# IMPACT OF COVID-19 ON COMMERCIAL BROILER FARMING IN SAMTSE DISTRICT

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ABSTRACT: The study was designed to assess the impact of covid-19 on broiler farming in Samtse dzongkhag. Ninety-three broiler farmers were randomly selected and interviewed face to face using a set of semi-structured questionnaires. More than half of the respondents (72.7%) mentioned that the broiler farms have been temporarily discontinued, while some respondents (24.7%) have continued and have quit broiler farming (1.1%) after the covid-19 pandemic. Consequently, the broiler population in 2020 has decreased by about 30% compared to 2019. Before the pandemic, about half of the farms were micro-farms (52.7%), semi-commercial farms (46.2%), and commercial farms (1.1%) were operational, however during covid-19, more than half were micro-farms (78.5%) and semi-commercials broiler farms (21.5%). A significant association was found in the scale of broiler farming during covid-19 compared to the past ($\chi 2(2) = 14.118$, $p=0.001$. About half of the respondents (46.2%) considered broiler farming as the primary source of income for the farmers, followed by betel nut (32.3%) and vegetable farming (21.5%) before the pandemic. However, during the pandemic, more than half of the respondents (59.1%) stated that betel nut is the primary source of income, followed by vegetables (40.9%). All the respondents mentioned that the availability of feed and getting day-old chicks on time during covid-19 owing to the national lockdown (restricted movement) were the major constraints to continuing and sustaining broiler farming. Besides, all respondents mentioned that the market access to sell broiler meat became increasingly challenging during covid-19 when compared to the past. Thus, it is suggested that the government has to devise an appropriate strategy, post pandemic measures and support to encourage the broiler farming communities to revive, promote and sustain broiler farming in the country. To revive, promote, and sustain broiler-farming communities post-pandemic, a combination of financial support, market development, training and education, research and development, infrastructure development, encouragement of small-scale farming, and partnership and collaboration can help to revive, promote and sustain broiler-farming communities post-pandemic.

Keywords: Commercial broiler production; Covid-19; day old chicks; feed; market

## 1. INTRODUCTION

Poultry farms are mainly concentrated in the southern part of the country, characterized by a subtropical climate (National Statistics Bureau [NSB] 2021). Four types of poultry (chickens, ducks, turkeys, and guinea fowl) are reared; chicken is extensively reared in the country. The broiler constitutes about 35% of the total poultry population (1.36 million), and more than 1800 MT of chicken were produced in 2020 (Annual Livestock Statistics 2020; National Poultry Research

& Development Centre [NPRDC] 2020). In many countries, broiler farming is considered vital to sustain a livelihood, ensure food safety, and better nourishment, and eradicate poverty in rural areas (Dei & Bumbie 2011). Owing to its importance, the Government introduced broiler farming in Tsirang district in 2004 and then at Samtse in 2006 (Tashi 2009). The NPRDC was established in 2009 to supply day-old chicks of layers and broilers to the farmers of Bhutan.

Having a short gestation period compared to other livestock, commercial broiler farming ventures are lucrative businesses compared to other farming commodities (Ethiopia Netherlands Trade for Agricultural Growth [ENTAG] 2020). The tremendous growth in the broiler industry is the result of scientific and technological advances in the breeding of poultry, feeding regime protocol, and health management of broiler birds (Velmayil 2020). However, the Covid-19 pandemic has had a significant impact on the commercial broiler farming industry all over the world. The outbreak of such a viral disease has disrupted supply chains, decreased demand for poultry products, and created challenges for farmers in terms of managing their flocks and maintaining biosecurity measures (Maples et al. 2020). Farmers have had to implement new measures recommended by the expert in order to ensure the safety of their workers and prevent the spread of the virus. This has included measures such as social distancing, increased use of personal protective equipment, and the implementation of strict biosecurity protocols. Containing the virus and safeguarding the people became every nation's first and foremost priority (Vijayalakshmy et al. 2020). The governments, policymakers, and relevant authorities must also have the right contingency plan, and actions to alleviate the negative impacts caused by the Covid-19 pandemic and related response efforts on key sectors that contribute to food security, nutrition, and livelihoods (FAO 2020). One of the primary impacts of Covid-19 on commercial broiler farming has been the disruption of supply chains. With many countries implementing lockdowns and travel restrictions, it has become difficult for farmers to transport broiler day old chicks, feed, and other necessary supplies required to operate broiler farming. Regarding the farming risk, Covid-19 has hit hard all sectors inclusive of commercial broiler farming ventures in Bhutan. In particular, the pandemic led to a decrease in broiler demand in the country. Another significant impact has been the decrease in demand for poultry products. With many restaurants, hotels, and catering services closed or operating at reduced capacity, the demand for poultry products has decreased significantly. This has resulted in reduced demand for broiler meat, leading to lower prices and reduced profits for farmers. This has ultimately led to the closure of farms and/or farmers had to rear broilers for a longer period during the pandemic which led to a higher cost of production (Kalangi et al. 2020). The disruption in the supply chain during the pandemic is inevitable owing to several underlying challenges. Therefore, concrete contingency plans and response mitigation during the pandemic are to be devised to ensure sustainable broiler farming to sustain the livelihood of the farmers.

The top three commercial broiler-producing districts are Chhukha, Sarpang, and Samtse which contribute to about 41%, 22%, and 14% of the broiler production, respectively (Department of Livestock [DoL] 2020). However, to date, very limited information and empirical evidence are available on the impact of coronavirus on commercial broiler farming and the livelihood of farmers in the country. Such scientific study is very crucial to document the ground reality which will guide the planners and policymakers in devising strategic interventions and support measures to overcome the challenges and remain

prepared in the near future. Thus, this study was designed to assess the impact of the Covid-19 pandemic on commercial broiler farming in Samtse district.

## 2. MATERIALS AND METHOD

### 2.1. Study area

The study was conducted in Samtse dzongkhag (district) situated in the southern foothills of the country from March 2022 to April 2022. Samtse is divided into 15 gewogs (blocks) with a total land area of 1305 sq. km. It is located at a latitude of 26°91' N and a longitude of 89°08' E (NSB 2021) with an altitude ranging between 600 - 3600 meters above sea level (masl). It experiences an annual average temperature of 27.2ºC and rainfall of about 6324.2 mm. The dzongkhag is characterized by a hot and humid climate in summer and cool and dry winter andfalls under subtropical broad-leaved forests (NCHM 2021).

### 2.2. Data collection

The Cochran's sample size formula was used to determine the sample size for this study as;

$$n_{o=} z^2pq/e^2$$

e = desired level of precision (i.e., margin of error)

p= is (the estimated) proportion of the population which has the attribute in a question

q = is 1-p.

$n_o$= Is the Cochran's sample size recommendation

The confidence interval of 95% was kept and 5% plus or minus precision was assumed. Z value at 95% confidence interval was 1.96 (can find in the Z table). Probability was, *P*= 0.5 (probability). Samtse district had a total of 158 poultry farms of which 122 were broiler farms (Samtse 2021). Therefore, the sample size was:

$$n_{o=} ((1.96)^2(0.5)\ (0.5))/\ (0.05)^2= 384$$

$$n= n_o/1+(n_o-1)/N$$

$$=384/\ (1+(383/122)) = 93$$

A total of 93 broiler farmers were randomly selected and visited for a face-to-face interview using a structured and semi-structured questionnaire. The questionnaire comprised five parts and covered the whole gamut broiler farming including the respondent's profile, operation and management of the farm, and marketing of broiler meat.

### 2.3 Data analysis

Data were entered and cleaned in a Microsoft Excel sheet, and then exported to the International Business Machines Corporation Statistical Package for Social Sciences Statistics [IBM SPSS Statistics] version 26 for further analysis. The data were checked for normality using the Shapiro-Wilk test. A Chi-square test of independence was carried out to compare the categorical data before and during the Covid-19 pandemic.

## 3. RESULTS AND DISCUSSION

### 3.1 Respondent characteristics

Table 1 shows the respondent characteristics. The average family members were 4.05 ± 0.11 (min., 2; max., 6 members). The median age of the respondent was 45 years (min., 25 years; max., 65 years). The mean broiler farming experience of the respondent was 7.99±0.32 years (min., 3 years; max., 16 years). Most of the respondents were literate. According to Aikaeli (2010), it was reported that the qualification of respondents has a vital role

in generating family income. Similarly, Nina (2013) reported that having better qualifications and knowledge of the farmers will be beneficial in adopting new technology to boost the farm product. Although more than half of the respondents were male, most of the farms were managed by females. Similarly, women had limited access to training, involvement in public decision making, and partial access to credit facilities, so most of the work were carried out by women in rural communities in Ethiopia (United Nations Population Fund [UNFPA] 1998). Thus, equal support i.e., training and capacity development on farming should be also given to women, and should be encouraged to participate (International Labor Organization [ILO] 2014).

The average number of family members available to contribute to the farm labour was 4.05 ± 0.11 ranging from 2 to 6. Nonetheless, the respondents mentioned that they experience labour shortages on broiler farms. According to Namgay et al (2013) family, labour shortage is due to the growing involvement of individuals in education and different employment choices. The scarcity of farm labour ultimately led to a rise in wage rates of farm labour and this led to a decline in the production performance of the agriculture sector (Devi 2012). Further, FAO (2020) reported that in Argentina movement restriction and/or Covid-19 infection are the main cause of labour shortages during the pandemic.

**Table 1:** Respondent characteristics (%)

| Characteristics | Respondents (%) |
|---|---|
| Gender | |
| Male | 79.6 |
| Female | 20.4 |
| Education | |
| Illiterate | 14.9 |
| Primary school | 43.6 |
| Secondary school | 41.5 |

About half of the respondents (46.24%) mentioned that their highest source of income was from broiler farming followed by betel nut (32.3%) and vegetable farming (21.5%) before the pandemic. However, during the pandemic, more than half of the respondents (59.1%) stated that their foremost source of income was derived from the sale of betel nuts followed by the sale of vegetable farming (40.9%) (e.g., chilies, beans, cabbage). In the USA it was reported that the loss amounted to $0.38 per square foot of the production capacity of broiler (Maples 2020). Similarly, in Myanmar, it was reported that purchasing managers' index in broiler farms decreased significantly during Covid-19 period adhering to less demand for chicken (Fang et al. 2021). Further, it was also reported that in Indonesia that each live broiler day old chick was sold with a loss of 47.06 % during the pandemic compared to the past (Nurahmi and Zalizar 2021). Similarly, in Samtse dzongkhag the broiler farmers had to reduce and/or discontinue broiler farming during the pandemic owing to the unavailability of primary inputs like Day Old Chicks and feed due to continuous lockdowns. Thus, the Covid-19 had a significant impact on the source of income for the farmers ($\chi 2(2) = 55.939$, $p=0.000$).

### 3.2 Management practices

#### 3.2.1 Broiler housing

All the visited broiler farm sheds were open houses and the broilers were reared under a deep litter system. The open houses are the sheds that are being constructed with half skirted walls using cement and the rest of the portion is being covered using wire mesh. Corrugated galvanized iron sheets were used as roofing for the shed. The respondents used the best possible housing material for shed constructions and installed modern farm automation such as (feeders and drinkers, lighting, etc.) to harness better quality meat. Kitalyi (1998) reported that the broiler shed construction accounts for

more capital investment and modern broiler farming practices require proper construction and optimum shed utilization.

### 3.2.2 Healthcare and mortality of broiler

Vaccination of birds, treatment, and minerals and vitamin supplementation are the major healthcare practices implemented in broiler farming. Before Covid-19, all respondents sought services from the extension staff for timely health care of broiler birds. All respondents experienced broiler mortality before and during Covid-19 pandemic. However, there was no association in mortality before and during Covid-19 ($\chi 2(17) = 18.675$, $p=0.347$). This could be probably because farmers had adhered to the bio-security protocol measures (e.g., entry restriction, foot bath in entry, and use of disinfectant (mostly lime powder)). On the contrary, according to FAO (2020), it was reported that in East and Southeast Asia, animal healthcare services (vaccine, treatment, and vitamin and mineral supplementation) including extension services were interrupted during Covid-19 pandemic.

## 3.3 Broiler farming before and during Covid-19

### 3.3.1 Number of broiler farms

The Covid-19 has greatly impacted broiler farming. Out of 93 commercial broiler farmers interviewed, some respondents (24.7%) said that they continue broiler farming, while substantial respondents (74.2%) said that they have discontinued farming and a few (1.1%) quit it. As a result of this, the broiler population decreased by about 25.91% (65924 numbers) in 2020 compared to 2019 (88982 numbers). Samtse Dzongkhag had 49 micro-farms (<119 birds per farm), 43 semi- commercial farms (200-500 birds per farm), and one commercial farm (501-5000 birds per farm) before Covid-19, and during Covid-19 pandemic the dzongkhag had 73 micro-farms, 20 semi-commercial farms, and no commercial farm.

A similar impact was recorded in Myanmar where about 60% of the total broiler farmers quit the broiler farming in 2020 (Fang et al. 2021) due to low broiler demand during the pandemic. Moreover, the broiler farm size had reduced due to Covid-19. Similarly in Indonesia, it was reported that the broiler population declined during the pandemic period, and the population of broiler birds and income of the broiler farmers have declined (Nurahmi and Zalizar 2021).

**Table 2:** Table showing the scale of broiler farming

| Scale of farming | Respondents (%) | | *p* value |
|---|---|---|---|
| | Before | During | |
| Micro | 52.7 | 78.5 | .001 |
| Semi commercial | 46.2 | 21.5 | |
| Commercial | 1.1 | 0 | |

### 3.3.2 Feed and feed availability

Before Covid-19, more than half of the respondents (62.4%) provide broiler feed purchased from the Bhutanese feed manufacturer to broilers, while the rest feed was imported from India (Samrat feed mill). During Covid-19, all respondents provided feed manufactured by the Bhutanese feed mill. The feed conversion ratio [FCR] of those broilers fed with feed manufactured in Bhutan was 2.0, which is lower than those of feed manufactured in India with 1.80 (Penjor 2017). This indicated that the feed imported from the Samrat feed firm was the better choice for the commercial broiler as the birds had higher body weight gain with lesser feed. According to Penjor (2017), the nutritional content and FCR of Samrat feed was found better when compared to Karma feed which had attributed to higher FCR.

Before Covid-19, more than half of the respondents (58.1%) reported that they paid Nu. 1700/bag of broiler feed (one bag = 50

kg feed), and the remaining respondents paid Nu.1800/bag. After Covid-19, all respondents reported that they paid Nu. 2300/bag feed. This increase in feed cost was also observed during Covid-19 in Turkey (Sariozkan et al. 2021). The possible reason for the rise in feed prices during Covid-19 could be due to escalated costs of transportation and operating business entities (Boef et al. 2021). The difficulty of getting raw materials for manufacturing animal feeds due to movement restrictions could also have affected the price of the feeds (Ethiopia-Netherlands Trade for Agricultural Growth [ENTAG] (2020). Moreover, FAO reported that the feed supplier and feed transporter sectors were reluctant to provide services because of movement restrictions and fear of getting infected by Covid-19 (FAO 2020). Owing to these underlying challenges, the cost and the availability of broiler feed were also affected during the Covid-19 period in our country.

### 3.3.3 Availability of day-old chick

All the respondents expressed that they experienced a challenge in getting broiler day old chicks on time due to lockdowns and international border closures. Thus, broiler production has decreased during Covid-19 pandemic. Similarly, in Myanmar, it was also reported that the availability of day old chicks was reduced during the pandemic (Fang et al. 2021). It was also reported that lockdown restrictions caused interruption of normal business routes both in-country and international which led to reduced access to broiler parent stock in government broiler breeder farms and further limited access to day-old chicks (Jamtsho 2020). The import of broiler day-old chicks from India by private suppliers was also hindered and affected during the pandemic.

### 3.3.4 Market situation and price of broiler meat

Before Covid-19, the average dressed broiler was Nu. 128.44±0.59 per kg (min., Nu.120/kg; max., Nu.140/kg), and on the contrary during Covid-19 the average broiler price per kg was Nu. 187.63±.61 during Covid-19 (mini. Nu.180 and max. Nu.200). So, there was a significant increase in the cost of broiler meat price before and during Covid-19 ($\chi 2(10) = 186$, $p=0.000$). The increase in the price of broiler meat during Covid-19 was also observed in Turkey (1.82-11.57%) (Sariozkan et al. 2021). The rise in broiler meat prices during Covid-19 could be due to the rise in the costs of a day-old chick, feed, feed transportation, and the increased rearing period of broiler chickens (because of the uncertain market to sell the broiler). Similarly, according to Kalangi et al. (2020), it was reported that an increase in the raising period, a rise in feed price, and a rise in feed conversion ratio could be the possible reasons for the rise in broiler price. All respondents reported that selling broiler meat has become more challenging during Covid-19 than before. All respondents (100%) mentioned that they marketed the broiler to Thimphu before Covid-19, while only (59.14%) of the respondents reported that they could market the broiler in Thimphu during Covid-19. The decrease in the number of respondents marketing broiler meat in Thimphu during Covid-19 could be because of additional expenses incurred as two vehicles were required under the transit system to transport broiler meat to Thimphu from Samtse. The rest of the respondents (40.86%) mentioned that they sold broiler meat in the local market. The respondents mentioned that broiler meat was harvested at 7-8 weeks of age before Covid-19, however, during the Covid-19 they had to rear for more than 8 weeks of age. Thus, the increase in the raising period must have contributed to the increase in the cost of production and discouraged farmers to continue broiler farming. Likewise, in Indonesia, the broiler was harvested when it reached 32 days of age before Covid-19 but on the contrary,

the broiler was harvested at the age of 48 days during Covid-19 (Kalangi et al. 2020). Further, there were disruptions in the production and the supply chain between the farmers and the regular buyer. Similarly, ENTAG (2020) reported that in Ethiopia there was not enough production because most of the farmers discontinued farming.

## 4 CONCLUSION & RECOMMENDATION

During the pandemic, the availability of feed, day-old chicks, and access to the market to sell products was severely affected compared to the past. There have been several noticeable impacts of the Covid-19 pandemic on commercial broiler farming. These impacts have affected various aspects of the industry, from production and supply chains to demand and prices. Out of 93 commercial broiler farmers interviewed, the findings indicated that the majority of the farmers have either temporarily discontinued or permanently closed down their farming businesses. Moreover, the farmers are also confronted with the challenges of the timely availability of day old chicks and feed due to lockdown and movement restrictions including rising feed costs. As a consequence, the broiler population has also decreased drastically during Covid-19 when compared to pre-pandemic. Owing to these reasons, the source of income from broiler farming has also decreased due to Covid-19. Thus, the government has to devise an appropriate strategy, post-pandemic measures, and support to encourage the broiler farming communities to revive, promote and sustain broiler farming in the country. The Covid-19 pandemic has had a significant impact on commercial broiler farming, with disruptions to supply chains, reduced demand, labor shortages, health concerns, and market volatility. These challenges have resulted in decreased productivity and increased costs for broiler farmers, making it difficult for them to sustain their operations. However, by implementing appropriate strategies, measures, and support, it is possible to revive, promote, and sustain broiler farming communities post-pandemic. These measures include financial support, market development, training and education, research and development, infrastructure development, encouragement of small-scale farming, and partnership and collaboration. It is essential to prioritize the well-being of broiler farmers and their communities to ensure that the industry can recover and thrive in the long term.

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