rs 2.50 against the production cost of Rs 4. As previously reported, the poultry sector accounts for millions of farmers in India employing over 2.75 crore individuals. They are now hoping for a rescue from this unexpected situation as this has become the generation's additional revenue for farmers and nutrition for the poorest of the poor.

Debasmita Das *et al*. (2020) Egg prices dropped to INR 1.95 per egg and poultry consumption decreased, resulting in market deflation as separate reports circulated among individuals that they might be infected by the COVID-19 virus if they ingest eggs or meat. During the Holi "Festival of Colors" held in March, but due to the outbreak of COVID-19, meat demand decreased to a very low point, i.e. Rs. 10 per kg sold in Maharashtra and Rs. 28-30 / kg in Haryana. This is one of the main festivals in India, where the intake of meat is very heavy. Thus, videos of poultry farmers went viral, killing and dumping their chickens. Sales of meat have also plummeted due to limitations placed on invitees at marriage ceremonies**.**

Bloomberg (2020) After the outbreak of COVID-19 in India, poultry goods were heading for a crisis. As per B.S Yadav, managing director of Godrej Agrovet Ltd, one of the leading companies in the poultry industry, India's weekly revenues have fallen to 47 percent when the price decline has fallen by about 60 percent. For every chicken, farmers have a loss of Rs 100-130.

The Hindu (2020) Therefore, poultry farmers began to slash demand to deal with losses. This failure was caused by the dissemination of disinformation that the use of poultry products was responsible for COVID-19.

Table 2.1. Poultry Monthly Prices in India per Kilogram Rupees and Change in Cost of Production.

Months	Price (₹)	Change (%)
NOV.2019	132.14	0.53
DEC.2019	140.95	6.67
JAN.2020	147.65	4.75
FEB.2020	134.32	-9.02
MAR.2020	133.77	-0.41

Dahd (2020, p. 1) The above table illustrates how a sudden drop in prices happened after January in the poultry industry. There was a period in time when the

number of cases of coronavirus surged. In mid-February, the egg producers alone had lost Rs 600 crore, selling it at a price of Rs 2.50 against the production cost of Rs 4. As previously reported, the poultry sector accounts for millions of farmers in India employing over 2.75 crore individuals. They are now hoping for a rescue from this unexpected condition as this has become the generation's additional revenue for farmers and nutrition for the poorest of the poor.

Government of Telangana (2020) It is the small farmers in the middle of this crisis who have become the victims of such false rumours. Southern states are poultry centres in India, as stated in the beginning of this article, and are therefore largely affected by this rumour. As cases spread in southern India, the rumour led people to stop consuming beef. In Hyderabad and Rangareddy, where most poultry is raised in Telangana, the active cases of COVID-19 are 400 and 16 by 27 April 2020 respectively.

Mayur M. *et al.* (2020) A significant proportion of the livestock production market, occupied by small / marginal farmers and landless workers, is expected to not be a serious problem with the non-availability of labour, even in larger dairy units that employ a large number of labour forces. However, the lack of sufficient labour available for organised poultry farms, hatcheries, feed plants, and even dairy processing units was a restriction, particularly during the 1st lockdown period, which, however, was gradually resolved. There was a labour shortage concerning livestock production involving diverse physical tasks and interruption in the selling of livestock and poultry goods. Surprisingly, the reverse movement of labour from urban to rural areas was mirrored in the emergency. In this sense, recognising the socio-psychological dimensions of these migrant workers and offering the requisite assistance and support for the preservation of their livelihoods at the destination will be important**.**

M L Melly (The Hindu, 2020) Farmers who suffered the first blow when social media rumours connected poultry consumption to coronavirus spread seek government relief. For the poultry industry and local farmers as well, it is a double whammy. The industry was first struck by social media reports relating chicken eating

to the coronavirus pandemic. Now, when these myths have been alleviated to some extent after the industry and government initiated awareness campaigns, the poultry farmers experience another blow due to lockdown. Representatives of the poultry industry and farmers urged the state and central governments to declare some relief and subsidies to small poultry farmers who have suffered tremendous losses and also to ensure the availability of chicken and eggs to every nook and corner of the country by alleviating the restrictions on transport under lockdown and helping to increase people's immunity to battle COVID-19. Again, the poultry industry sought the government's assistance in alleviating fears regarding the interaction of COVID-19 with chicken and other birds**.**

Wei and Lu (2020) Because of the uncertainty of the outbreak or the traffic constraints, most farm service providers stopped operating.

S. Mahendra Dev *et al.* (2020) It must be noticed that non-farm wages and jobs have been increasing in rural areas. In fact, a NABARD survey indicates that if we include all rural households, only 23 per cent of rural income is from agriculture (cultivation and livestock). About 44percent of the revenue falls from manual labour, 24percent from government / private service and 8percent from other businesses. It indicates that in rural areas, revenue from the non-farm sector is the primary source.44percent of the revenue falls from manual labour, 24percent from government / private service and 8percent from other businesses. It indicates that in rural areas, revenue from the non-farm sector is the primary source. Rural wages were partially influenced in the pre-Covid-19 era due to lower real wage growth 24. Media sources show that, due to the arrival of migrant workers from the cities, rural incomes are dropping. However, urban areas have been impacted rather than rural areas by the lockout. Rural recovery in June and July 2020 outpaced that of urban areas. Tractor demand has also grown in rural areas**.**

Mukherjee *et al.* (2020) Almost all commercial activities have been cut off by the lockout. This results in the systematic lack of employment and salaries for migrant workers and the elderly in urban areas. Estimates from the Centre for Tracking the Indian Economy indicate that unemployment rose from 8.4 percent in mid-March to

23 percent in the first week of April. In urban areas, unemployment climbed to 30.9 percent as of April 5. India has seasonal migrant labour of about 40-50 million people. Much of the employees come from eastern India. Global media have broadcast images of hundreds of thousands of migrant workers from several states wandering for miles and miles along highways in recent days; others have walked 1000 kilometres to return to their home village. As production and marketing shut down, lockdown has slowed down the economy. Due to economic recession and failure of many firms, a large amount of work force sacrifices their employment. As a consequence, the labour population began migrating back to their respective villages**.**

Ravindran (2013) India's poultry company has grown from technological advancements in poultry breeding and disease control, but the production of low-priced high-quality feed has been an additional factor.

Davis *et al*. (2013) For broiler production, the highest single cost of production is feed which will account for up to 70 per cent of overall expenses.

Landes *et al*. (2004) Feed provides for 55-64 per cent of variable costs in the scenario of poultry production in India**.**

Krishna *et al*. (2014) Normally, poultry feed comprises 60-65 percent maize. Maize accounts for much of the nutrition in the feed ration for both broiler and layer rations, while soybean meal supplies the bulk of the protein requirement**.**

Landes *et al*. (2004) On average, broiler rations consist of 64 percent maize and 20 percent soybean cake, while sheet rations contain 42 percent maize and 16 percent soybean cake.

Dixon *et al*. (2008) In India, a concomitant surge in domestic maize production has encouraged the development of the poultry industry**.**

Hanan Al-Khalaifah *et al.* (2020) Based on the above findings of the poultry industry study, it is apparent that the difficulty of shipping feed materials between countries is the biggest problem of the global quarantine and curfews due to the

COVID 19 crisis. This has badly affected the supply of the main ingredients needed for feed rations, in particular because most feed ingredients such as maize and soybeans are not domestically produced and must be imported from other countries. The availability of the key ingredients needed for feed rations has been badly affected, in particular because most feed ingredients such as maize and soybeans are not produced domestically and must be imported from other countries. In addition, the quality and price of raw feed products, whether imported or obtained domestically from other poultry firms, have been greatly affected by global and local quarantines. The lack of raw material supply raises the cost, irrespective of quality requirements. If some quality of feed rations are used, changing the type and quality of feed ingredients will impact the production efficiency of chickens. Both of these issues play an important part in the development cycle and have a direct effect on the food supply chain for buyers of table eggs and meat**.**

The prospect of local development of key feed ingredients such as maize and soya should be discussed as a solution to the import ban and global feed ingredient shortages. In addition, to partly substitute maize and soya in the feed rations, all other nearby forms of protein and energy may be used. Marine algae are examples of local origins, whole dates, and in the country, native plants. In the absence of foreign sources due to the global recession, such as the ongoing COVID 19 crisis, this strategy would definitely lead to supplying local feed materials.

Shoumojit Banerjee (The Hindu, 2020) The COVID-19 pandemic has had a knock-on impact on farmers raising maize and soybeans, key ingredients that make up 60percent and 25percent of poultry feed, respectively. In districts like Nashik and Aurangabad, maize prices have plunged from Rs 22 to Rs12. More seriously, in the rural hinterland, the poultry industry is a source of jobs for thousands who have taken up poultry farming because they find agriculture economically unfeasible, said Dr. Nawale. Experts said the rumours have also taken a toll on poultry-dependent farmers growing maize and soybeans, as they have suffered heavy losses. Maharashtra has a reliance on the poultry industry of 50 lakh maize and 57 lakh soybean growers. They constitute 12 percent of the farming population of the country.

Lalatendu Mishra (The Hindu, 2020) Therefore, if the poultry industry experiences such a calamity, it often has a cascading impact on the agricultural sector. As the rumours relating chicken consumption to COVID-19 started to emerge, the Minimum Support Price (MSP) of maize had plummeted to about 1300 per quintal from about 1,700 per quintal. As the poultry industry is one of the processing industries of Indian agriculture, the livelihood of many farmers depends on poultry, including those growing maize and soybeans. Apart from the problem of financial losses, the need for an hour is to restore the customer's trust in poultry meat. The price of maize that goes into the production of poultry feed has significantly decreased. Since the last two or three months, when COVID-19 began to spread across the world, maize prices have been slumping. Maize prices have slumped because global demand is not there. Maize prices have suffered as demand for poultry feed has plummeted. Because of the COVID-19 influence, prices decreased from Rs 1,900 in January to Rs 1,500 to Rs 1,600 per 10 0 kg. Demand for maize, a key part of the poultry industry, has been impacted and prices have also dropped. This is due to challenges facing the food manufacturing sector, such as worker shortages due to COVID-19**.**

M L Melly (The Hindu, 2020) Due to the lockdown affecting supplies from feeder cities to major cities such as Mumbai, Bangalore and Hyderabad, the movement of vehicles to red zones or containment zones across the country is prohibited. The price rebound would not compensate for the heavy losses already suffered by poultry producers. As the key user of soy and maize is the poultry industry, the crisis is also affecting farmers growing these two crops. The price of maize has fallen from Rs 25 to Rs 15 per kg over the past few days.

Vishwanath Kulkarni *et al*. (2020) Recalling the 2016 bird flu outbreak, the poultry industry called for interest discounts and the selling of maize from government supplies at approximately 4 / kg.

Parthasarathi Biswas *et al*. (2020) The result of the meltdown might not be confined to the poultry market. Feed accounts for around 70 per cent of the manufacturing expense of broilers and eggs. For a 2-kg live broiler bird and 125 grams for each egg, farmers give around 3.5 kg of feed. After the beginning of

January, the prices of broiler feed have fallen from Rs 35 to Rs 30-31 per kg and, in the case of layer feed, from Rs 25 to Rs 22-23. The reduced demand for feed is bound to be transferred to ingredients, particularly maize.

Chapter III

RESEARCH METHODOLOGY

In this chapter various scientific and systematic procedure were used for conducting the present study. The methodology adopted in the present investigation for objective 1st that is Studying the effect of COVID-19 on national and global poultry industry. presented below:

Data was collected from January to May 2020 via social media platforms, different websites, magazine, journals like Indian Journal of Poultry Science and newspapers and many other sources.

ICRA. 2020. COVID-19 lockdown has severely hit the poultry industry with Q4 being the worst quarter: ICAR. Accessed Apr. 2020

Analysis of egg price fluctuation and cause

Journal of Agricultural Science, 10 (11) (2018), pp. 581-587

Indian Journal of Poultry Science

Data from sources were collected to assess the egg price trend during pandemic period. Prevailing egg prices pertaining to five different highest egg producing regions i.e., East Godavari (Andhra Pradesh), Hyderabad (Telangana), Namakkal (Tamil Nadu), Pune (Maharashtra), Kolkata (West Bengal) were retrieved from National Egg Coordination Committee data base (http://www.e2necc.com/EGG DailyAndMontlyPrices.aspx). Daily broiler prices from broiler belt regions Maharashtra, Tamil Nadu, Telangana, Andhra Pradesh and Uttar Pradesh were retrieved from real-time market sources (Poultry Bazaar). Prevailing market prices of maize were retrieved from Agriwatch and Agricultural Marketing Intelligence Center, Hyderabad.

The methodology adopted for objective 2nd presented under the following headings:

3.1 Locale of the study

3.1.1 Description of the study area

The study was conducted in Varanasi city situated in Uttar Pradesh, in northern part of India. Varanasi is located on the banks of the holy river, Ganges. Varanasi is situated at an altitude of 86 (282 ft.) meter from sea level and located between 25°19′ North latitude and 83°0.2′ East longitude. Varanasi falls in a subtropical condition with moisture deficit index was recorded between 20-41 percent. The normal period for onset of monsoon in this region is the 3rd week of June which last up to end of September or sometimes extend up to the first week of October. Shower of rain are often experienced during winter season. The annual rainfall of this region is about 1120 mm. Generally, the maximum and minimum temperature ranges between 15.5-39.3^{0}C and 5.3-28.4^{0}C, respectively. May and June are the hottest month with maximum temperature ranging from 44.50 to 45.50 ^{0}C .The cold period lies between Novembers to January with minimum temperature was recorded between 5.2 to15.3^{0}C. The mean relative humidity is about 65.97percent which rise to 95.87percent during wet season and goes down to 20.12percent during dry season.

3.1.2 Selection of district

Varanasi district was selected purposively for present study.

Fig. 3.1. Map of Varanasi District

3.1.3 Selection of the block

The Varanasi district is divided into 8 blocks. Among these, 2 block were selected purposely by using simple random sampling technique. There were Sewapuri block and Kashi Vidhyapeeth and other blocks.

3.1.4 Selection of village

Two villages namely Khajuri and Bachhav of Sewapuri and Kashi Vidhyapeeth and other blocks were selected for the study

3.2 Selection of respondents

A sample of 30 poultry farmers (10 small, 10 medium, 10 large) were selected randomly from Varanasi district

Fig. 3.2. Visited to Mamta Poultry Farm, Varanasi, Sewapuri

Fig. 3.3. Cockrel Bird Farm at Ramna, Varanasi

3.3 Variables and their measurement

Variables were selected in accordance with the objectives of study while selecting the variables adequate attention was paid to review of literature collected for this purpose. The variables along with the instruments used for measuring them are given in the table below:

These were sources for information related Poultry farmers were measured as 'YES' or 'NO 'and score assigned as1, 0, respectively

Constraints

3.4 Tool and techniques used for data collection

3.4.1 Data collection and statistical tools

The interview schedule was prepared based on the objectives and variables for study. Data were colected from the selected Poultry Farmers of that selected villages.To convert the data into meaningful findings, the following statistical tools were used Frequency, Percentage.

3.4.2 Frequency

The frequency of a particular cell was divided by the total number of members multiply by 100 for calculating the percentage.

$$P = (n/N) \times 100$$

Where

P = percentage (percent)

n = frequency of particular cell

N = total number of respondents in that particular cell

3.3.2 Percentage

The frequency of a particular cell was divided by the total number of members multiply by 100 for calculating percentage.

$$P = (n/N) \times 100$$

Where

P = percentage (percent)

n = frequency of particular cell

N = total number of respondents in that particular cell

Chapter IV

RESULTS AND DISCUSSION

The findings drawn concerning the specific objectives of the study through analysis of using appropriate statistical techniques and from the review literature have been presented in this chapter.

The findings have been divided and discussed under following sub heads:

1. Studying the effect of COVID-19 on national and global poultry industry.
2. A case study on Poultry Farmers of Varanasi district to investigate the constraints faced and the effect of COVID-19 on poultry farmers.

4.1 Impact of COVID-19 at National Level

The Covid- had a serious effect on the domestic poultry industry, the worst quarter in recent years. Due to sharp declines in demand, realization and profitability, the industry suffered significant net losses. Consumption was heavily impacted by the spread of misinformation about poultry being a source of Covid-19 on social media. The government responded to the disinformation, but the losses amounted to USD 236 million between January and March 2020. Poultry meat sales dropped by a whopping 80 percent, and poultry meat prices fell by half. More than one million small poultry farmers and more than half a million workers in the industry have been unemployed. As poultry farmers cancelled orders, some farmers even buried their chickens alive. This also affected feed producers. More than 10 million maize and soy farmers benefit directly from the field. Poultry farming generates more than 50 million direct and indirect jobs in poultry processing, trading, feed production, agricultural crops, transportation, exports, and others. People have avoided meat, fish, poultry, and egg consumption, etc. Because of the decline in demand, the wholesale price of chicken drops by as much as 70 to 75%. As a consequence, chicken is now available in retail at Rs 50-100per kg compared to Rs 180-200 earlier.

Table 4.1. Price (USD) trend of various poultry entities during COVID-19 pandemic 2020

	January	February	March	April
Live broiler (kg)	0.90	0.84	0.79	0.87
Table eggs (per 100)	5.00	5.00	4.00	4.00

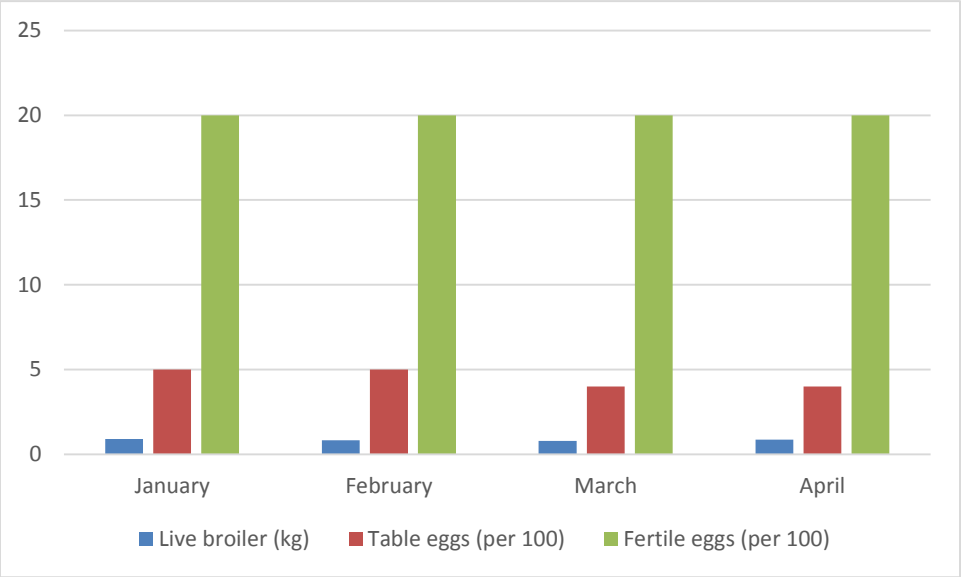

Fig. 4.1. Price (USD) trend of various poultry entities during COVID-19 pandemic 2020

Table 4.1 shows price Table 1 presents the overall price pattern of eggs and live broiler in different months during Covid-19. Result from table 4.1 can be drawn that there is decrease in price of live broiler per kg and table eggs per 100 due to Covid-19 effect.

Table 4.2. Price (in USD) of broiler per kg live wt. in different months in major broiler producing states

States	January	February	March	April
Andhra Pradesh	1.21	0.77	0.35	1
Telangana	1.17	0.74	0.36	0.93
Tamil Nadu	1.23	0.90	0.56	1.15
Maharashtra	1.12	0.69	0.34	0.99
Uttar Pradesh	1.33	0.80	0.66	0.66

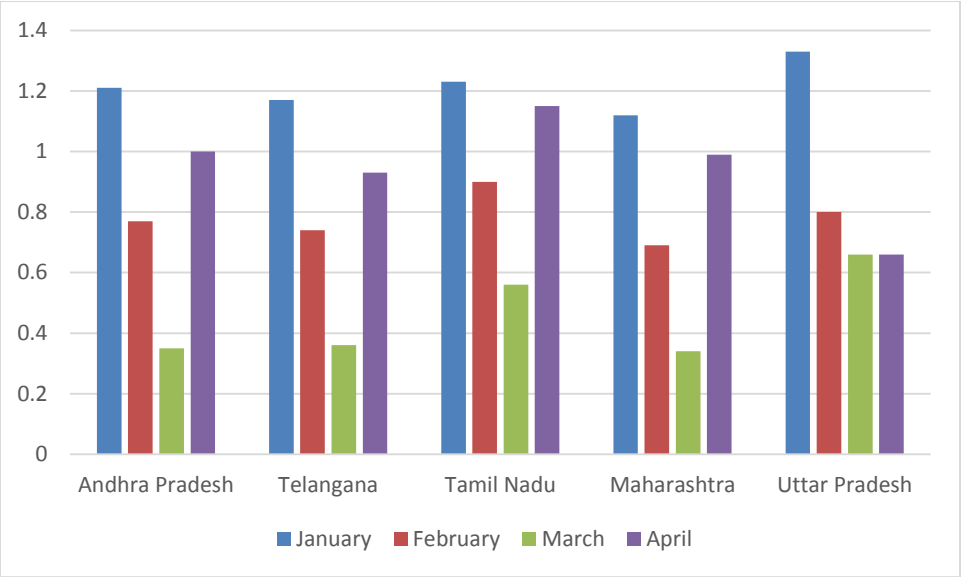

Fig. 4.2. Price (in USD) of broiler per kg live wt. in different months in major broiler producing states

Result from table 4.2 shows that there is major fall in price of broilers that effected drastically to poultry industry. Due to 50 percent less consumption in the COVID-19 scare, demand declined further in April. Similarly, demand was reduced by 50 percent during March to April in Andhra Pradesh (the country's highest producing poultry state), compared to January, where 56,000 tons of production per week was observed. In Uttar Pradesh (India's most populous state), prices in January, February, March and April were USD 1.33, 0.8, 0.66 and 0.66, respectively. Results pertaining to percentage change in price fluctuation showed a negative trend from Jan-Feb, Feb to Mar, Mar-Apr and Jan-Apr respectively. The trend shows that prices were maximum in January and got to minimum in March then after it slowly started increasing

Table 4.3. Sale price (in USD) of table eggs (per 100) in different regions of India

Regions	January	February	March	April
East Godavari	6.08	5.01	4.34	4.69
Hyderabad	5.67	4.80	4.00	5.03
Namakkal	5.61	5.15	4.10	5.43
Pune	6.57	5.61	4.76	5.74
Kolkata	6.54	5.40	5.00	4.91

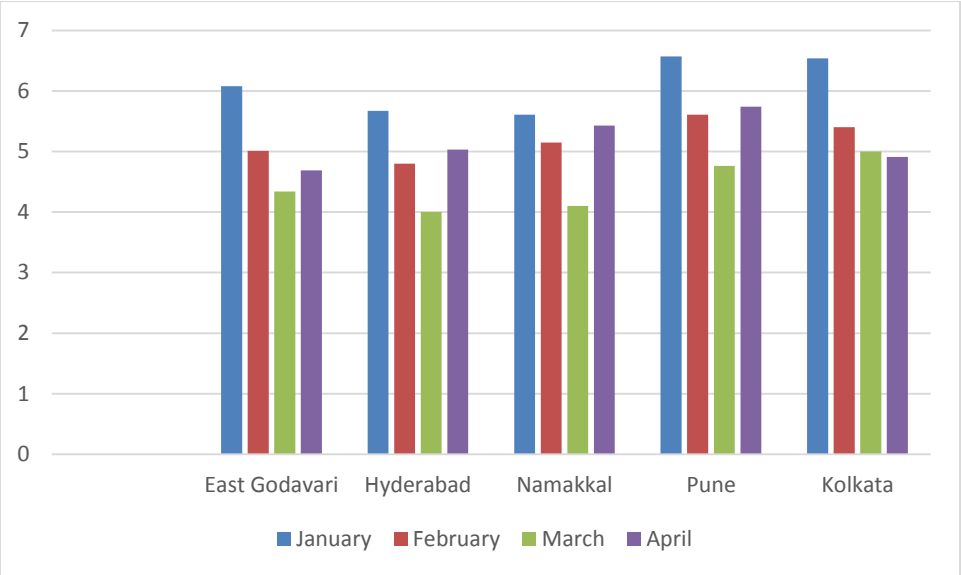

Fig. 4.3. Sale price (in USD) of table eggs (per 100) in different regions of India

Results from table 4.3 can be drawn that sale price of table egg were maximum in month of January in all regions and it continuously declined upto the April which means there drastic reduction in the consumption of eggs. On a relative study a dramatic price drop from January in the South (East Godavari and Hyderabad) and East (Kolkata) bound regions suggested the consumer's vulnerability to COVID-19 rumors. The percent change in price variation from Jan-Feb, Feb-Mar, Mar-Apr and Jan-Apr, respectively, was recorded as negative as 36, 43, 129 and 21.3. Namakkal, the nation's largest egg production centre, has sustained a USD 1.1 million loss from the stagnation of 190 million eggs.

The customer fear of connecting chicken to Covid-19 is currently much lower. In recent weeks, the biggest problem has been logistics and keeping the shops open to the customer. In at least 60 percent of the world, the distribution problem has now been solved.

By the end of this year the poultry sector is expected to roll back, while new investment resources will remain restricted for some time. The Indian Poultry Federation has asked the government for assistance such as loan rescheduling, frozen/cold chicken meat promotion, cold storage, feed subsidies, and the inclusion of eggs in mid-day meal schemes. All in all, loans of $2.7 billion are required. The

industry has also sought government funding for the establishment of the Poultry Board. To these particular requests, the government has not replied. Demand has recently risen, and prices are currently good due to supply constraints.

The poultry industry's projected loss due to the effects of COVID-19 and its related lockdown is USD 3053 million. Reports from the Ministry of Animal Husbandry showed a projected loss of USD 203 million per day due to a 30-40% decrease in demand and, consequently, prices from the beginning of February to the beginning of May. The first two weeks of March alone accounted for USD 95 million in losses.

The Poultry Farm Association of India also organized a Chicken Fair in many states like U.P. to dispel the rumors that COVID-19 propagates through chicken consumption.

The key impact of the crisis is caused by government quarantine lockdown steps that by restricting the movement and distribution of poultry products, have disrupted the food supply chains. Both restaurants and retail sales were fully closed during the full lockdown. As a consequence, the company's revenues have decreased significantly and the marketing industry has been adversely affected. The availability of bank closures during the lockdown also impacted of the industry's cash money.

Farm gate prices dropped to Rs 15-35 kg compared to Rs 80-85 per kg for production costs. In order to cope with losses, poultry farmers began to decrease production. In mid-February, the egg producers alone had lost Rs 600 crore, selling it at a price of Rs 2.50 against the production cost of Rs 4. As previously reported, the poultry sector accounts for millions of farmers in India employing over 2.75 crore individuals.

On average, broiler rations consist of 64% maize and 20% soybean cake, while sheet rations contain 42% maize and 16% soybean cake. . The price of maize has fallen from Rs 25 to Rs 15 per kg over the past few days.

4.2 Impact of COVID-19 at Global Level

The coronavirus effect has largely affected the global animal husbandry industry. After the outbreak, there has been a sharp drop in demand for poultry and meat as there have been different reports among the populations that the virus would spread through the meat and chicken of the animal. The Centres for Disease Control & Prevention, however, noted that it is known that coronavirus is transmitted via direct contact with humans and not via livestock or aqua animals.

Increased consumption of pork, beef, chicken and other forms of seafood such as prawns worldwide were the key factors responsible for industry development prior to the pandemic. Changing people's lifestyles and desires for luxury food products were also the key reasons for market development.

The animal husbandry sector is divided into dairy, beef, poultry, aquaculture, and others by form (insects). Because of the COVID-19 pandemic, meat and poultry are likely to be greatly affected. From a geographical point of view, the US, China, Italy, France, Germany, Spain, the UK, and India are the most affected areas. Due to the increased rate of viral replication, regional demand for chicken and meat is declining. It has also been shown that people are opting for the jackfruit as a substitute for chicken and mutton. In comparison, demand growth has also been impacted by the shutdown of food chain facilities, including restaurants.

Several aid packages are being announced by countries to reduce the effects of coronavirus in the industry, as well as rumors about it. In India for example, the government has set up an Economic Response Task Force for COVID-19 to determine the effect of COVID-19 on different industries, including animal husbandry.

The poultry value chains for eggs and broiler meat of local companies have also been impacted by the ongoing COVID 19 crisis as part of this global environment. In terms of quantity and quality, this impact certainly disrupted the supply of poultry products to customers and affected production.

At certain points especially during the partial and complete lockdown times. The industry exported part of its production to countries surrounding it such as Iraq, the Kingdom of Saudi Arabia and other countries in the Gulf. Due to the covid-19 crisis, exports were 10 percent affected.

This company is an integrated company that sells table eggs, live, chilled and frozen chickens and quills to other local poultry industries and feed rations. The agency has poultry farms and poultry processing plants for layers and broilers that manufacture burgers, nuggets, frankfurters, meat balls, etc. The effect on this company's business of the COVID 19 crisis began with the start of the absolute lockdown, as all retail businesses were absolutely locked-down. The loss of revenue was 100 percent for live birds during the full lockdown, 75 percent for frozen birds, and 100 percent for table-eggs.

The sales of industry had a gradual impact beginning March 1st, 2020. All these factors had a negative effect on the industry's production and sales lines, although the stored material may have been barley adequate for around 3 months. The poultry industry's exports to the surrounding countries were impacted by the country's covid-19 crisis by 15 percent. During the full lockdown and 40-50 percent during the partial lockdown, company retail revenues were affected by 100 percent. Since there are no local hatchery eggs for broilers at the business. Delays in the receipt of the imported fertilized eggs affected it. Due to the lockdown from the crisis. With the full lockdown on May 10, 2020, the effect of COVID 19 on Company 7 began. As with the other poultry industries, due to the complete lockdown and movement and transportation limits, the main effect was on the sales sector during the full lockdown.

With the full lockdown on May 10, 2020, the effect of COVID 19 on began. As with the other poultry industries, due to the complete lockdown and movement and transportation limits, the main effect was on the sales sector during the full lockdown. The company does not market its goods on its own and does not export its products to other countries its goods. It sells live broiler chickens and table eggs to local outlets that have been entirely closed during the full lockdown, which has had a huge effect on sales and profit

Objective 2. Effect of COVID - 19 on Poultry small farmers

Table 4.4. Distribution of poultry farmers according to their Effect of COVID-19 on Poultry small farmers

S.No.	Statement	Frequency	Percentage
1	Effect on poultry supply chain	0	0
2	Effect on poultry product processing	0	0
3	Eggs and chicken price crashed	10	100
4	Chick destroyed during Covid-19	00	00
5	Low demand of chicken/eggs	10	100
6	Effect on sale of poultry product	10	100
7	Feed price decreased	6	60
8	Decrease in production of poultry	10	100
9	Loan repayment capacity declined	2	20
10	Effect on price and supply during covid-19	10	100

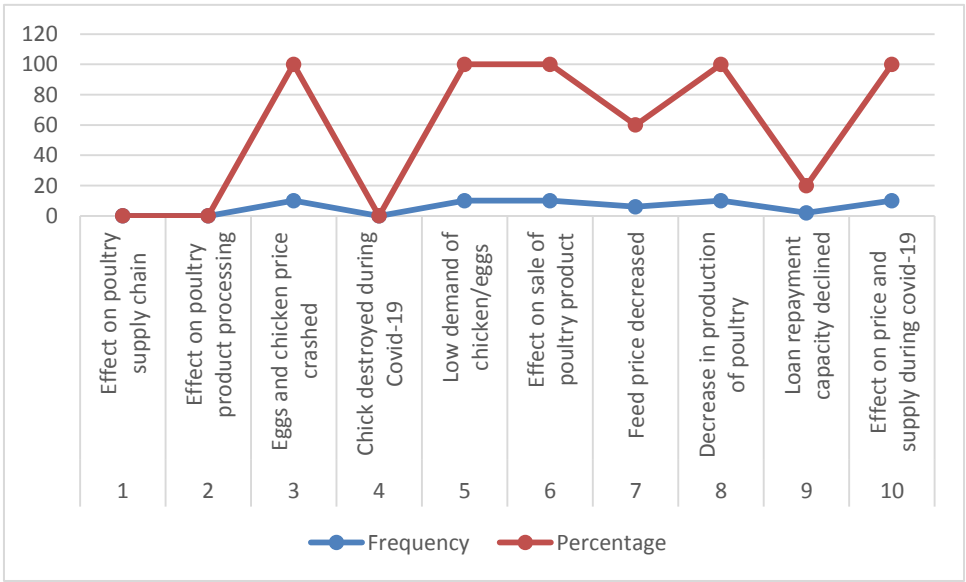

Fig. 4.4. Distribution of small poultry farmers according to their effect of COVID-19 on poultry farms

The result from table 4.4 shows the various effects of covid-19 on marginal poultry farmers in the study. The study revealed that the major effects of covid-19 on poultry farmer during covid-19, Eggs and chicken price crashed (100percent), Low demand of chicken/eggs (100percent), Effect on sale of poultry product (100percent), Decrease in production of poultry (100percent), Effect on price and supply during covid-19 (100percent), were major effect experienced by all of the farmers and these were placed at first position followed by, Feed price decreased (60percent), Loan repayment capacity declined (20percent), Effect on poultry supply chain (00percent), Effect on poultry product processing (00percent) were found to be other major problems faced by them, whereas none of the farmer destroyed their chicks during covid-19 .

Effect of Covid – 19 on Poultry medium farmers

Table 4.5. Distribution of poultry farmers according to their Effect of COVID – 19 on Poultry medium farmers

S.No.	Statement	Frequency	Percentage
1	Effect on poultry supply chain	10	100
2	Effect on poultry product processing	4	40
3	Eggs and chicken price crashed	10	100
4	Chick destroyed during Covid-19	00	00
5	Low demand of chicken/eggs	10	100
6	Effect on sale of poultry product	10	100
7	Feed price decreased	6	60
8	Decrease in production of poultry	10	100
9	Loan repayment capacity declined	7	70
10	Effect on price and supply during covid-19	10	100

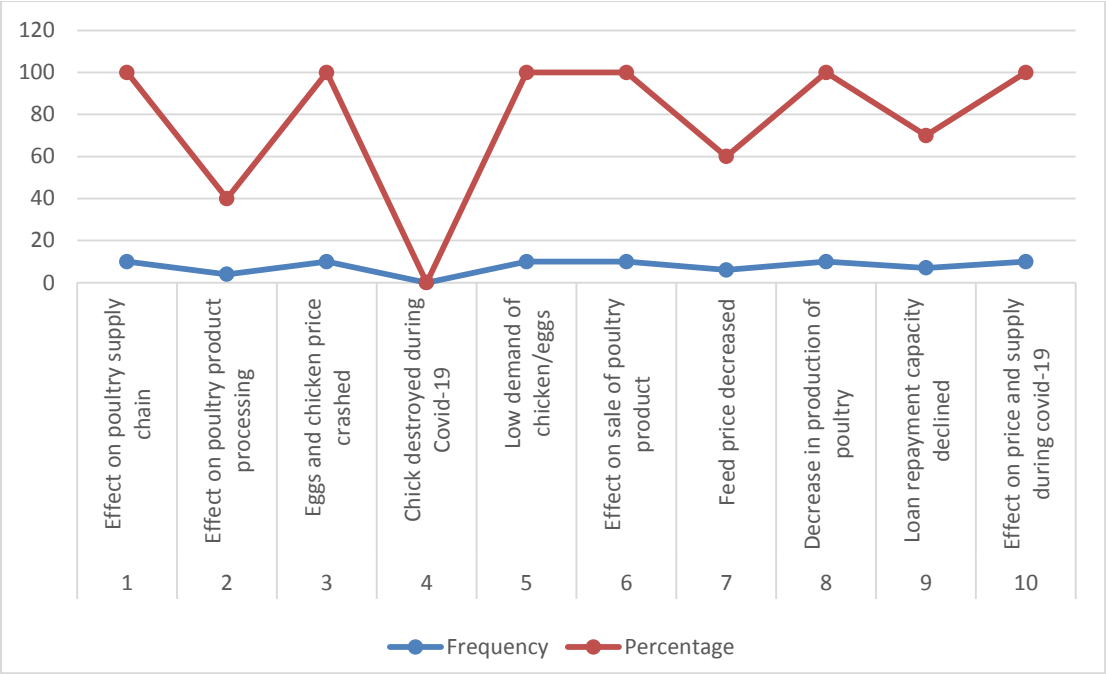

Fig.4.5. Distribution of poultry farmers according to their effect of COVID – 19 on Poultry medium farmers

The result from table 4.5 shows the various effects of covid-19 on small poultry farmer in the study. The study revealed that the major effects of covid-19 on poultry farmer during covid-19 Effect on poultry supply chain (100percent), Eggs and chicken price crashed (100percent), Low demand of chicken/eggs (100percent), Effect on sale of poultry product (100percent), Decrease in production of poultry (100percent), Effect on price and supply during covid-19 (100percent), were major effect experienced by all of the farmers and these were placed at first position followed by Loan repayment capacity declined (70percent), Feed price decreased (60percent), Effect on poultry product processing (40percent) were found to be other major problems faced by them, whereas none of the farmer destroyed their chicks during covid-19 .

Effect of COVID – 19 on large Poultry farmers

Table 4.6. Distribution of poultry farmers according to their Effect of COVID – 19 on large Poultry farmers

S.No.	Statement	Frequency	Percentage
1	Effect on poultry supply chain	10	100
2	Effect on poultry product processing	10	40
3	Eggs and chicken price crashed	10	100
4	Chick destroyed during Covid-19	5	50
5	Low demand of chicken/eggs	10	100
6	Effect on sale of poultry product	10	100
7	Feed price decreased	8	60
8	Decrease in production of poultry	10	100
9	Loan repayment capacity declined	3	30
10	Effect on price and supply during covid-19	10	100

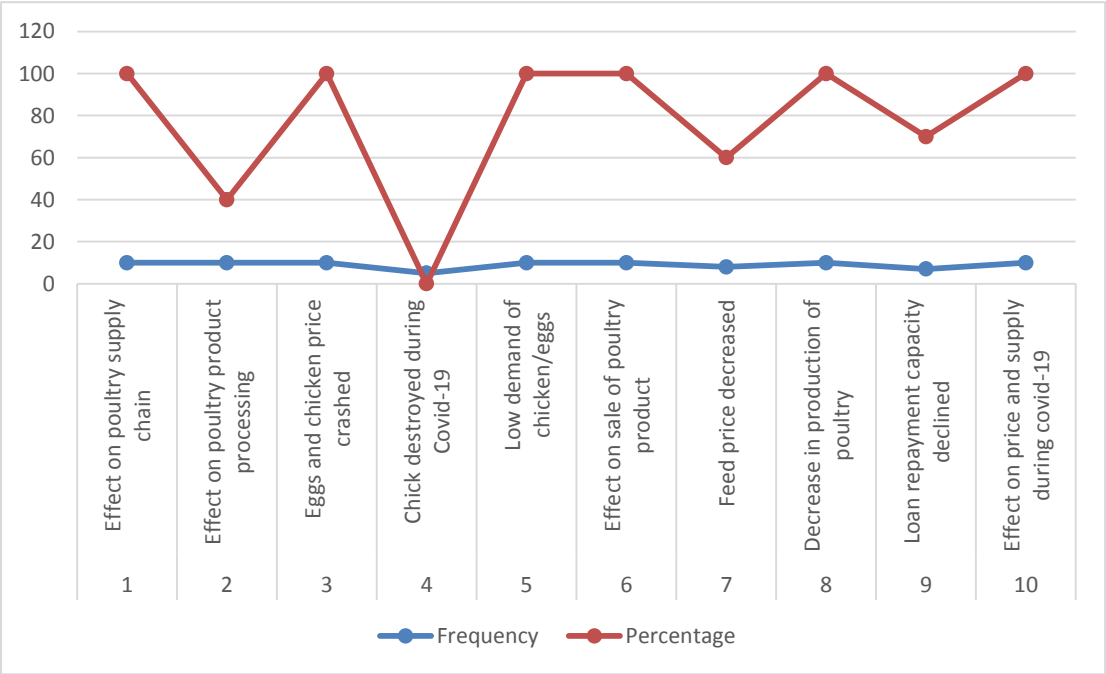

Fig. 4.6. Distribution of poultry farmers according to their effect of COVID – 19 on large Poultry farmers

The result from table 4.6 shows the various effects of covid-19 on large poultry farmer in the study. The study revealed that the major effects of covid-19 on poultry farmer during covid-19 Effect on poultry supply chain (100percent), Eggs and chicken price crashed (100percent), Low demand of chicken/eggs (100percent), Effect on sale of poultry product (100percent), Decrease in production of poultry (100percent), Effect on price and supply during covid-19 (100percent), were major effect experienced by all of the farmers and these were placed at first position followed by Loan repayment capacity declined (30percent), Feed price decreased (60percent), Effect on poultry product processing (40percent) were found to be other major problems faced by them, whereas farmer destroyed their chicks during covid-19 were (50 percent) .

Constraints faced small Poultry farmers during COVID – 19

Table 4.7. Distribution of poultry farmers according to their Constraints faced small Poultry farmers during COVID – 19

S.No.	Problems	Frequency	Percentage
1	Fluctuation of market price	10	100
2	Lack of transportation facilities	0	0
3	Lack of storage facility	3	30
4	Non-availability of labour	0	0
5	Lack of grading and packaging	0	0
6	Non-availability of poultry material	5	50
7	Lack of knowledge	4	40
8	Disease problem and unavailability of proper treatment	10	100
9	Failing of assessment of demand	10	100
10	High cost of transportation facility	0	40

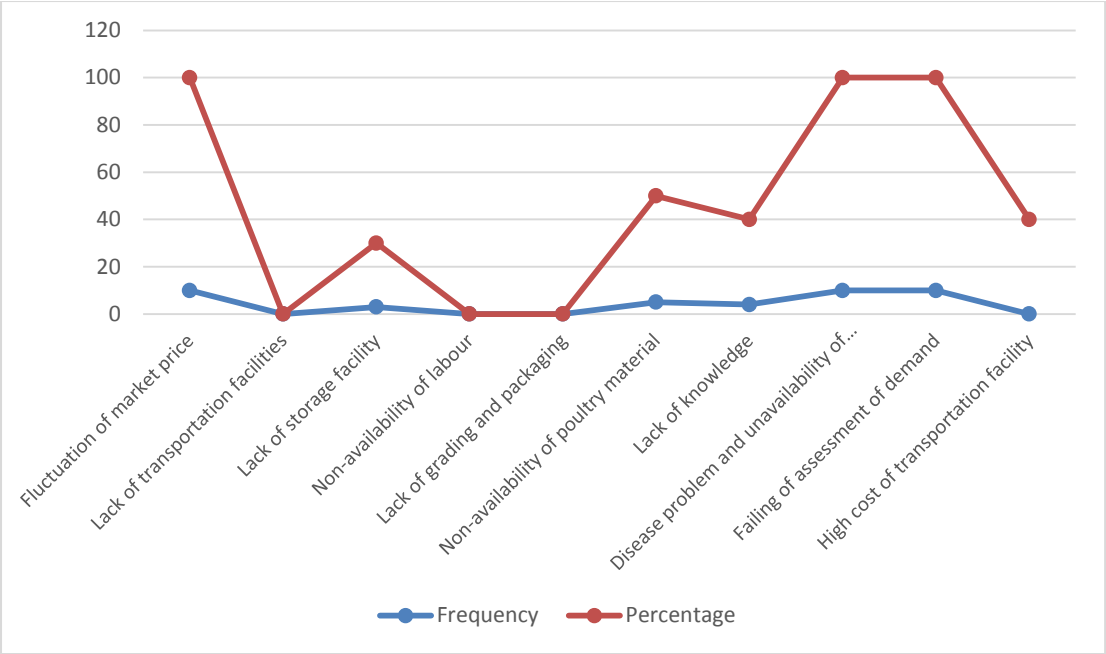

Fig. 4.7. Distribution of small poultry farmers according to their Constraints faced by Poultry farmers during COVID – 19

The result from table 4.7 depicts the various constraints faced by the small poultry farmers during covid-19 in the study. The study revealed that the major challenges faced by the poultry farmer during covid-19 Fluctuation of market price (100percent), Disease problem and unavailability of proper treatment (100percent), Failing of assessment of demand (100percent) were major problem experienced by all of the farmers and these were placed at first position followed by, Lack of knowledge (40percent), Non-availability of labour (50percent), Non-availability of poultry material (50percent), Lack of storage facility (30percent), High cost of transportation facility (40percent), Lack of grading and packaging (00percent), Lack of transportation facilities (0percent),were found to be other major problems faced by them.

Object, 2 Constraints faced medium Poultry farmers during Covid – 19

Table 4.8. Distribution of poultry farmers according to their Constraints faced medium Poultry farmers during COVID – 19

S.No.	Problems	Frequency	Percentage
1	Fluctuation of market price	10	100
2	Lack of transportation facilities	7	70
3	Lack of storage facility	4	40
4	Non-availability of labour	5	50
5	Lack of grading and packaging	8	80
6	Non-availability of poultry material	5	50
7	Lack of knowledge	7	70
8	Disease problem and unavailability of proper treatment	10	100
9	Failing of assessment of demand	10	100
10	High cost of transportation facility	40	40

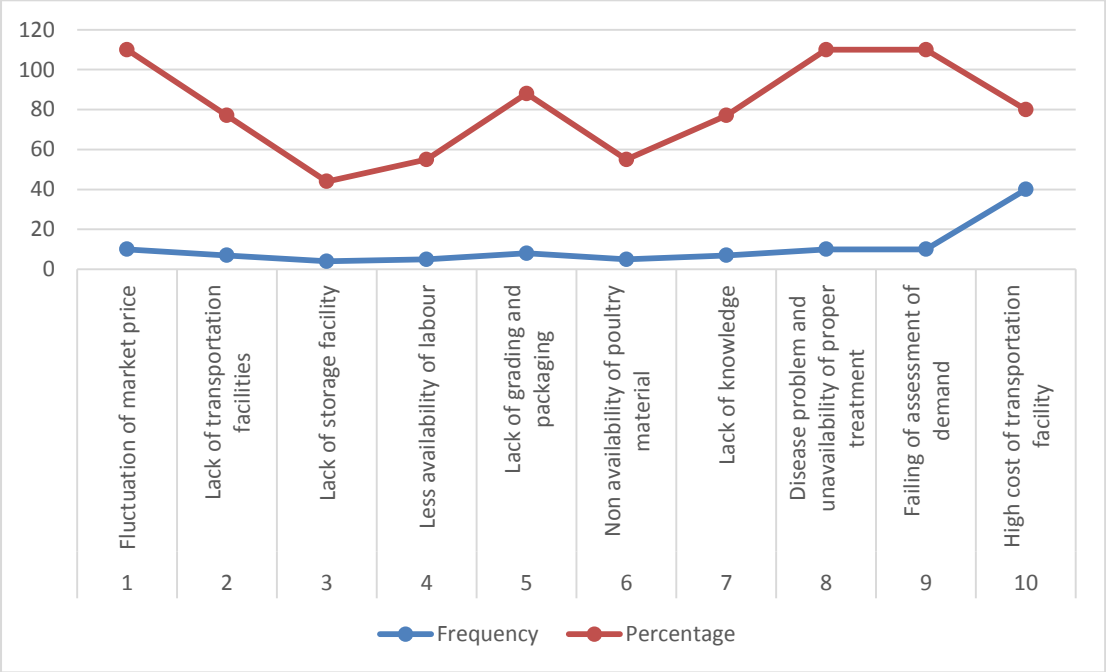

Fig. 4.8. Distribution of medium poultry farmers according to their Constraints faced by Poultry farmers during Covid – 19

The result from table 4.8 depicts the various constraints faced by the medium poultry farmers during covid-19 in the study. The study revealed that the major challenges faced by the poultry farmer during covid-19 Fluctuation of market price (100percent), Disease problem and unavailability of proper treatment (100percent), Failing of assessment of demand (100percent) were major problem experienced by all of the farmers and these were placed at first position followed by Lack of grading and packaging (80percent), Lack of transportation facilities (70percent), Lack of knowledge (70percent), Non-availability of labour (50percent), Non-availability of poultry material (50percent), Lack of storage facility (40percent), High cost of transportation facility (40percent) were found to be other major problems faced by them.

Constraints faced large Poultry farmers during Covid – 19

Table 4.9. Distribution of poultry farmers according to their Constraints faced large Poultry farmers during COVID – 19

S.No.	Problems	Frequency	Percentage
1	Fluctuation of market price	10	100
2	Lack of transportation facilities	10	70
3	Lack of storage facility	10	100
4	Non-availability of labour	10	100
5	Lack of grading and packaging	8	80
6	Non-availability of poultry material	8	80
7	Lack of knowledge	2	20
8	Disease problem and unavailability of proper treatment	4	40
9	Failing of assessment of demand	10	100
10	High cost of transportation facility	6	60

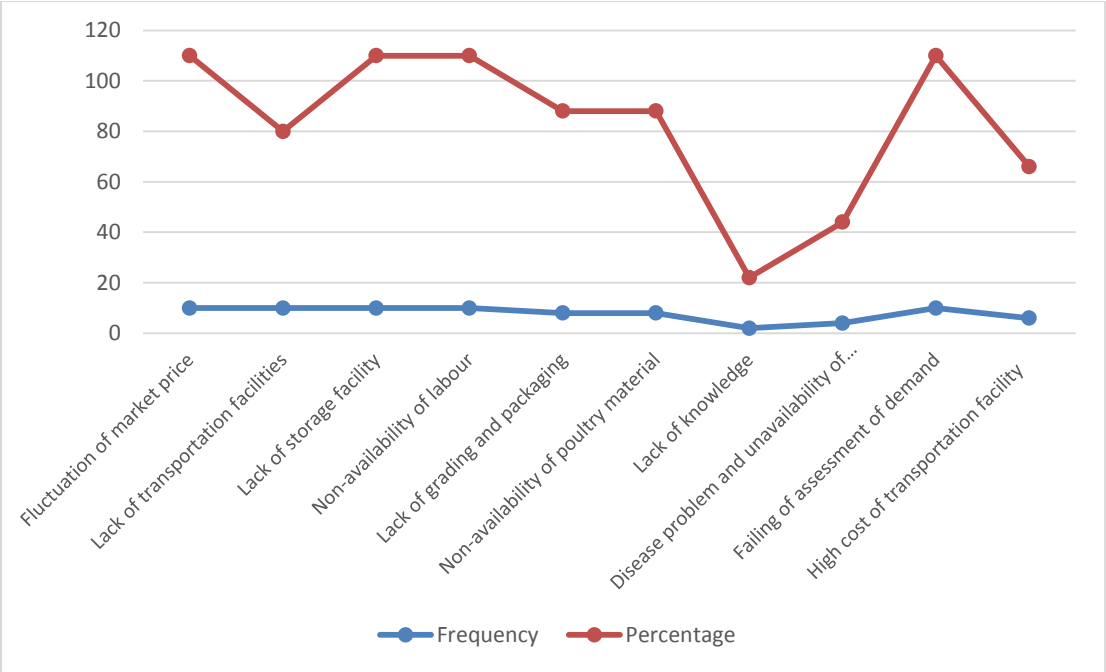

Fig. 4.9. Distribution of large poultry farmers according to their Constraints faced by Poultry farmers during Covid – 19

The result from table 4.9 depicts the various constraints faced by the medium poultry farmers during covid-19 in the study. The study revealed that the major challenges faced by the poultry farmer during covid-19 Fluctuation of market price (100percent), Lack of storage facility (100percent), Failing of assessment of demand (100percent) Non-availability of poultry material (100percent), were major problem experienced by all of the farmers and these were placed at first position followed by Lack of grading and packaging (80percent), Lack of transportation facilities (70percent), High cost of transportation facility (60percent) Non-availability of labour (50percent), Disease problem and unavailability of proper treatment (40percent), Lack of knowledge (20percent), were found to be other major problems faced by them.

Chapter V

SUMMARY AND CONCLUSION

SUMMARY

COVID-19 is a coronavirus-induced infectious disease called SARS-CoV-2, which is a respiratory pathogen. On 31 December 2019, (WHO) first heard about this new virus from cases in Wuhan, People's Republic of China. WHO (2020) announces the emergence of a pandemic of emerging coronavirus infections (COVID-19). Corona viruses are zoonotic, meaning they are transmitted between animals and people. This virus is changing both the environment and the Indian economy. The Department of Health and Family Welfare, the West Bengal Government, NCDC, ICMR, WHO, ICAR and other organizations are seeking to reduce the infestation of the virus and mitigate the loss of human life. The World Health Organization announced Covid-19 to be a pandemic on March 11, 2020, in acknowledgment of the pervasive global dissemination of Covid-19.

The Government of India declared the lockdown of the entire country on 22 March 2020 in order to tackle the virus. Hence due to stopped movement and many rumours spreading everywhere all the industries faced a major decline in growth and production and it also included the poultry farmers in its effect.

The major findings of the research are summarized below under following the objective

1. Studying the effect of COVID-19 on national and global poultry industry.
2. A case study on Poultry Farmers of Varanasi district to investigate the constraints faced and the effect of COVID-19 on poultry farmers.

The Covid-19 had a serious effect on the domestic poultry industry, the worst quarter in terms of Indian economy in recent years. Due to sharp declines in demand, realization and profitability, the industry suffered significant net losses. Consumption was heavily impacted by the spread of misinformation about poultry being a source of

Covid-19. More than one million small poultry farmers and more than half a million workers in the industry have been unemployed. Because of the decline in demand, the wholesale price of chicken drops by as much as 70 to 75percent.

On the global level the coronavirus effect has largely affected the Poultry industry. Because of the COVID-19 pandemic, meat and poultry are likely to be greatly affected. From a geographical point of view, the US, China, Italy, France, Germany, Spain, the UK, and India are the most affected areas. Due to the increased rate of viral replication, regional demand for chicken and meat is declining. The poultry value chains for eggs and broiler meat of local companies have also been impacted by the ongoing COVID 19 crisis as part of this global environment. In terms of quantity and quality, this impact certainly disrupted the supply of poultry products to customers and affected production.

In case study the summary was drawn that categorization of poultry farmer on the basis of their farm size is into small, medium and large farmer and among them majority is of medium size followed by small and large.

The various effects of covid-19 on poultry farm in the research were found that. The study revealed that the major effects of covid-19 on poultry farmer during covid-19 Effect on poultry supply chain , Eggs and chicken price crashed, Low demand of chicken/eggs , Effect on sale of poultry product , Decrease in production of poultry, Effect on price and supply during covid-19, were major effect experienced by all of the farmers followed by Loan repayment capacity declined (Feed price decreased, Effect on poultry product processing were found to be other major problems faced by them, whereas none of the farmer destroyed their chicks during Covid -19 .

In the research various constraints faced by the poultry farmers during covid-19 The study revealed that the major challenges faced by the poultry farmer during covid-19 Fluctuation of market price, Disease problem and unavailability of proper treatment, Failing of assessment of demand were major problem experienced by all of the farmers and followed by Lack of grading and packaging Lack of transportation

facilities Lack of knowledge Non-availability of labour, Non-availability of poultry material, Lack of storage facility, High cost of transportation facility were found to be other major problems faced by them.

CONCLUSION

Covid-19 has serious impact at national as well as global level, in national context there was prominent decline in demand and and price, export and import in relation to production and consumption. Due to the pandemic meat sell drop by 80 percent and prices went down less than half. Egg industry also has to suffer the price of eggs were maximum in January which went to minimum in March and same trend was observed in meat prices and hence poultry industry had to suffer more. It also leads to loss of jobs for them who were directly and indirectly dependent on poultry industry for employment.

Talking about the global level the poultry value chains for eggs and broiler meat of local companies have also been impacted by the ongoing COVID 19 crisis. The export and import of many countries went down drastically. The effect on this company's business of the COVID 19 crisis began with the start of the absolute lockdown, as all retail businesses were absolutely locked-down. The loss of revenue was 100 percent for live birds during the full lockdown, 75 percent for frozen birds, and 100 percent for table-eggs.

The study on the effect and constraints faced by poultry farmers due to covid-19 showed that it has major effect on the poultry farmers that even price per kg of poultry decreased upto 70-80percent and due decrease in consumption of poultry products farmers faced major problem in their business regarding drastic reduction in sale and piece , loss in repayment capacity of loan etc. demand and supply change was effected at great extent though the feed price decreased but many suffered major loss in the business.

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APPENDIX

A Case Study on Poultry Farmers of Varanasi District to Investigate the Constraints Faced and the Effect of COVID-19 on Poultry Farmers.

General Information

Name of the farmer

Type of poultry farmer Small, Medium, Large

Size of poultry farm

Contact No.

Effect of COVID – 19 on Small, Medium and Large Poultry farmers

S.No.	Effect	Remarks	
		Yes	No
1.	Effect on poultry supply chain		
2.	Effect on poultry product processing		
3.	Eggs and chicken price crashed		
4.	Chick destroyed during Covid-19		
5.	Low demand of chicken/eggs		
6.	Effect on sale of poultry product		
7.	Feed price decreased		
8.	Decrease in production of poultry		
9.	Loan repayment capacity declined		
10.	Effect on price and supply during covid-19		

Constraints Faced by Poultry Farmers during COVID – 19

S.No.	Problems	Remarks	
		Yes	No
1.	Fluctuation of market price		
2.	Lack of transportation facilities		
3.	Lack of storage facility		
4.	Less availability of labour		
5.	Lack of grading and packaging		
6.	Non availability of poultry material		
7.	Lack of knowledge		
8.	Disease problem and unavailability of proper treatment		
9.	Failing of assessment of demand		
10.	High cost of transportation facility		