Forecasting Monthly Prices of Fresh Chicken Parts in the Philippines

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Abstract:- This study aims to forecast the monthly prices of fresh chicken parts in the Philippines using different ARIMA models. The study used monthly price data from January 2018 to December 2022. The Box-Jenkins methodology was followed to select the best ARIMA models. The results show that the ARIMA (1,1,9), ARIMA (8,1,1) and ARIMA (1,1,9) are the models that best fit for forecasting the prices of Fresh Chicken Breast, Fresh Chicken Fully Dressed and Fresh Chicken Wings, respectively in the Philippines. The forecasted prices show a steady increase over the next five years, with the average monthly price of Fresh Chicken Breast, Fresh Chicken Fully Dressed and Fresh Chicken Wings expected to rise from 212.01, 199.82 and 210.62 pesos per kilogram, respectively, in December 2022 to 264.16. 247.70, 269.95 per kilogram, respectively in December 2027. The study concludes tha t Auto Regressive Integrated Moving Average (ARIMA) is a powerful tool in forecasting fresh chicken parts in the Philippines where the results gave reasonable and acceptable forecasts. Additionally, the information generated can be useful for producers, consumers, and policymakers in mak ing informed decisions about the pricing and production of fresh chicken parts in the Philippines.

***Keywords:-** E Views, ARIMA, Box-Jenkins, Fresh Chicken Parts Price and Estimate Equation using Candidate Models.*

I. INTRODUCTION

Forecasting monthly prices of fresh chicken parts in the Philippines is a critical task for various stakeholders, including poultry farmers, government agencies, and consumers since chicken is a staple food in the Philippines, and its affordability is essential for many households' daily sustenance. The majority of the population consumes chicken as a source of protein, and it constitutes a significant part of the average Filipino's diet (Singh et al., 2020). Any significant price fluctuations can have a significant impact on the overall cost of living for many households in the country.

The poultry industry is a vital contributor to the Philippine economy, generating employment and income for millions of people (Fujii & Manue l, 2019). It is a critical source of livelihood for farmers, traders, and other stakeholders, contributing to poverty reduction and inclusive growth. Therefore, forecasting chicken prices can help ensure the sustainability of the industry and protect the livelihoods of those involved.

In addition, forecasting chicken prices can help government agencies in their efforts to promote food security and price stability. For example, the Department of Agriculture can use price forecasts to develop policies and programs that ensure the availability of affordable chicken meat for the general population (Philippine News Agency, 2020).

Finally, consumers can benefit from price forecasts by being able to plan their household budgets and make informed purchasing decisions. By anticipating price changes, consumers can take advantage of lower prices and avoid overpaying for chicken products.

In conclusion, forecasting monthly prices of fresh chicken parts in the Philippines is essential for promoting economic stability, food security, and sustainable growth in the poultry industry. It enables stakeholders to make informed decisions that can benefit both the industry and consumers.

➢ *Objective of the Study*

The core purpose of this study is to forecast the monthly price per kilo of fresh chicken parts namely: Fresh Chicken Breast, Fresh Chicken Fully Dressed and Fresh Chicken Wings in the Philippines. The researchers will formulate an ARIMA model analysis through EViews. The data considered in this study are the historical monthly prices per kilo of Fresh Chicken Breast, Fresh Chicken Fully Dressed and Fresh Chicken Wings in the Philippines in the Philippines from January 2018 to December 2022.

➢ *Statement of the Problem*

This study is conducted to estimate the future monthly prices per kilo of fresh chicken parts in the Philippines by using ARIMA model analysis through EViews. This research also wants to answer the following question:

- What is the behavior of the graph of the historical monthly prices per kilo of fresh chicken parts in the Philippines?
- Determine the best ARIMA model candidate.
- What will be the monthly future prices per kilo of fresh chicken breast, fresh chicken fully dressed and fresh

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chicken wings in the Philippines for the period of January 2018 – December 2022?

II. RESEARCH PARADIGM

The data are expressed in this section of the study. A research paradigm is a method, model, or pattern for conducting research. This includes the process of data collection and analysis.

Research paradigm of this study also explains the relationship between the two data which are the date (month and year) and the price.

Below is the research paradigm of the Auto Regressive Integrated Moving Average (ARIMA) model based on the Auto-Correlation Function (ACF) and Partial Auto Correlation Function (PACF) where AR refers to PACF and MA refers to ACF. This study will be based on the theoretical paradigm and review of related literatures. As shown in the below research paradigm, the study illustrates the relationship between date and price on a monthly basis. It is reflected on the paradigm that the date and time are factors in determining the future value of medium egg per unit.

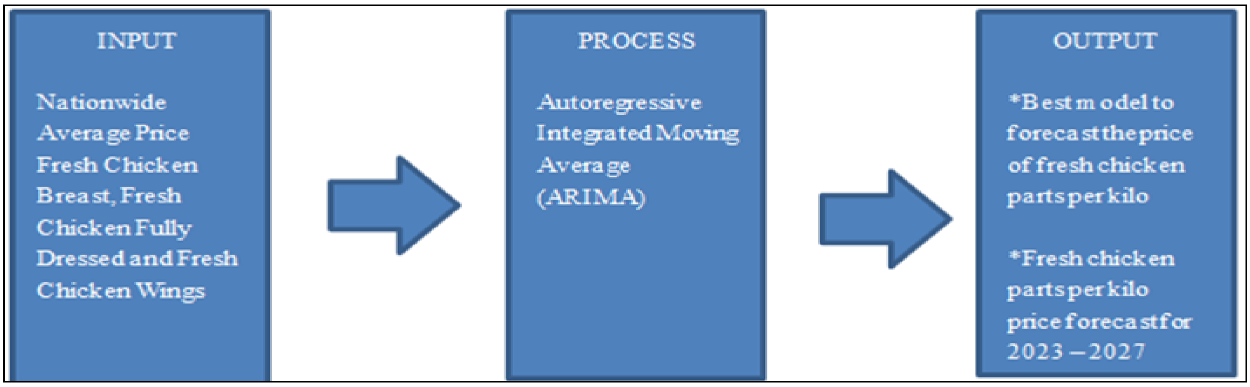

Fig 1 Research Paradigm

The researchers followed this research paradigm. An ARIMA model analysis is to be applied to the data in order to come up with the expected output as indicated in the diagram.

➢ *Scope and Limitations of the Study*

The scope of this research is from January of 2018 up to December of 2022, for a total of 60 observations for each variable to satisfy the assumption of ARMIA Model Analysis. The data were gathered and collected from Philippine Statistics Authority (PSA).

III. REVIEW OF RELATED LITERATURE

This section of the paper will provide an overview of the current knowledge of the topic and allowing to identify relevant theories and methods that would help to determine the nature of the research by studying a previous data and to discuss the factors affecting the price increase of chicken eggs in the Philippines.

According to Mandaue City Public Market Administrator Edgar Seno told Rappler on (June 2022), at least 15 market vendors have temporarily closed their stalls due to a chicken supply shortage, "more or less, we have 15 stalls temporarily closed because of the shortage in chicken supply. This is mostly caused by an ongoing ban on poultry and poultry-related commodities in the country", he added.

Reildrin Morales, officer-in-charge of the Bureau of Animal Industry (BAI), said in Manila Bulletin (July 2022), due to the more relaxed Covid -19 pandemic restrictions, the demand for products, such as poultry, has rapidly increased. As such, he said that the uneven demand-supply situation may also be attributed to the restrictions on the movement of live birds, poultry products, and by-products due to avian influenza cases in some areas.

Based to Donnie King, then Tyson's chief operating officer and group president of poultry. In (May 2021), there was short on chickens because of disappointing results with the type of breeding rooster it had picked. "We're changing out a male that, quite frankly, we made a bad decision on, said at the time. There was an "unexpected decline" in hatchings earlier that year because of the type of roosters it used.

King, Grady Ferguson, senior research analyst at Gro Intelligence, an agricultural data analytics firm explained, but the roosters don't bear all the blame. Chicken processors were caught off guard by the sudden bounce back in foodservice demand in 2021 after mass restaurant closures in 2020. The decision to cut supply in 2020 affected flock sizes in 2021 — you can't shrink a chicken flock overnight. Effectively, producers made a bet in 2020 that demand would still be down in 2021 and anticipated that smaller supply would be sufficient. But in 2021, demand came roaring back. Because of that, chicken producers were "under-supply [and] unable to meet the demand of this unexpectedly white hot, post-isolation demand" for chicken, said Ferguson.

As per Bill Creighton, vice president of retail sales for Springdale, Ark.-based Tyson Foods (May 2022), one of the largest impacts on poultry in 2022 has been the continued increase in demand, which of course saw a big rise in March of 2020 at the outskirts of the pandemic. “With the lingering impacts of COVID-19, we continue to see consumers enjoying cooking at home, and the affordability and versatility of chicken creates an opportunity for the growth we are experiencing in retail, from a trend perspective, we have seen the premium segment of our business grow faster than the rest of the market”, he added.

In a statement in The Board of Investments (BOI) in Business Inquirer (July 2017), they approved the registration of San Miguel Foods Inc.’s (SMFI) was registered as a producer of whole dressed chicken and further processed chicken parts (marinated and deboned). P2.4-billion meat processing project under the prevailing Investment Priorities Plan, which entitles the company to fiscal and non-fiscal perks.

As reported (July 2020), from the National Meat Inspection Service showed that from June 24, 2019 to June 22, 2020, the combined inventory of frozen dressed chicken in Metro Manila, Central Luzon, and Calabarzon surged by 60%, while local production soared by 156.44%. The United Broiler Raisers Association (UBRA) data showed that chicken prices are slightly down. As of July 3, the price of regular-sized broilers decreased from P89.8 to P88.8 per kilogram in the previous week. Prime-sized broiler prices fell by around a peso, too, from P91.62 to P90.71 per kilogram.

A study by Sornette and Zhou (2015) showed how the use of price forecasts can help with market regulation and intervention. The study focused on the Chinese poultry market and found that the use of price forecasts helped regulators to identify and intervene in the market during times of price volatility. The authors concluded that the use of price forecasts could help regulators to better manage market risks and improve market efficiency. In addition, a study by Sardar and Saha (2021) demonstrated how the use of ARIMA models can help with forecasting chicken prices in India. The study found that ARIMA models were effective in predicting chicken prices, which could be useful for market intervention and regulation by the government. The authors suggested that such forecasts could help in developing policies that could stabilize chicken prices and ensure market efficiency.

The analysis of past and current data can predict the possible situation in the near future. In statistics, there are many ways to accurately forecast commodity prices and some researchers use the Autoregressive Integrated Moving Average (ARIMA) to forecast available data.

In the study by Urrutia, Jackie et. al. (2019) , predicting the Philippines' Gross Domestic Product (GDP) for the first quarter of 2018 through the fourth quarter of 2022. The study chooses the best model from Bayesian Artificial Neural Network and Autoregressive Integrated Moving Average, to anticipate the Philippines' GDP. With a total of 112 observations, the researcher used data from the first quarter of 1990 through the fourth quarter of 2017. It is determined in this study that the statistical models ARIMA(1,1,1) and Bayesian ANN can forecast the GDP of the Philippines af ter conducting statistical tests to develop and compare them. Forecasting accuracy models like MSE, NMSE, MAE, and RMSE are used by the researcher.

In this article, Gordon Scott explained the type of autoregressive integrated moving average (ARIMA) model called Box-Jenkins evaluates the relative importance of one dependent variable to other fluctuating variables. Instead of using actual values, the model looks at variations between values in the series to forecast future securities or financial market movements. It is possible to comprehend an ARIMA model by outlining each of its parts as follows: A model known as autoregression (AR) depicts a variable that is changing and regresses on its own lagged, or prior, values. To enable the time series to become stable, the data values are replaced by the difference between the current values and the previous values in the Integrated (I) model. When a moving average model is applied to lagged observations, the moving average (MA) incorporates the relationship between an observation and a residual error.

IV. METHODOLOGY

This chapter presents the methods used by the researchers in this study. The study used descriptive design method to identify data that were factored in the price forecast of medium-sized egg in the Philippines and suggested possible solution based on the findings of the study. For accomplishment of this research, data were collected from government website and publications. Data were selected and transferred into an Excel spreadsheet. Then, the researchers uploaded this in EVIEWS. The researchers used Auto Regressive Integrated Moving Average model and tested the assumptions to satisfy the Auto Regressive Integrated Moving Average.

- *Statistical Tool*

EViews was used by the researchers to come up with more accurate and reliable results. EViews is a modern econometric, statistics, and forecasting package that offers powerful analytical tools within a flexible, easy-to-use interface and used by various kinds of researchers for statistical data analysis.

- *Statistical Treatment*

- *Auto Regressive Integrated Moving Average*

The researchers used Auto Regressive Integrated Moving Average, ARIMA. An autoregressive integrated moving average, or ARIMA , is a statistical analysis model that uses time series data to either better understand the data set or to predict future trends. A statistical model is autoregressive if it predicts future values based on past values. To conduct the Auto Regressive Integrated Moving Average, there are assumptions that are needed to be satisfied following the three steps:

$$Y_t = \beta_1 + \Phi_1 Y_{t-1} + \Phi_2 Y_{t-2} + \ldots + \Phi_p Y_{t-p}$$

Fig 2 ARIMA Formula

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- Identification – Analyzing the properties of variable of interest if it is Stationary. Stationarity can be identified through Graph, Correlogram and formal tests such as Augmented Dickey-Fuller Test (ADF). This study uses ADF in determining the unit root. Stationarity lies where the p- value is less than the alpha which is 0.05.
- Estimation – Estimate the possible candidate models. This is the stage to find the stationary and parsimonious model that fits the data well. Comparison of tests such as: Akaike, Schwartz and Hanna-Quinn.
- Diagnostic and Forecasting – Following the requirements for a stable univariate process:
- Residuals of the model are white noise (Ljung-Box Q Statistics).
- Check if the estimated ARMA process is stationary. AR roots should lie inside the unit circle.
- Check if the estimated ARMA process is invertible. All MA roots should be inside the unit circle.

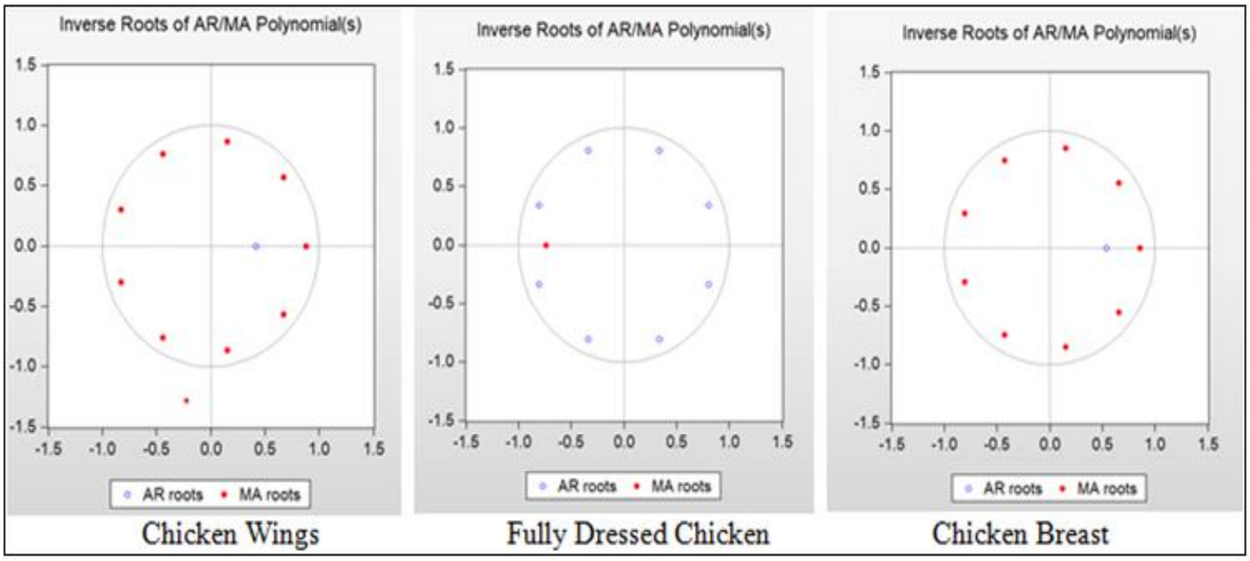

Fig 3 Inverse Roots of AR/MA Polynomials

The underlying assumptions must be satisfied in order to get a more valid model. Diagnostics for the underlying assumptions must be done and remedial measures can then be taken accordingly. If the assumptions of the Auto Regressive Integrated Moving Average are met, then the forecast can be conducted using the best model.

V. RESULTS AND DISCUSSION

This section will explain the historical behavior of the price of Fresh Chicken Breast, Fresh Chicken Fully Dressed and Fresh Chicken Wings in respect to date, ranging from January 2018 up to the December 2022. This section will also tackle the ARIMA best models used to forecast the prices of fresh chicken parts and the behavior of the forecasted graph within the span of five (5) years from January 2022 up to the December 2026.

The graph on the fig. 4 refers to the behavior of fresh chicken parts prices in respect to date in 2018-2022. As observed, the three graphs have similar movements which shows a sharp increase in mid-2019 this is due to the African swine fever outbreak that affected many pig farms in the Philippines, which caused a decrease in pork supply and an increase in demand for other meat products such as chicken. The resulting higher demand for chicken contributed to an increase in prices. ("Chicken prices rise amid ASF scare", Philippine News Agency, September 9, 2019). While the decrease in early parts of 2020 and sharp increase on its later parts is due to the COVID-19 pandemic that started in 2020 has had mixed effects on the poultry industry in the Philippines. Lockdowns and travel restrictions disrupted the supply chain and reduced demand from food service establishments. However, increased demand from households and a shift towards online shopping contributed to an increase in retail sales. The net effect on prices has been mixed, with some reports indicating a decrease in prices due to oversupply ("Poultry industry reels from Covid-19", Philippine Daily Inquirer, July 12, 2020), but the higher demand from households due to panic buying eventually caught up which ultimately increase the prices ("Poultry prices rise due to quarantine restrictions", BusinessWorld, March 19, 2021). Finally, the sharp increase in 2021 through 2022 can be attributed to the cost of chicken feed, which includes corn and soybean meal, is a significant input cost for poultry farmers. Fluctuations in the prices of these commodities can, therefore, affect the cost of production and ultimately the price of fresh chicken. For instance, in 2021, the price of corn in the Philippines reached record highs d ue to typhoons and other weather disturbances, leading to an increase in feed prices and, consequently, chicken prices. ("Poultry farmers want to import corn as prices soar", Philippine Daily Inquirer, March 25, 2021).

Fig 4 Graph of Price from Jan 2018 – Dec 2022 of Fresh Chicken Parts in the Philippines

Consequently, using the historical data ARIMA models are used to forecast the future values of a monthly prices of fresh chicken parts. These ARIMA models were preferred for forecasting fresh chicken prices because it can incorporate both the autoregressive (AR) and moving average (MA) components, as well as the integration (I) component. The AR component captures the relationship between the past values and the current value of the time series, while the MA component captures the influence of random shocks or errors in the time series. The integration component captures the differencing of the time series to make it stationary, which is necessary for the ARIMA model to work.

Furthermore, ARIMA models allow for the incorporation of seasonality, which is important for forecasting fresh chicken prices as they tend to exhibit seasonal patterns. By including the seasonal component in the ARIMA model, the forecast can take into account the expected seasonal fluctuations in prices.

Overall, the ARIMA model is chosen for forecasting fresh chicken prices because it can capture the trend, seasonality, and random shocks in the time series data, making it a powerful tool for predicting future prices.

Table 1 Best Model Selection

ARIMA Models	ARIMA Models	Equation
Fresh Chicken Breast	ARIMA (1,1,9)	D1fresh_chicken_breast c AR(1) MA(9)
Fresh Chicken Fully Dressed	ARIMA (8,1,1)	D1fresh_chicken_fully_dressed c AR(8) MA(1)
Fresh Chicken Wings	ARIMA (1,1,9)	D1fresh_chicken_wings c AR(1) MA(9)

The graph on the fig. 5 refers to the historical and forecasted behavior of fresh chicken parts prices in respect to date in 2018-2027. As observed in the graph, there is a minimal but steady increasing trend from 2023 to 2027.

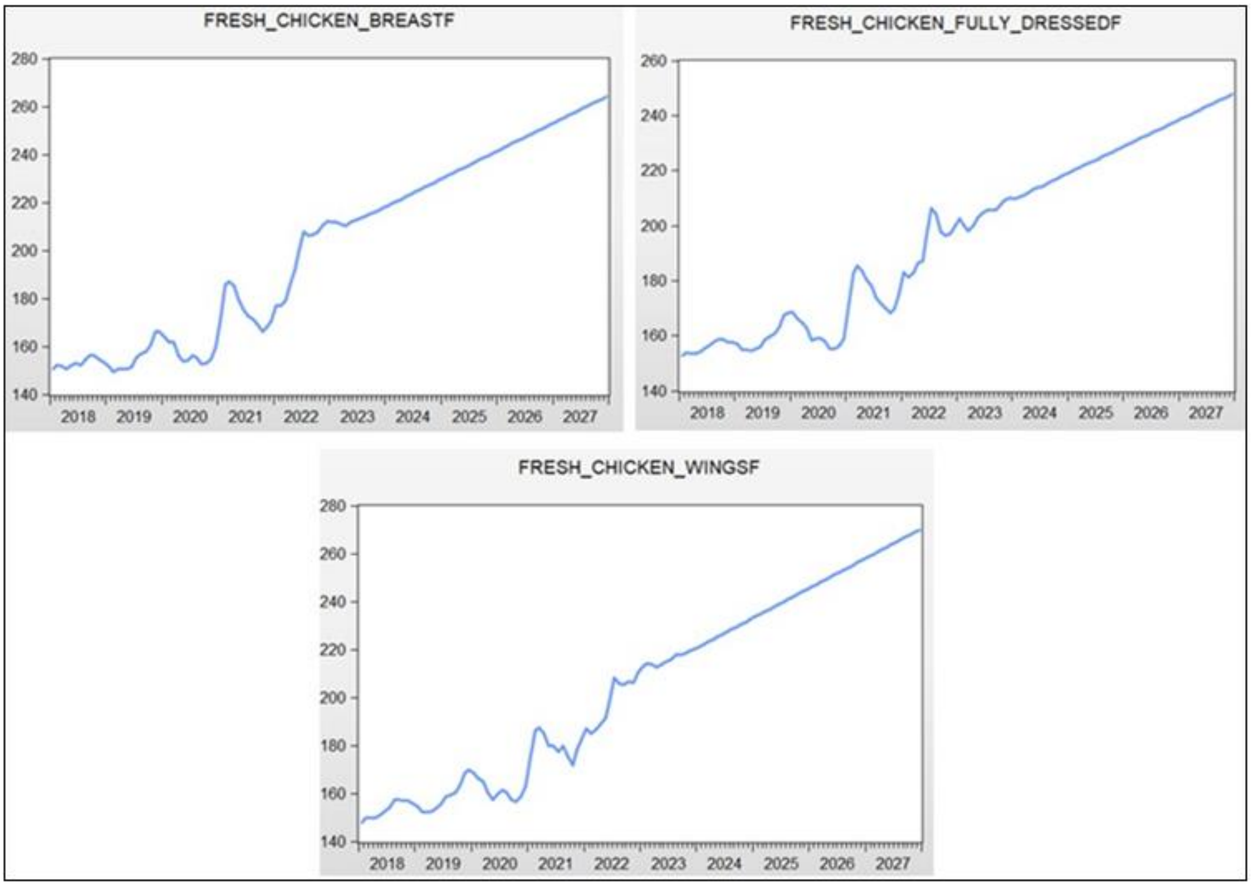

Fig 5 Forecasted Graph of Price from Jan 2023 – Dec 2027 of Fresh Chicken Parts in the Philippines

VI. CONCLUSION AND RECOMMENDATION

In conclusion, the ARIMA model applied for forecasting fresh chicken parts prices, gave reasonable and acceptable forecasts. The behavior prices of all selected poultry commodities presented the same upward trend with sharp spikes and declines. These fluctuations are represented by various factors such as effect of swine flu, economic disruptions due to COVID-19 and supply and demand issues, among others. Additionally, it can be concluded that the forecasted prices of the selected commodities presented an upward trend similar to the baseline data of 2018-2022 based on results generated from the best ARIMA candidates.

The Department of Agriculture(DA), taking into consideration recent events like the COVID-19, should utilize reasonable forecast of monthly prices of the fresh chicken parts in comparison to the current price watchlist to determine if the price spike or increase is rational. This can help to regulate prices and prevent price gouging by unscrupulous traders. By monitoring prices and enforcing price controls, the DA can ensure that prices are fair and reasonable for consumers. Also, the DA can use the forecasted prices to plan market interventions and policies to stabilize prices and ensure that they remain within a reasonable range.

For future studies, it is recommended to explore of the effect of inflation on the forecasted prices of fresh chicken parts.

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APPENDICES

➢ *Appendix A: Original Data and Transformed Data*

Table 2 Prices of Fresh Chicken Parts in the Philippines for the Period: January 2018 – December 2022

Year	FRESH CHICKEN BREAST Price/kilo	FRESH CHICKEN FULLY DRESSED Price/kilo	FRESH CHICKEN WINGS Price/kilo
Jan-18	150.61	152.72	147.76
Feb-18	152.11	154.00	149.79
Mar-18	151.65	153.58	149.61
Apr-18	150.57	153.70	149.69
May-18	152.21	154.18	150.97
Jun-18	153.16	155.67	152.42
Jul-18	152.09	156.51	154.10
Aug-18	154.58	157.91	157.34
Sep-18	156.06	158.55	157.33
Oct-18	156.08	158.80	156.83
Nov-18	154.65	157.81	156.91
Dec-18	153.56	157.50	155.90
Jan-19	151.86	156.81	154.48
Feb-19	149.25	155.01	152.12
Mar-19	150.67	154.76	152.15
Apr-19	150.65	154.55	152.77
May-19	150.77	155.12	153.93
Jun-19	151.55	156.05	155.26
Jul-19	155.29	158.72	158.72
Aug-19	156.94	159.60	159.49
Sep-19	157.81	160.75	160.20
Oct-19	160.50	163.09	163.30
Nov-19	166.02	167.43	168.41
Dec-19	166.11	168.24	169.62

Year	FRESH CHICKEN BREAST Price/kilo	FRESH CHICKEN FULLY DRESSED Price/kilo	FRESH CHICKEN WINGS Price/kilo
Jan-20	164.35	168.61	168.73
Feb-20	161.84	166.09	166.14
Mar-20	161.68	165.00	165.11
Apr-20	156.20	162.78	160.37
May-20	153.96	158.50	157.52
Jun-20	154.40	158.99	159.64
Jul-20	156.36	158.86	161.21
Aug-20	155.40	157.87	160.55
Sep-20	152.60	155.31	157.41
Oct-20	152.88	155.22	156.67
Nov-20	154.42	156.24	158.57
Dec-20	159.92	158.87	163.20
Jan-21	171.39	171.15	174.86
Feb-21	185.96	182.63	186.30
Mar-21	186.95	185.35	187.23
Apr-21	185.59	183.68	184.95
May-21	179.54	180.25	179.62
Jun-21	175.37	178.26	179.84
Jul-21	172.49	173.65	177.36
Aug-21	171.39	171.60	179.67
Sep-21	169.05	170.14	175.43
Oct-21	166.28	168.34	171.67
Nov-21	167.86	169.77	177.80
Dec-21	170.41	175.21	182.54

Year	FRESH CHICKEN BREAST Price/kilo	FRESH CHICKEN FULLY DRESSED Price/kilo	FRESH CHICKEN WINGS Price/kilo
Jan-22	176.85	183.03	186.89
Feb-22	176.86	181.48	185.20
Mar-22	178.94	182.72	186.41
Apr-22	186.12	186.40	189.15
May-22	192.01	187.04	191.22
Jun-22	199.85	196.31	198.05
Jul-22	207.99	206.30	208.11
Aug-22	206.23	204.20	205.90
Sep-22	206.55	197.74	205.29
Oct-22	207.66	196.51	206.76
Nov-22	210.64	197.03	206.22
Dec-22	212.01	199.82	210.62

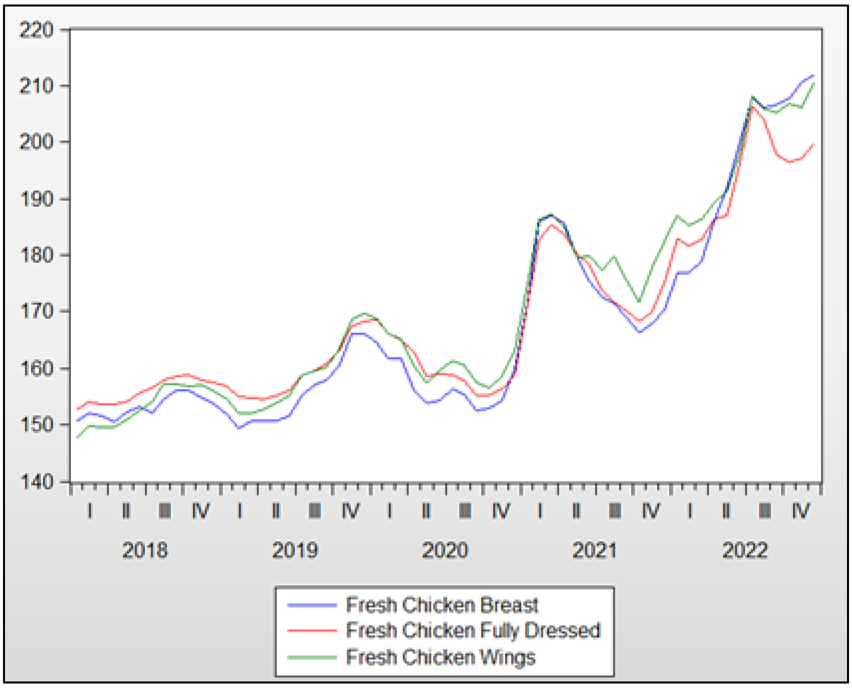


Fig 6 Graph of the Price of Fresh Chicken Parts in the Philippines from Jan 2018 – Dec 2022 (per Kilo) - Consolidated

➢ *Appendix B: Test of Stationary*

D1: Intercept – Reject Ho

Augmented Dickey-Fuller Unit Root Test on D(FRESH_CHICKEN_BREAST)

Null Hypothesis: D(FRESH_CHICKEN_BREAST) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.874186	0.0040
Test critical values:	1% level	-3.548208	
	5% level	-2.912631	
	10% level	-2.594027	

*MacKinnon (1996) one-sided p-values.

D1: Trend and Intercept – Reject Ho

Augmented Dickey-Fuller Unit Root Test on D(FRESH_CHICKEN_BREAST)

Null Hypothesis: D(FRESH_CHICKEN_BREAST) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.984396	0.0146
Test critical values:	1% level	-4.124265	
	5% level	-3.489228	
	10% level	-3.173114	

*MacKinnon (1996) one-sided p-values.

D1: None – Reject Ho

Augmented Dickey-Fuller Unit Root Test on D(FRESH_CHICKEN_BREAST)

Null Hypothesis: D(FRESH_CHICKEN_BREAST) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.735340	0.0003
Test critical values:	1% level	-2.605442	
	5% level	-1.946549	
	10% level	-1.613181	

*MacKinnon (1996) one-sided p-values.

Fig 7 Test null Hypothesis that a Unit Root is Present in a time series via ADF for Fresh Chicken Breast

D1: Intercept – Reject Ho

Augmented Dickey-Fuller Unit Root Test on D(FRESH_CHICKEN_FULLY_DRESSED)

Null Hypothesis: D(FRESH_CHICKEN_FULLY_DRESSED) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.109981	0.0001
Test critical values:	1% level	-3.550396	
	5% level	-2.913549	
	10% level	-2.594521	

*MacKinnon (1996) one-sided p-values.

D1: Trend and Intercept – Reject Ho

Augmented Dickey-Fuller Unit Root Test on D(FRESH_CHICKEN_FULLY_DRESSED)

Null Hypothesis: D(FRESH_CHICKEN_FULLY_DRESSED) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.143968	0.0005
Test critical values:	1% level	-4.127338	
	5% level	-3.490662	
	10% level	-3.173943	

*MacKinnon (1996) one-sided p-values.

D1: None – Reject Ho

Augmented Dickey-Fuller Unit Root Test on D(FRESH_CHICKEN_FULLY_DRESSED)

Null Hypothesis: D(FRESH_CHICKEN_FULLY_DRESSED) has a unit root
Exogenous: None
Lag Length: 1 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.898167	0.0000
Test critical values:	1% level	-2.606163	
	5% level	-1.946654	
	10% level	-1.613122	

*MacKinnon (1996) one-sided p-values.

Fig 8 Test null hypothesis that a unit root is present in a time series via ADF for Fresh Chicken Fully Dressed

D1: Intercept – Reject Ho

Augmented Dickey-Fuller Unit Root Test on D(FRESH_CHICKEN_WINGS)

Null Hypothesis: D(FRESH_CHICKEN_WINGS) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.631844	0.0004
Test critical values:	1% level	-3.548208	
	5% level	-2.912631	
	10% level	-2.594027	

*MacKinnon (1996) one-sided p-values.

D1: Trend and Intercept – Reject Ho

Augmented Dickey-Fuller Unit Root Test on D(FRESH_CHICKEN_WINGS)

Null Hypothesis: D(FRESH_CHICKEN_WINGS) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.706446	0.0019
Test critical values:	1% level	-4.124265	
	5% level	-3.489228	
	10% level	-3.173114	

*MacKinnon (1996) one-sided p-values.

D1: None – Reject Ho

Augmented Dickey-Fuller Unit Root Test on D(FRESH_CHICKEN_WINGS)

Null Hypothesis: D(FRESH_CHICKEN_WINGS) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.387229	0.0000
Test critical values:	1% level	-2.605442	
	5% level	-1.946549	
	10% level	-1.613181	

*MacKinnon (1996) one-sided p-values.

Fig 9 Test Null Hypothesis that a Unit Root is Present in a Time Series via ADF for Fresh Chicken Wings

- *H0:* The data are not stationary.
- *Ha:* The data are stationary**.**
- *Rejection Rule:* If P-value is greater than 0.05, then fail to reject the null hypothesis.

- *Conclusion:* Using Dickey-Fuller Unit Root statistical test the data are stationary. Under Difference 1, the intercept, trend & intercept and none all fall below the P-value of 0.05, thus, satisfying the alternative hypothesis that the data are stationary.

- *Command for Differencing:*
  d1fresh_chicken_breast=d(fresh_chicken_breast,1) d1fresh_chicken_fully_dressed=d(fresh_chicken_fully_dressed,1) d1fresh_chicken_legs=d(fresh_chicken_legs,1)d1fresh_chicken_wings=d(fresh_chicken_wings,1)

Below result shows the stationarity where the Unit Root Test falls under the 1st Difference.

Intercept – Reject Ho

Augmented Dickey-Fuller Unit Root Test on D(D1FRESH_CHICKEN_BREAST)

Null Hypothesis: D(D1FRESH_CHICKEN_BREAST) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.001078	0.0000
Test critical values:	1% level	-3.550396	
	5% level	-2.913549	
	10% level	-2.594521	

*MacKinnon (1996) one-sided p-values.

Trend and Intercept – Reject Ho

Augmented Dickey-Fuller Unit Root Test on D(D1FRESH_CHICKEN_BREAST)

Null Hypothesis: D(D1FRESH_CHICKEN_BREAST) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.925123	0.0000
Test critical values:	1% level	-4.127338	
	5% level	-3.490662	
	10% level	-3.173943	

*MacKinnon (1996) one-sided p-values.

None – Reject Ho

Augmented Dickey-Fuller Unit Root Test on D(D1FRESH_CHICKEN_BREAST)

Null Hypothesis: D(D1FRESH_CHICKEN_BREAST) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.072775	0.0000
Test critical values:	1% level	-2.606163	
	5% level	-1.946654	
	10% level	-1.613122	

*MacKinnon (1996) one-sided p-values.

Fig 10 Stationarity of the Variable in the 1st Difference for Fresh Chicken Breast

Intercept – Reject Ho

Augmented Dickey-Fuller Unit Root Test on D(D1FRESH_CHICKEN_FULLY_DRESSED)

Null Hypothesis: D(D1FRESH_CHICKEN_FULLY_DRESSED) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.438032	0.0000
Test critical values:	1% level	-3.552666	
	5% level	-2.914517	
	10% level	-2.595033	

*MacKinnon (1996) one-sided p-values.

Trend and Intercept – Reject Ho

Augmented Dickey-Fuller Unit Root Test on D(D1FRESH_CHICKEN_FULLY_DRESSED)

Null Hypothesis: D(D1FRESH_CHICKEN_FULLY_DRESSED) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.365575	0.0000
Test critical values:	1% level	-4.130526	
	5% level	-3.492149	
	10% level	-3.174802	

*MacKinnon (1996) one-sided p-values.

None – Reject Ho

Augmented Dickey-Fuller Unit Root Test on D(D1FRESH_CHICKEN_FULLY_DRESSED)

Null Hypothesis: D(D1FRESH_CHICKEN_FULLY_DRESSED) has a unit root
Exogenous: None
Lag Length: 1 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.508044	0.0000
Test critical values:	1% level	-2.606911	
	5% level	-1.946764	
	10% level	-1.613062	

*MacKinnon (1996) one-sided p-values.

Fig 11 Stationarity of the Variable in the 1st Difference for Fresh Chicken Fully Dressed

Intercept – Reject Ho

Augmented Dickey-Fuller Unit Root Test on D(D1FRESH_CHICKEN_WINGS)

Null Hypothesis: D(D1FRESH_CHICKEN_WINGS) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.214723	0.0000
Test critical values:	1% level	-3.550396	
	5% level	-2.913549	
	10% level	-2.594521	

*MacKinnon (1996) one-sided p-values.

Trend and Intercept – Reject Ho

Augmented Dickey-Fuller Unit Root Test on D(D1FRESH_CHICKEN_WINGS)

Null Hypothesis: D(D1FRESH_CHICKEN_WINGS) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.214723	0.0000
Test critical values:	1% level	-3.550396	
	5% level	-2.913549	
	10% level	-2.594521	

*MacKinnon (1996) one-sided p-values.

None – Reject Ho

Augmented Dickey-Fuller Unit Root Test on D(D1FRESH_CHICKEN_WINGS)

Null Hypothesis: D(D1FRESH_CHICKEN_WINGS) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.289838	0.0000
Test critical values:	1% level	-2.606163	
	5% level	-1.946654	
	10% level	-1.613122	

*MacKinnon (1996) one-sided p-values.

Fig 12 Stationarity of the Variable in the 1st Difference for Fresh Chicken Fully Wings

- *Correlogram*

Correlogram of D(FRESH_CHICKEN_BREAST)

Date: 02/25/23 Time: 16:56
Sample: 2018M01 2022M12
Included observations: 59

	AC	PAC	Q-Stat	Prob
1	0.577	0.577	20.677	0.000
2	0.218	-0.173	23.674	0.000
3	-0.019	-0.104	23.698	0.000
4	-0.125	-0.046	24.714	0.000
5	-0.198	-0.118	27.319	0.000
6	-0.158	0.026	29.006	0.000
7	-0.172	-0.139	31.047	0.000
8	-0.271	-0.228	36.222	0.000
9	-0.324	-0.131	43.776	0.000
10	-0.225	0.008	47.500	0.000
11	-0.053	0.051	47.711	0.000
12	-0.072	-0.268	48.108	0.000
13	0.013	0.069	48.122	0.000
14	0.220	0.255	52.002	0.000
15	0.379	0.171	63.741	0.000
16	0.326	-0.083	72.659	0.000
17	0.337	0.150	82.405	0.000
18	0.147	-0.134	84.304	0.000
19	-0.024	0.057	84.354	0.000
20	-0.117	0.011	85.618	0.000

Correlogram of D(FRESH_CHICKEN_FULLY_DRESSED)

Date: 02/25/23 Time: 17:00
Sample: 2018M01 2022M12
Included observations: 59

	AC	PAC	Q-Stat	Prob
1	0.518	0.518	16.680	0.000
2	0.024	-0.334	16.718	0.000
3	-0.119	0.058	17.622	0.001
4	-0.213	-0.231	20.579	0.000
5	-0.207	0.010	23.442	0.000
6	-0.112	-0.053	24.296	0.000
7	-0.121	-0.151	25.310	0.001
8	-0.319	-0.363	32.483	0.000
9	-0.305	-0.013	39.163	0.000
10	-0.082	-0.042	39.661	0.000
11	0.058	-0.045	39.916	0.000
12	0.048	-0.224	40.088	0.000
13	0.051	-0.052	40.289	0.000
14	0.176	0.155	42.770	0.000
15	0.239	0.064	47.448	0.000
16	0.281	0.082	54.034	0.000
17	0.357	0.203	64.962	0.000
18	0.149	-0.090	66.903	0.000
19	-0.148	0.044	68.874	0.000
20	-0.250	-0.070	74.663	0.000

Correlogram of D(FRESH_CHICKEN_WINGS)

Date: 02/26/23 Time: 01:24
Sample: 2018M01 2022M12
Included observations: 59

	AC	PAC	Q-Stat	Prob
1	0.432	0.432	11.573	0.001
2	0.014	-0.212	11.585	0.003
3	-0.173	-0.114	13.509	0.004
4	-0.218	-0.105	16.633	0.002
5	-0.087	0.049	17.134	0.004
6	-0.018	-0.053	17.156	0.009
7	-0.028	-0.064	17.208	0.016
8	-0.215	-0.269	20.460	0.009
9	-0.328	-0.192	28.226	0.001
10	-0.144	0.047	29.753	0.001
11	0.061	0.017	30.036	0.002
12	0.016	-0.247	30.057	0.003
13	0.071	0.046	30.447	0.004
14	0.055	-0.027	30.686	0.006
15	0.150	0.186	32.524	0.005
16	0.240	0.084	37.334	0.002
17	0.329	0.200	46.635	0.000
18	0.169	-0.103	49.145	0.000
19	-0.037	0.112	49.270	0.000
20	-0.104	0.065	50.265	0.000

Fig 13 Correlogram Results for Determining p and q (AR, MA)

- ✓ The graphical result shows in the correlogram in determining the candidate models for slection.
- ✓ Equation specification - Dependent variable followed by list of regressor, ARMA in choosing candidate models.

Table 3 Candidate Models and Comparison using Akaike, Schwartz & Hannan-Quinn

ARIMA Models	Akaike	Schwartz	Hannan-Quinn	$R2$	Adjusted R^2
Fresh Chicken Breast			***Equation:D1fresh_chicken_breast c AR(1) MA(1)***		
ARIMA (1,1,1)	5.186228	5.327078	5.241210	0.347751	0.312173
ARIMA (1,1,8)	5.193820	5.334670	5.248803	0.343283	0.307463
ARIMA (1,1,9)	5.150230	5.291080	5.205212	0.376602	0.342599
ARIMA (1,1,15)	5.116068	5.256918	5.171050	0.407259	0.374928
ARIMA (1,1,16)	5.206185	5.347035	5.261167	0.334171	0.297853
ARIMA (1,1,17)	5.113859	5.254709	5.168841	0.413608	0.381623
ARIMA (12,1,1)	5.245016	5.385866	5.299998	0.309957	0.272318
ARIMA (12,1,8)	5.533353	5.674203	5.588335	0.082255	0.032196
ARIMA (12,1,9)	5.476711	5.617561	5.531693	0.144619	0.097962
ARIMA (12,1,15)	5.547909	5.688759	5.602891	0.062442	0.011303
ARIMA (12,1,16)	5.496540	5.637390	5.551522	0.129678	0.082206
ARIMA (12,1,17)	5.455337	5.596187	5.510319	0.188307	0.144032
ARIMA (14,1,1)	5.250509	5.391359	5.305491	0.305064	0.267158
ARIMA (14,1,8)	5.516501	5.657351	5.571483	0.098392	0.049213
ARIMA (14,1,9)	5.485271	5.626121	5.540253	0.127941	0.080374
ARIMA (14,1,15)	5.442459	5.583309	5.497441	0.185906	0.141500
ARIMA (14,1,16)	5.460914	5.601764	5.515896	0.164968	0.119421
ARIMA (14,1,17)	5.356116	5.496966	5.411098	0.301325	0.263215
Fresh Chicken Fully Dressed			***Equation: D1fresh_chicken_fully_dressed c AR(1) MA(1)***		
ARIMA (1,1,1)	5.044118	5.184968	5.099101	0.383781	0.350169
ARIMA (1,1,8)	5.127234	5.268084	5.182216	0.331438	0.294971
ARIMA (1,1,9)	5.137722	5.278572	5.192704	0.324309	0.287453
ARIMA (1,1,16)	5.198042	5.338892	5.253024	0.275473	0.235954
ARIMA (1,1,17)	4.961003	5.101853	5.015986	0.563162	0.539334
ARIMA (2,1,1)	5.039379	5.180229	5.094361	0.387860	0.354471
ARIMA (2,1,8)	5.431934	5.572784	5.486916	0.086464	0.036634
ARIMA (2,1,9)	5.419913	5.560763	5.474895	0.102220	0.053250
ARIMA (2,1,16)	5.417820	5.558670	5.472802	0.122753	0.074903
ARIMA (2,1,17)	5.255000	5.395850	5.309982	0.379066	0.345197
ARIMA (8,1,1) AR 8 - .09	4.939764	5.080614	4.994746	0.454074	0.424296
ARIMA (8,1,8)	5.344071	5.484921	5.399053	0.184686	0.140214
ARIMA (8,1,9)	5.377713	5.518563	5.432695	0.141066	0.094216
ARIMA (8,1,16)	5.332445	5.473295	5.387427	0.196142	0.152295
ARIMA (8,1,17)	5.170900	5.311750	5.225882	0.402847	0.370275
Fresh Chicken Wings			***Equation: D1fresh_chicken_wings c AR(1) MA(1)***		
ARIMA (1,1,1)	5.223846	5.364696	5.278828	0.219208	0.176619
ARIMA (1,1,9)	5.168598	5.309448	5.223580	0.271541	0.231806
ARIMA (1,1,17)	5.129736	5.270586	5.184718	0.330362	0.293836
ARIMA (8,1,1)	5.206338	5.347188	5.261320	0.235266	0.193554
ARIMA (8,1,9)	5.363394	5.504244	5.418376	0.109328	0.060746
ARIMA (8,1,17)	5.272175	5.413025	5.327157	0.231927	0.190032

The table shows the list of candidate models for selection to come up with the best fit model for forecasting. As a rule from Akaike, Schwartz and Hannan-Quinn criterions, “the smaller value, the better” and R^2 must be higher.

Dependent Variable: D1FRESH_CHICKEN_BREAST
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 02/25/23 Time: 20:01
Sample: 2018M02 2022M12
Included observations: 59
Convergence achieved after 33 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.967291	0.758485	1.275293	0.2076
AR(1)	0.541845	0.077890	6.956515	0.0000
MA(9)	-0.259788	0.117588	-2.209313	0.0313
SIGMASQ	8.673262	1.459539	5.942468	0.0000

R-squared	0.376602	Mean dependent var	1.040678
Adjusted R-squared	0.342599	S.D. dependent var	3.762017
S.E. of regression	3.050253	Akaike info criterion	5.150230
Sum squared resid	511.7225	Schwarz criterion	5.291080
Log likelihood	-147.9318	Hannan-Quinn criter.	5.205212
F-statistic	11.07540	Durbin-Watson stat	1.819550
Prob(F-statistic)	0.000009		

Dependent Variable: D1FRESH_CHICKEN_FULLY_DRESSED
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 02/25/23 Time: 19:49
Sample: 2018M02 2022M12
Included observations: 59
Convergence achieved after 15 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.806060	0.543052	1.484315	0.1434
AR(8)	-0.342313	0.204321	-1.675368	0.0995
MA(1)	0.740340	0.098497	7.516398	0.0000
SIGMASQ	6.923354	0.986719	7.016544	0.0000

R-squared	0.454074	Mean dependent var	0.798305
Adjusted R-squared	0.424296	S.D. dependent var	3.591728
S.E. of regression	2.725228	Akaike info criterion	4.939764
Sum squared resid	408.4779	Schwarz criterion	5.080614
Log likelihood	-141.7230	Hannan-Quinn criter.	4.994746
F-statistic	15.24876	Durbin-Watson stat	1.933004
Prob(F-statistic)	0.000000		

Dependent Variable: D1FRESH_CHICKEN_WINGS
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 02/25/23 Time: 19:51
Sample: 2018M02 2022M12
Included observations: 59
Convergence achieved after 15 iterations
Coefficient covariance computed using outer product of gradients

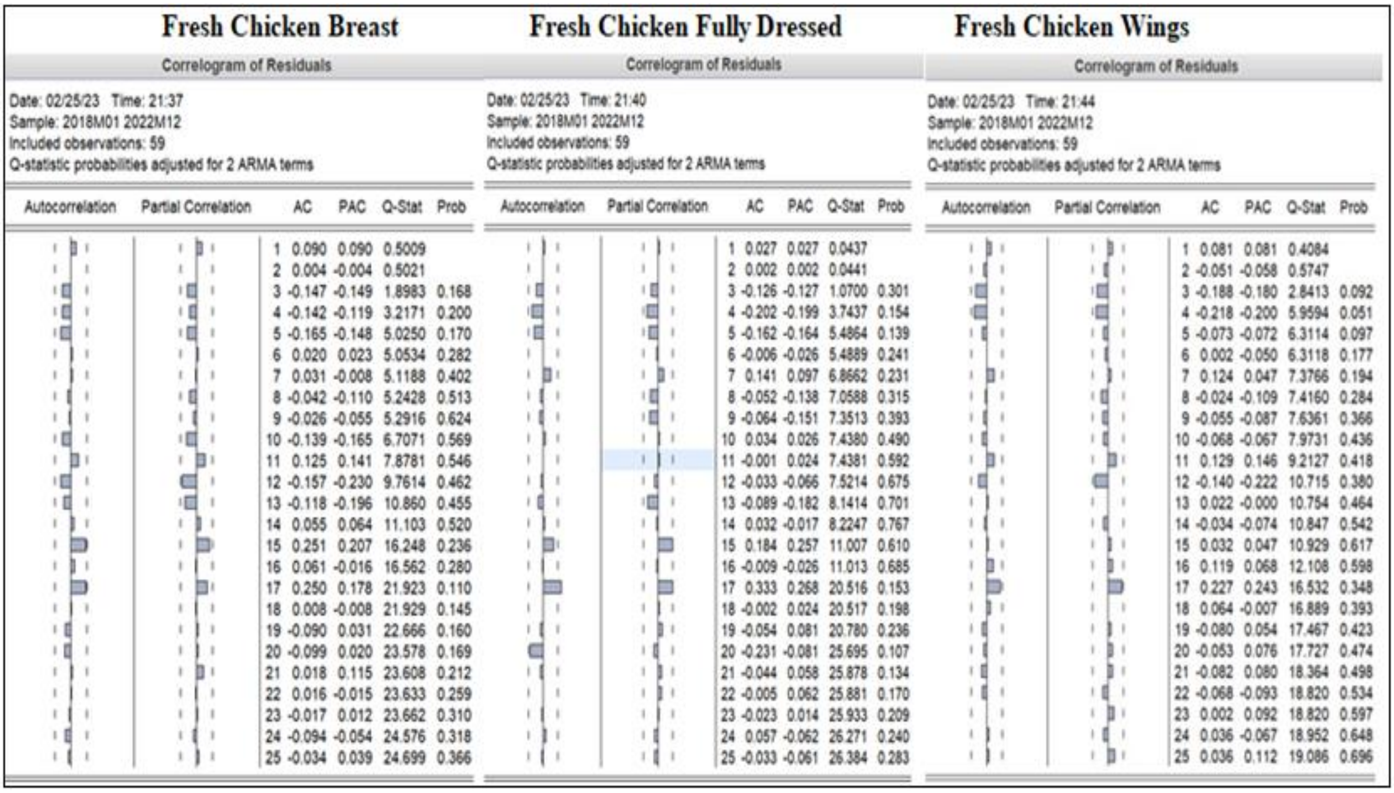
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.038052	0.519162	1.999475	0.0505
AR(1)	0.422157	0.103185	4.091254	0.0001
MA(9)	-0.311205	0.104998	-2.963913	0.0045
SIGMASQ	8.813344	1.503202	5.863049	0.0000

R-squared	0.271541	Mean dependent var	1.065424
Adjusted R-squared	0.231806	S.D. dependent var	3.508163
S.E. of regression	3.074787	Akaike info criterion	5.168598
Sum squared resid	519.9873	Schwarz criterion	5.309448
Log likelihood	-148.4736	Hannan-Quinn criter.	5.223580
F-statistic	6.833936	Durbin-Watson stat	1.796896
Prob(F-statistic)	0.000537		

Fig 14 Best Model for Forecasting

- *Based on the Result from the Estimation Process, the Best Model Fits for Forecasting are as follows:*

✓ Fresh Chicken Breast - ARIMA (1,1,9)
✓ Fresh Chicken Fully Dressed - ARIMA (8,1,1) Fresh Chicken Wings - ARIMA (1,1,9



Fresh Chicken Breast

Correlogram of Residuals

Date: 02/25/23 Time: 21:37
Sample: 2018M01 2022M12
Included observations: 59
Q-statistic probabilities adjusted for 2 ARMA terms

	AC	PAC	Q-Stat	Prob
1	0.090	0.090	0.5009	
2	0.004	-0.004	0.5021	
3	-0.147	-0.149	1.8983	0.168
4	-0.142	-0.119	3.2171	0.200
5	-0.165	-0.148	5.0250	0.170
6	0.020	0.023	5.0534	0.282
7	0.031	-0.008	5.1188	0.402
8	-0.042	-0.110	5.2428	0.513
9	-0.026	-0.055	5.2916	0.624
10	-0.139	-0.165	6.7071	0.569
11	0.125	0.141	7.8781	0.546
12	-0.157	-0.230	9.7614	0.462
13	-0.118	-0.196	10.860	0.455
14	0.055	0.064	11.103	0.520
15	0.251	0.207	16.248	0.236
16	0.061	-0.016	16.562	0.280
17	0.250	0.178	21.923	0.110
18	0.008	-0.008	21.929	0.145
19	-0.090	0.031	22.666	0.160
20	-0.099	0.020	23.578	0.169
21	0.018	0.115	23.608	0.212
22	0.016	-0.015	23.633	0.259
23	-0.017	0.012	23.662	0.310
24	-0.094	-0.054	24.576	0.318
25	-0.034	0.039	24.699	0.366

Fresh Chicken Fully Dressed

Correlogram of Residuals

Date: 02/25/23 Time: 21:40
Sample: 2018M01 2022M12
Included observations: 59
Q-statistic probabilities adjusted for 2 ARMA terms

	AC	PAC	Q-Stat	Prob
1	0.027	0.027	0.0437	
2	0.002	0.002	0.0441	
3	-0.126	-0.127	1.0700	0.301
4	-0.202	-0.199	3.7437	0.154
5	-0.162	-0.164	5.4864	0.139
6	-0.006	-0.026	5.4889	0.241
7	0.141	0.097	6.8662	0.231
8	-0.052	-0.138	7.0588	0.315
9	-0.064	-0.151	7.3513	0.393
10	0.034	0.026	7.4380	0.490
11	-0.001	0.024	7.4381	0.592
12	-0.033	-0.066	7.5214	0.675
13	-0.089	-0.182	8.1414	0.701
14	0.032	-0.017	8.2247	0.767
15	0.184	0.257	11.007	0.610
16	-0.009	-0.026	11.013	0.685
17	0.333	0.268	20.516	0.153
18	-0.002	0.024	20.517	0.198
19	-0.054	0.081	20.780	0.236
20	-0.231	-0.081	25.695	0.107
21	-0.044	0.058	25.878	0.134
22	-0.005	0.062	25.881	0.170
23	-0.023	0.014	25.933	0.209
24	0.057	-0.062	26.271	0.240
25	-0.033	-0.061	26.384	0.283

Fresh Chicken Wings

Correlogram of Residuals

Date: 02/25/23 Time: 21:44
Sample: 2018M01 2022M12
Included observations: 59
Q-statistic probabilities adjusted for 2 ARMA terms

	AC	PAC	Q-Stat	Prob
1	0.081	0.081	0.4084	
2	-0.051	-0.058	0.5747	
3	-0.188	-0.180	2.8413	0.092
4	-0.218	-0.200	5.9594	0.051
5	-0.073	-0.072	6.3114	0.097
6	0.002	-0.050	6.3118	0.177
7	0.124	0.047	7.3766	0.194
8	-0.024	-0.109	7.4160	0.284
9	-0.055	-0.087	7.6361	0.366
10	-0.068	-0.067	7.9731	0.436
11	0.129	0.146	9.2127	0.418
12	-0.140	-0.222	10.715	0.380
13	0.022	-0.000	10.754	0.464
14	-0.034	-0.074	10.847	0.542
15	0.032	0.047	10.929	0.617
16	0.119	0.068	12.108	0.598
17	0.227	0.243	16.532	0.348
18	0.064	-0.007	16.889	0.393
19	-0.080	0.054	17.467	0.423
20	-0.053	0.076	17.727	0.474
21	-0.082	0.080	18.364	0.498
22	-0.068	-0.093	18.820	0.534
23	0.002	0.092	18.820	0.597
24	0.036	-0.067	18.952	0.648
25	0.036	0.112	19.086	0.696

Fig 15 Correlogram of Residuals (White Noise Residuals)

Figure 10 shows the null hypothesis residuals are white noise, therefore it passed the requirement for a stable univariate process.

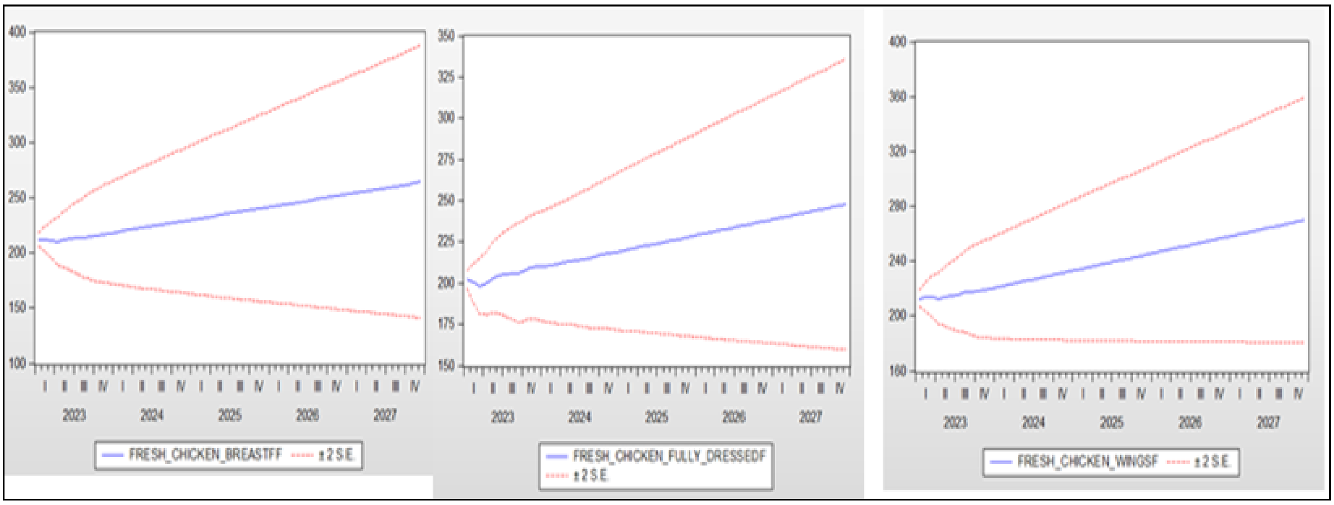


Fig 16 Forecasted Graph of Price from Jan 2023 – Dec 2027 of Fresh Chicken Breast in the Philippines

Table 4 5-Year Forecast of the Price of chicken Parts in the Philippines (for the Period: January 2023-December 2027)

YEAR	FRESH CHICKEN, BREAST, 1 KG	FRESH CHICKEN, FULLY DRESSED, 1 KG	FRESH CHICKEN, WINGS, 1 KG
Jan-23	211.80	202.42	212.90
Feb-23	211.71	200.33	214.07
Mar-23	211.09	197.99	213.97
Apr-23	210.31	199.79	212.49
May-23	211.73	203.09	213.82
Jun-23	212.77	204.59	215.02
Jul-23	213.37	205.49	215.70
Aug-23	214.01	205.62	217.70
Sep-23	214.91	205.81	217.74
Oct-23	215.84	207.61	218.36
Nov-23	216.78	209.49	219.22
Dec-23	217.74	209.96	220.18
Jan-24	218.70	209.91	221.19
Feb-24	219.66	210.48	222.21
Mar-24	220.63	211.25	223.24
Apr-24	221.60	212.29	224.28
May-24	222.56	213.31	225.32
Jun-24	223.53	213.77	226.35
Jul-24	224.50	214.21	227.39
Aug-24	225.46	215.13	228.43
Sep-24	226.43	216.23	229.47
Oct-24	227.40	217.12	230.51
Nov-24	228.37	217.94	231.54
Dec-24	229.33	218.66	232.58
Jan-25	230.30	219.40	233.62
Feb-25	231.27	220.32	234.66
Mar-25	232.24	221.25	235.70
Apr-25	233.20	222.02	236.73
May-25	234.17	222.72	237.77
Jun-25	235.14	223.50	238.81
Jul-25	236.10	224.30	239.85
Aug-25	237.07	225.14	240.89
Sep-25	238.04	225.97	241.93
Oct-25	239.01	226.73	242.96
Nov-25	239.97	227.50	244.00
Dec-25	240.94	228.32	245.04
Jan-26	241.91	229.16	246.08
Feb-26	242.88	229.97	247.12
Mar-26	243.84	230.78	248.15
Apr-26	244.81	231.58	249.19
May-26	245.78	232.37	250.23
Jun-26	246.74	233.19	251.27
Jul-26	247.71	234.01	252.31
Aug-26	248.68	234.82	253.34
Sep-26	249.65	235.61	254.38
Oct-26	250.61	236.41	255.42
Nov-26	251.58	237.22	256.46
Dec-26	252.55	238.03	257.50
Jan-27	253.52	238.84	258.53
Feb-27	254.48	239.64	259.57
Mar-27	255.45	240.44	260.61
Apr-27	256.42	241.25	261.65
May-27	257.38	242.06	262.69
Jun-27	258.35	242.86	263.72
Jul-27	259.32	243.67	264.76
Aug-27	260.29	244.48	265.80
Sep-27	261.25	245.28	266.84
Oct-27	262.22	246.09	267.88
Nov-27	263.19	246.90	268.91
Dec-27	264.16	247.70	269.95

Table 4 shows the forecasted prices of fresh chicken parts in the Philippines for the period 2023-2027 based on the research study conducted by the researchers using Auto Regressive Integrated Moving Average (ARIMA).