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Effects of COVID-19 on Iran's Livestock and Meat Market

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ABSTRACT

The recently emerged Coronavirus (COVID-19) has been identified as a pandemic by the World Health Organization (WHO) and has affected all sections of human society including agriculture, livestock, manufacturing, and industry. In this research, we investigated the impact of COVID-19 on Iran's livestock and meat market by using an equilibrium displacement model. The prevalence of the Coronavirus has had the greatest economic effects on rising exchange rates and has reduced exports in Iran. The results also show that the factors of the Coronavirus (exchange rate and exports) have the highest effect on Iran's meat market. The rising exchange rates and reduced exports lead to higher prices and lower quantities in the meat market, which increase the suppliers' welfare at the retail and farm levels. These results show the negative effect of the outbreak of Coronavirus. Corona outbreak increases price at the farm and retail level, therefore, farm and retail quantities fall. Since the impact of an increase in the price is much greater than the effect of reducing production, producer surplus increases. A policy conclusion of this research is that the current situation in Iran is difficult for the poultry and livestock industry because of the need for foreign currency and the abuse of market power in the distribution system. Farmer cooperatives can overcome these problems because their objectives are to serve farmers and their goals align with farmers goals.

Keywords: COVID-19, Equilibrium displacement model, Exchange rate, Exports.

INTRODUCTION

The new Coronavirus has affected people around the world. The origin of the Coronavirus dates back to a fish market in Wuhan, China. Another outbreak of the disease is attributed to a food market in Beijing (Narayanan *et al.*, 2021). There is also news of many workers at a meat factory and slaughterhouse in Germany being affected by a Coronavirus (Schulz *et al.*, 2020). The German Federal Institute for Risk Assessment also found that there was no evidence that humans had contracted the new Coronavirus by eating contaminated food (Rahman *et al.*, 2021). The World Health Organization and the US Food and Drug Administration have also confirmed this (Ling *et al.*, 2020).

In this regard, at the beginning of the Corona outbreak, people were concerned that the virus was transmitted through eating meat, but this hypothesis was rejected (Lowenstein *et al*., 2016). However, the question that arises is why and how the Coronavirus has affected the meat market in many countries around the world, including Iran.

One of the important effects of the Coronavirus on the Iranian economy is the effect on the exchange rate. Last year, severe currency fluctuations in the supply and demand market pushed up prices of various types of meat. Meat producers (beef and mutton) are receptive to rising prices, but chicken producers need to adapt to the supply of their products to avoid any financial problems (Moghadasi *et al*., 2012). Cattle breeders have reduced their herd numbers due to rising maintenance costs and production input costs, declining credit and financial support, transportation problems,

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and declining demand during the economic crisis (Hosseini *et al*., 2009). Due to this, the meat production capacity (beef and mutton) was weakened due to the decrease in the number of livestock and did not meet the demand. The supply of poultry was faster than the demand and, as a result, prices rose more slowly than the prices of beef and mutton (FAO, 2020a).

The price of meat has been at a high level since last year. The recent peak in prices due to high costs of feed and livestock inputs and livestock smuggling is because of the rising exchange rates and a decrease in the number of halal (domestic) animals. In the future, increasing production will reduce price pressures. However, prices generally remain high due to the high cost of livestock production and maintenance inputs (Shahbazi *et al*., 2009). This is also due to the stricter health programs and global standards for livestock by the producing countries. In general, all of the above will be effective in the future of the production and trade system. Normal beef and mutton prices increased by 18-20% by 2020 compared to the previous year, while poultry prices have risen by 16% in recent years, and mutton prices have risen sharply due to supply shortages. Based on this information, it can be said that meat prices will be high in Iran in the future.

The growth of annual meat production is slow due to the rising exchange rates and producer costs. High feed prices, rising transportation costs, the presence of brokers and intermediaries prevent the increase in technical and economic efficiency.

Poultry meat has a shorter production period and higher feed conversion efficiency than beef and mutton (Reardon *et al*., 2020).

The most essential food items used in livestock and poultry diets are imported from other countries, the supply of which is strongly influenced by currency and financial dependencies. If farmers do not have government support, poultry and livestock businesses will definitely go bankrupt due to the high cost of production (white meat, red meat, milk or eggs) since about 60% of the cost of farming is food and rations (Maleki, 2020).

Another effect of the Coronavirus outbreak on the Iranian economy is the reduction in trade. The reasons for the decrease in trade in Iran are the outbreak of the Coronavirus and the closure of some important borders for several months; and now trade in some borders is slow due to compliance with health protocols and restrictions on travel.

In the second half of 2020, the whole country's non-oil exports decreased by about 35%. Economic growth around the world has declined following the outbreak of the Coronavirus. Given the economic worries of the future due to the Coronavirus outbreak, economic foresight and declining consumption have been created due to declining incomes around the world, and people are trying to adjust their income and expenditure to avoid problems. Since no one knows the economic future of the countries due to the Coronavirus outbreak, consumption has been reduced to some extent, which also reduces the demand for goods. Accordingly, trade has also been affected and reduced (Sova, 2020). Declining incomes in many neighboring countries, including declining oil revenues, have also reduced trade. According to the Food and Agriculture Organization of the United Nations (FAO), the FAO’s meat index slipped 1.8 and was 9.2% below the year-earlier level, as global import demand continued to lag availability despite Coronavirus-linked disruptions to slaughtering. (FAO, 2021a). In Iran, the problems caused by the outbreak of Coronavirus have been mixed with the problems of exporters and have reduced the exports of food and agricultural industries. In addition, as shown in Figure 1, due to declining exports caused by the COVID-19 outbreak, Iran's economic growth has also declined in 2020.

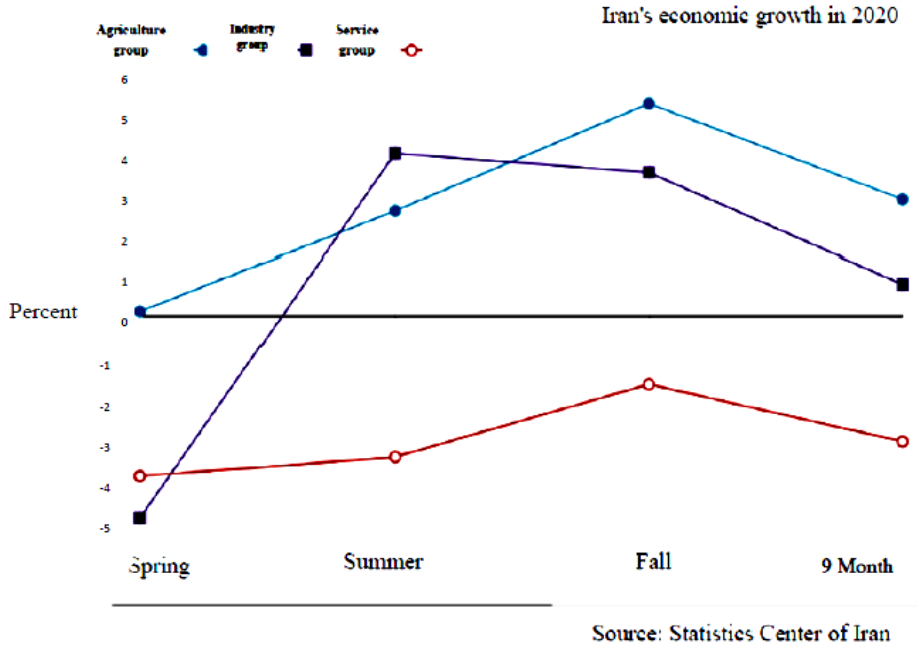

Figure 1. Iran's economic growth (Percent) in 2020.

The novelty of this manuscript is to examine the impact of Coronavirus on increasing the exchange rate and reducing trade. In addition, Coronavirus affects the welfare of producers and changes the price and amount of meat demand due to the horizontal relationship between meat markets, thus substitution is created between types of meat. Then, the following questions arise:

How do changes in exchange rates and trade resulting from the outbreak of the Coronavirus affect the price and quantity of meat supply?

What is the reaction of meat producers to the change in the quantity and price that occurs in the substitution of different types of meat?

How does a change in exchange rates and trade change the welfare of suppliers?

The COVID-19 pandemic has upended societies, economic activity, and business environments. Hobbs (2021) showed that a series of short-run demand and supply shocks affected the food system. The pandemic has generated a lively discourse around the adaptability and resilience of food supply chains in the medium to longer term. The COVID-19 pandemic also focused consumer attention on the food system and the nature of food supply chains. Consumers' underlying food values may shape their response to uncertainty during a pandemic. Strengthening the immune system is essential for fighting COVID-19, and animal protein and fiber-rich foods play a key role (Kumari, 2020). Livestock acts as an important source of high value animal protein for the vast majority of the world's population (Global and Regional Food Consumption, 2020). Milk maintains the positive value of increasing immune homeostasis in the human upper respiratory tract (Perdijk, 2018), including the pharynx. Therefore, in order to continue production and distribution of safe products for consumers across the country, more attention should be paid to the livestock and poultry sector.

To curb COVID-19 infection, governments have banned second- and third-class jobs in most countries during the months leading up to the outbreak (Asia-pacific, 2020). This strategy puts a lot of pressure on all aspects of livestock production and marketing in the countries.

The transportation ban caused a shortage of animal feed and other logistics equipment along with limited veterinary services. Following the bans, the closure of dairy food outlets and restaurants and the banning of various social and cultural programs severely reduced market demand for milk, eggs, and meat. There is no scientific evidence of viral transmission from animals to humans, either through direct contact or through the consumption of meat. COVID-19 is a human epidemic that is potentially a danger to domestic animals.

The outbreak spread through direct human contact (Jalava *et al*., 2019). The early human-to-human transmission was limited, and cases in the wholesale market in Wuhan, China, were concentrated mainly in older men. Given these two points, and given that Coronaviruses are derived from animals, this in the first place indicated the possibility of co-transmission between humans and animals because most COVID-19 patients are in or around the "wet market" in Wuhan or sold fruits, vegetables, seafood and live (often wild) food. Subsequent studies, however, placed more emphasis on the human-to-human transmission of the virus, and this mode of transmission later became more apparent (Wang *et al*., 2020).

The worry is that the COVID-19 epidemic will eventually lead to a major economic crisis. The International Food Policy Research Institute (IFPRI) predicts that approximately 14-22 million people worldwide are at risk of severe poverty, even if we can control the spread of COVID-19 and overcome the epidemic (Devex, 2020).

It is possible to implement food export bans, by most leading exporting countries. As a result, livestock-derived food products will not be available where they are most needed. Hence, any failure in strong policy can accelerate the food crisis and cause disaster (FAO; IFAD; UNICEF; WFP; WHO, 2019).

Mat *et al.* (2020) studied the time series of the monthly data between the years 2014 and 2019 and analyzed them to examine the factors that affected the consumer price of carcass meat in Turkey. The PPI variable and the consumer price of carcass meat and dollar rate variables were found to be the cause of each other with Granger causality test. They suggested that, if Turkey is to prevent the excessive fluctuations in the consumer- and producer-prices of carcass meat caused by macro variables, an effective price control mechanism should be put into practice. It seems that this change would be possible only by developing and implementing policies to lower the input prices and production costs.

Akin *et al.* (2020) showed that the demand for veal in the red meat market is steadily increasing in Turkey. In the formation of this demand and price, additional factors such as consumer preferences, government interventions in the red meat market, import decisions, and the implemented policies and subsidies are effective. The results of the estimation showed that the retail prices of veal cubes and minced meats fluctuated conspicuously in the said period and that the implemented policies and the market interventions were not adequate to eliminate the instability and uncertainty of the prices.

Arikan *et al.* (2019) determined how an increase in the price of red meat was reflected in the price of chicken meat. This level of influence of red meat on chicken meat is effective in production planning. The results of the study indicated that 1 unit increase in the prices of beef would result in an increase by 1.35 unit in the prices of chicken meat, and a 1 unit increase in the prices of mutton would result in an increase by 0.39 unit in the prices of chicken meat.

As shown in various studies, it is important to pay attention to the livestock and poultry sector in critical situations caused by the Coronavirus. However, most studies have examined the qualitative effects of Coronavirus. Few studies have examined the quantitative effects of Coronavirus on price in the Iranian livestock and poultry meat market. Also, there is a paucity of research that comprehensively and systematically examines the effects of welfare changes and

producers' reactions on the Iranian meat market and a framework that can consider the behaviors of Iranian meat producers and consumers in vertical and horizontal markets.

Methodology

The agricultural sector plays a major role in human life, but the share of this sector has decreased as Iran's economy has developed. More attention should be paid to agricultural development because of Coronavirus, economic sanctions and other international challenges faced by the country. In this study, we determine the effects of COVID-19 on Iran's livestock and meat market.

The Equilibrium Displacement Model (EDM) is a tool that is widely used in agricultural analysis. In the EDM model, supply and demand equations are considered. The advantage of this model is that the type of functional format of supply and demand does not matter. The equations in this model show the results of the shock put into the model relative to the initial equilibrium (Wohlgnant, 2012). Also, the EDM model is able to change the policy on commodity prices and its effect on the price and consumption of products by following the effect of one or more policies simultaneously through a shift of supply and demand in different markets (Muth, 1964).

In this study, EDM was used to evaluate the effect of Coronavirus variable on producers and consumers of meat. The EDM model determines the effect of Coronavirus variable on price and quantity of livestock products by shifting the supply and demand functions before and after the outbreak of Coronavirus. This is the first study to measure the impact of Coronavirus on vertical and horizontal meat markets by using an EDM.

Equilibrium Displacement Model (EDM)

In order to assess the impact of Coronavirus on the livestock and meat markets, we consider the horizontal markets among cattle, chicken, and sheep, as well as vertical markets within each species, including the farm and retail markets. The specification of an EDM includes the percentage change in the price and quantity of each species (cattle, chicken and sheep) in retail markets and farm markets (Wohlgnant, 2012):

$$EQ_B^R = \eta_{BB}(EP_B^R - \delta_B) + \eta_{BC}(EP_C^R - \delta_C) + \eta_{BC}(EP_M^R - \delta_M) \quad (1)$$

$$EQ_C^R = \eta_{CB}(EP_B^R - \delta_B) + \eta_{VV}(EP_C^R - \delta_C) + \eta_{CM}(EP_M^R - \delta_M) \quad (2)$$

$$EQ_M^R = \eta_{MB}(EP_B^R - \delta_B) + \eta_{MC}(EP_C^R - \delta_C) + \eta_{MM}(EP_M^R - \delta_M) \quad (3)$$

$$EP_B^R = S_B EP_B^F \quad (4)$$

$$EP_M^R = S_M EP_M^F \quad (5)$$

$$EP_C^R = S_C EP_C^F \quad (6)$$

$$EQ_B^F = -(1 - S_B)\sigma_B EP_B^F + EQ_B^R \quad (7)$$

$$EQ_M^F = -(1 - S_V)\sigma_M EP_M^F + EQ_M^R \quad (8)$$

$$EQ_C^F = -(1 - S_C)\sigma_C EP_C^F + EQ_C^R \quad (9)$$

$$EP_B^F = \left(\frac{1}{\varepsilon_B}\right) EQ_B^F - K_B \quad (10)$$

$$EP_M^F = \left(\frac{1}{\varepsilon_V}\right) EQ_M^F - K_M \quad (11)$$

$$EP_C^F = \left(\frac{1}{\varepsilon_C}\right) EQ_C^F - K_C \quad (12)$$

In all equations, EP is the percentage change in Price, dln(p)= dp/p, and EQ is the percentage change in Quantity, dln(Q)= dQ/Q. The B, C, and M subscripts are for Beef, Chicken, and Mutton (the meat products from the species) at the Farm (F) and Retail (R) levels, respectively. In the retail market, live animal units have been transformed into meat equivalents (Muth, 1964). EQ^R_B, EQ^R_C, EQ^R_M are the percentage change in the Quantity for Beef, Chicken and Mutton, and EP^R_B, EP^R_C, EP^R_M are the percentage change in Price for Beef, Chicken and Mutton.

The relationship between the three retail markets for beef, chicken, and mutton is

expressed horizontally. Own price elasticity and cross price elasticity are η_{ii} and η_{ij}, respectively. Equations (1-3) are the percentage change in the retail demand for beef, chicken and mutton. δB, δV and δC are the transaction costs at the retail level. Equations (4-7) are the percentage change in the retail price for beef, chicken, and mutton. The S is the producers' share of the retail price. Thus, SB is the beef producer's share of retail price, SC is the chicken producers' share, and SM is the sheep producers' share. Average prices and quantities are used to calculate these coefficients.

Demand at the farm level is expressed in Equations (7-9). σB, σC, and σM are the substitution elasticity between beef, chicken, and mutton, respectively. Equations (10-12) are the inverse total supply of cattle, chicken, and sheep ready for slaughter as percentage changes. ƐB, ƐC, and ƐM are the supply Elasticities of cattle, chicken, and sheep, respectively. The impact of Corona virus variable is considered as exogenous shifters/variables, kB, kC, and kM on the total supply of cattle, chicken, and sheep.

"K" Variable of Iran's Livestock and Poultry Market

Since the prevalence of Coronavirus has had the greatest economic effect on raising exchange rates and reducing exports in Iran, in order to gauge the influence of Coronavirus variables on meat markets, we consider the effects of Coronavirus variables (exchange rate and exports) on inverse supply for each kind of meat (beef, chicken, and mutton).

According to Fathi and Bakhshoodeh (2014), the exogenous variable K (the percentage change of exchange rate or exports variable divided by the percentage change in price for each kind of meat), is calculated as follows:

$$k_n = \frac{EG_n^F}{EP_n^F} \qquad n = B, M \text{ and } C \qquad (13)$$

Where, n includes Beef (B), Chicken (C) and Mutton (M), EG^F_n is the percentage change of exchange rate or exports variable in one year, and EP^F_n is the percentage change in farm price for cattle, sheep and chicken in one year. For example, the value of K is the percentage change of exchange rate variable from 2019 to 2020 divided by the percentage change in beef price from 2019 to 2020.

Following the implementation of the Equilibrium Displacement Model, various results are obtained from the effects of exchange rate or exports variable on the meat market. We use the EDM to determine the rising exchange rates and reduction of exports impacts on price and quantity at the farm and retail levels. We also computed welfare changes for farm suppliers and retailers from the effects of the Coronavirus.

Welfare Changes

According to the Equations (10) to (12), the effects of exchange rate and exports variables enter through Kn in the inverse total supply function at the farm level. Therefore, exchange rate variable affects the welfare of suppliers at the farm level. In this research, the welfare changes of farm supplier and retailers were calculated according to Willig (1976):

$$dln(Q_n^R) \cong \frac{dQ_n^R}{Q_n^R} = EQ_n^R, \qquad \mathrm{dln}(P_n^R) \cong \mathrm{d}P_n^R/P_n^R = \mathrm{EP}_n^R$$
$$\Delta PS_n^R = P_n^{R0} Q_n^{R0} (EP_n^R - \delta_n)(1 + 0.5EQ_n^R) \qquad n = B, M \text{ and } C \qquad (14)$$

Where, ΔPS^R_n is the Suppliers' welfare in the Retail market, P^{R0}_n is the initial Price and Q^{R0}_n is the initial Quantity.

The Suppliers' welfare of Farm market (ΔPS^F_n) is calculated using Equation (15).

$$dln(Q_n^R) \cong \frac{dQ_n^R}{Q_n^R} = EQ_n^R, \qquad \mathrm{dln}(P_n^R) \cong \mathrm{d}P_n^R/P_n^R = \mathrm{EP}_n^R$$
$$\Delta PS_n^F = P_n^{F0} Q_n^{F0} (EP_n^F - K_n)(1 + 0.5EQ_n^F) \qquad n = B, M \text{ and } C \qquad (15)$$

Where, P^{F0}_n and Q^{F0}_n are the initial Price and Quantity of live meat animals (beef, mutton, and chicken). The total surplus for

suppliers of each meat is equal to the total surplus of producers in farm and the retail market ($\Delta PSn = \Delta PSRn + \Delta PSFn$) and the total meat market is equal to ($\Delta PS = \Sigma \Delta PSn$).

Data Collection

Data on farm price of cattle, sheep, and chicken and retail price of beef, mutton, and chicken are from the livestock and poultry Company, the production of cattle, sheep, and chicken on the farm and retail levels are from the Iranian Agricultural Organization. Other costs of livestock and poultry are reported in the Iranian Statistics Center as time series. Data on expenditures for each factor are from the Livestock Affairs Support Company (2020).

RESULTS

The actual percentage changes in the price and quantity of retail and farm markets for each year from 2012 to 2019 are shown in Table 1. The price for each kind of meat increased markedly in 2017 to 2019, and the quantity of each kind of meat fell in 2018-2019. One reason for the price increase in recent years is the higher level of licensed and illegal livestock exports. Depreciation of the Iranian currency (Rial) has greatly encouraged these legal and smuggled exports, therefore, an increase in meat prices (Agricultural Organization of Iran, 2020). Due to the boom in the export market, livestock owners have sold their animals at a younger age and lower weight. The large increase in livestock exports will reduce future reproduction potential and cause a shortage of meat. The average annual percentage change in the farm-level price of mutton is 1.39, which is higher than beef and chicken, and the average percentage change in the quantity of mutton at the farm level is -0.70, which is less than the other meats.

The results of percentage change in the Price (EP) and Quantity (EQ) for the retail and the farm-level meat market after the outbreak of Coronavirus are shown in Table 2 for 2020. After the outbreak of Coronavirus in the meat market, the percentage change in Price (EP) for beef, chicken, and mutton are positive at the retail and farm levels, and the percentage change in Quantity (EQ) are negative at the retail and farm level (Ijaz *et al.*, 2021). These results show the negative effect of the outbreak of Coronavirus. Corona outbreak increases price at the farm and retail levels, so, farm and retail quantity fall. Table 2 shows that chicken prices at the farm level react more to increases in the exchange rates, and reduced exports have a larger effect on prices at the retail level for beef (Dyck and Nelson, 2003). Quantity changes are large for rising exchange rates on mutton at the farm level.

Also, due to the higher production and demand for chicken meat, the percentage change in Price (EP) of chicken leads to a more severe reaction. The percentage change in price for each kind of meat is much higher at the retail level. This indicates the need for increased price control by regulatory agencies.

In addition, the exports declined with the outbreak of COVID-19. This decline was due to the global economic downturn caused by the outbreak of the Coronavirus, and also due to the impact of Coronavirus on people's food consumption culture (Waltenburg *et al.*, 2020).

The outbreak of Coronavirus has damaged the poultry industry and the activists in this sector. Lack of livestock inputs (due to rising exchange rates and declining imports) has pushed up the price of inputs and forced poultry farmers to buy grains at expensive prices. Due to the situation caused by the Coronavirus, there is no plan to export chickens on a regular basis, and it is not possible to find a customer for export (Mallory *et al.*, 2020). These issues led to a reduction in incubation due to reduced consumption and rise in chicken prices in the following months.

Table 1. Percentage changes in the price and quantity of retail and farm level of meat market before the outbreak of Coronavirus, for the period 2012-2019 in Iran.

Years		Markets	Chicken	Beef	Mutton
2012	Price	Farm level	0.050	0.817	0.312
		Retail level	0.033	0.037	0.052
	Quantity	Farm level	0.008	0.085	0.001
		Retail level	0.049	0.090	-0.293
2013	Price	Farm level	0.020	0.291	-0.876
		Retail level	0.016	0.004	0.201
	Quantity	Farm level	0.110	0.050	-0.032
		Retail level	0.067	0.111	-0.051
2014	Price	Farm level	0.032	0.007	9.607
		Retail level	0.031	0.08	0.083
	Quantity	Farm level	0.031	0.030	0.010
		Retail level	-0.016	0.038	0.05
2015	Price	Farm level	0.049	0.016	0.053
		Retail level	0.030	0.037	0.038
	Quantity	Farm level	0.010	9.275	0.091
		Retail level	0.034	0.076	0.007
2016	Price	Farm level	0.022	0.028	0.109
		Retail level	0.029	0.071	0.111
	Quantity	Farm level	0.19	-0.109	-0.448
		Retail level	0.044	0.229	0.429
2017	Price	Farm level	0.197	0.200	0.276
		Retail level	0.159	0.333	0.367
	Quantity	Farm level	0.074	0.191	-0.018
		Retail level	-0.015	-0.227	0.071
2018	Price	Farm level	0.210	0.140	0.313
		Retail level	0.875	0.237	0.268
	Quantity	Farm level	-0.044	-0.115	-0.154
		Retail level	-0.036	-0.038	-0.451
2019	Price	Farm level	0.232	0.156	0.405
		Retail level	0.986	0.323	0.372
	Quantity	Farm level	-0.041	-0.165	-0.182
		Retail level	-0.089	-0.112	-0.521

Table 2. Percentage change in the price and quantity of meat market in retail and farm level after the outbreak of Coronavirus, in 2020.

Economic variables affected by COVID- 19		Level	Chicken	Beef	Mutton
Exchange rate	Price	Farm level	0.075	0.026	0.028
		Retail level	0.086	0.042	0.031
	Quantity	Farm level	-1.424	-0.116	-1.432
		Retail level	-1.151	-0.019	-0.876
Exports	Price	Farm level	0.113	0.021	0.015
		Retail level	0.027	0.078	0.062
	Quantity	Farm level	-0.978	-0.243	-1.869
		Retail level	-0.672	-0.210	-1.571

DISCUSSION

Changes in the exports and exchange rate variables (through the K variable) impact the suppliers' function, which changes their welfare. The changes in producer surplus in the meat market after the outbreak of Coronavirus in 2020 are shown in Table 3. These are the welfare impacts of the price and quantity changes presented in Table 3.

The rising exchange rates and reduced exports in the meat market lead to higher prices and lower quantities, which increase the suppliers' welfare at the retail and farm levels (Jones, 2006). In addition, according to Equation (15), the impact of increasing

the price is much greater than the effect of reducing production. For this reason, producer surplus is increased.

As shown in Table 3, the rising exchange rate had the largest impact on producer surplus at the farm and retail levels for mutton during the outbreak of Coronavirus. This increase was due to the higher price of mutton in the meat market. By rising exchange rates, livestock input prices rise and lead to an increase in meat prices (Dornbusch, 1987).

The export variable has the largest impact on producer surplus at the retail level for mutton, and the largest effect at the farm level is for chicken (Reeve, 2020).

The least impact on producer surplus at the retail level for chicken is due to high demand for chicken (because chicken is cheaper than beef and mutton), and the control of regulatory agencies and government support led to the fact that the price of chicken did not increase much at the retail level, so, people could access it more easily.

Table 3. Producer surplus in the meat market after the outbreak of Coronavirus in 2020, (Dollars).

Economic variables affected by COVID- 19		Markets	Chicken	Beef	Mutton
Exchange rate	Producer surplus	Farm level	2,233,351	389,428	2,623,534
		Retail level	546	3237	4795
	Total producer surplus		2,233,897	626,186	2,628,329
	Total surplus meat producers	5,488,412			
Exports	Producer surplus	Farm level	924,563	621,487	832,764
		Retail level	407	2346	2897
	Total producer surplus		924,970	623,833	835,661
	Total surplus meat producers	2,384,464			

It is obvious that consumers are not the beneficiaries of the outbreak of Coronavirus. They experience a reduction in quantity and an increase in price. Thus, consumers are very interested in improving government control and price monitoring.

One of the limitations of this study was the use of the EDM model for multi-market in Iran in the base year 2020. Future studies are suggested to use time series or panel data to study a wider area. Also, one of the interesting topics in future studies is comparison of economic conditions in different markets, particularly in developing and developed countries. With the help of these studies, solutions can be provided for agricultural development in critical economic conditions due to the outbreak of Coronavirus. By providing suitable solutions and implementing them, the quantity and quality of production is improved and prices are controlled, which leads to the reduction of poverty and malnutrition.

CONCLUSIONS

Due to the important role of the prevalence of COVID-19 in the agricultural sector and the significance of the meat market, we studied the effects of Coronavirus factors on Iran's meat market (prices and quantities of beef, chicken, and mutton at the retail and farm level). Since the Coronavirus affects the producers, the producers' behavior for each kind of meat was modelled, and the effects of the Coronavirus were estimated. Because the Coronavirus affects the supply side of the market, we found that prices increased and output fell with the outbreak of the Coronavirus. We also investigated the effects of these changes on producer surplus for each meat. According to the research findings, agricultural (livestock) production is a risky business, so, the government should support this sector. The national and provincial funds should be developed to support the poultry and livestock production sector and provide cooperatives funds at the local government level in Iran.

In the market of inputs, low profitability and market volatility have been the major causes of closure for many firms in this sector. Supporting the development of productive cooperatives also seems to be beneficial at the local level. These cooperatives purchase farmers' products at a reasonable price and provide the inputs they need.

Producers union or cooperatives should reduce the cost of marketing by providing services, which reduce the price of products and encourage farmers to produce more. When cooperatives enter the supply chain, there are improvements in input supply, assembly, processing, and product distribution. The current situation in Iran is difficult for the poultry and livestock industry because of the need for foreign currency and the misuse of market power in the distribution system. The timely supply of inputs can be a problem because those inputs are hoarded or supplied to other parties without notice. These activities lead to increased prices for inputs. It is the duty of the government to control the exchange rate and to monitor the prices completely. The government can hold some organizations responsible to cut off the hands of speculators and hoarders.

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تاثیر کووید-۱۹ بر بازار دام و گوشت ایران

م. رونقی

چکیده

ویروس کرونا **(COVID-19)** که اخیراً ظهور کرده است توسط سازمان بهداشت جهان **(WHO)** به عنوان یک اپیدمی شناخته شده است و همه اقشار جامعه بشری، از جمله کشاورزی، دامداری، تولید و صنعت را تحت تأثیر قرار داده است. در این تحقیق ، ما با استفاده از مدل جابجایی تعادلی تأثیر کووید-۱۹ بر بازار دام و گوشت ایران را بررسی می کنیم. شیوع ویروس کرونا بیشترین تأثیرات اقتصادی را بر افزایش نرخ ارز و کاهش صادرات در ایران داشته است. نتایج نشان می دهد که کروناویروس بر عوامل (نرخ ارز و صادرات) تاثیر داشته و این عوامل بیشترین اثر را بر بازار گوشت ایران دارند. افزایش نرخ ارز و کاهش صادرات منجر به افزایش قیمت و کاهش مقادیر در بازار گوشت می شود که باعث افزایش رفاه تامین کنندگان در سطح خرده فروشی و مزرعه می شود. این نتایج تأثیر منفی شیوع ویروس کرونا را نشان می دهد. شیوع کرونا قیمت را در سطح مزرعه و خرده فروشی افزایش می دهد، بنابراین مقداردر مزرعه و خرده فروشی کاهش می یابد. با توجه به تاثیر بالاتر افزایش قیمت نسبت به کاهش تولید، مازاد تولیدکننده افزایش می یابد. توصیه سیاسی این تحقیق این است که وضعیت کنونی ایران به دلیل نیاز به ارز خارجی و سوء استفاده از قدرت بازار در سیستم توزیع برای صنعت طیور و دامداری دچار مشکل است. تعاونی های کشاورزی می توانند در این راستا کمک کنند زیرا اهداف آنها خدمت به کشاورزان است و اهداف آنها باید با اهداف کشاورزان همسو باشد.