AUTOREGRESSIVE INTEGRATED MOVING AVERAGE (ARIMA) ANALYSIS ON EGG PRODUCTION (CASE STUDY OF PT SATWA INDO PERKASA, BORONG PA'LA'LA VILLAGE, PATTALASANG DISTRICT, GOWA REGENCY, SOUTH SULAWESI PROVINCE)

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Abstract

This research was conducted to determine the performance of chicken egg production by using forecasting methods and time series analysis to describe the condition of egg production and also the conditions of the system maintenance applied to PT Satwa Indo Perkasa. PT Satwa Indo Perkasa as a subsidiary of PERKASA Group which is engaged in livestock producing Day Old Chick (DOC) which was established in 2006 in Borong Pa'la'la Village, Pattallassang District, Gowa Regency, South Sulawesi Province as a Breeding Farm company. which in a relatively short period of time PT Satwa Indo Perkasa succeeded in producing quality DOC and chicken eggs and was able to position itself as a well-known poultry business player in eastern Indonesia. Using time series data at 8 weeks, namely at weeks 25 to 32 which will be used to forecast up to 8 production times in the future using autoregressive integrated moving average (ARIMA) analysis. Based on the results of the ARIMA (autoregressive integrated moving average) model analysis that has been carried out, forecasting on the 53rd day to the 60th day has results that are close to the actual production amount, which has a small difference, which is less than 10% with the absolute amount. in the positive or negative value of the production value. in the positive or negative value of the production value. This means that the use of forecasting using the ARIMA method for for use in egg production is relevant.

Keyword: ARIMA, Forecasting

1.INTRODUCTION

Livestock farming is part of agricultural development which has an important role in Indonesian economic activities. Kamiludin, 2009 believes that the aim of livestock development is to meet the nutritional needs of the community which comes from animal protein in the form of meat, eggs and milk which is very necessary to improve the quality of human resources. Laying chickens are one of the potential gas livestock in Indonesia and are cultivated specifically to produce eggs commercially. Consumable eggs are produced by laying hens, which are one type of poultry raised in Indonesia. Febrianto, 2017 Eggs as a product of the livestock sub-sector are a commodity that is accessible to all levels of society, so chicken eggs are included as one of the basic food source commodities.

Chicken eggs are one of the staple food source commodities whose price developments are monitored by the government which monitors staple food source commodities in Indonesia in order to maintain egg price stability. The stability of prices of basic commodities in Indonesia has been regulated through the regulation of the Minister of Trade of the Republic of Indonesia Number 58 of 2018 concerning Determination of reference prices for purchases by Farmers and reference prices for sales by Consumers. The existence of these regulations can function to protect breeders and consumers. PT Satwa Indo Perkasa is a subsidiary of the

PERKASA Group which operates in the field of livestock producing Day Old Chick (DOC) which was established in 2006 in Borong Pa'la'la Village, Pattallassang District, Gowa Regency, South Sulawesi Province as a chicken breeding company (Breeding Farm) in a relatively short period of time, PT Satwa Indo Perkasa succeeded in producing quality DOC and chicken eggs and was able to position itself as a well-known poultry business player in eastern Indonesia.

The increase in the population of laying hens at PT Satwa Indo Perkasa needs to be accompanied by an increase in the production of laying hens, especially from the rearing system through improvements and a good rearing system because maintenance will affect production activities, therefore, this research aims to determine the performance of chicken egg production using the method forecasting and time series analysis. . This research can describe the conditions of egg production and also the conditions of the maintenance system implemented at PT Satwa Indo Perkasa. The problem formulation in the research entitled "Analysis of Autoregressive Integrated Moving Average (Arima) on Egg Production (Case Study of Pt Satwa Indo Perkasa, Borong Pa'la'la Village, Pattallassang District, Gowa Regency, South Sulawesi Province)" is to predict egg production for the next 3 months from August to October 2021.

2. RESEARCH METHODS

This research was conducted at PT Satwa Indo Perkasa, Borong Pa'la'la Village, Pattallassang District, Gowa Regency, South Sulawesi Province from August 2021 to October 2021, namely on August 14 2021 which is the 1st day and October 7 2021 is the 1st day. 60. This research was conducted using time series data on the number of egg production over a period of 3 months. A total of 8 weeks, namely weeks 25 to 32, will be used to forecast up to 8 times future production. During this time period, it can be seen that the pattern of production fluctuations formed at PT Satwa Indo Perkasa, Borong Pa'la'la Village, Pattallassang District, Gowa Regency, South Sulawesi Province. Data obtained from PT Satwa Indo Perkasa, Borong Pa'la'la Village, Pattallassang District, Gowa Regency, South Sulawesi Province, namely egg production data.

This research uses autoregressive integrated moving average (ARIMA) analysis. The data was processed using Eviews 9 software. The ARIMA (autoregressive integrated moving average) model or what is often known as the Jenkins box model was coined by (Jenkins, 1970) which is a forecasting model for stationary and non-stationary time series data. This ARIMA model combines an autoregressive (AR) model with order p and a moving average (MA) model with order q methods and an order d process. This differencing process is carried out if the time series data used is not stationary so it must be converted to stationary so that modeling can be carried out using ARIMA. Makridakis (1999) The determination of the p and q order values can be seen using the correlogran on the autocorrelation function (ACF) and partial autocorrelation function (PACF) components and the determination of the d order is determined through the number of differencing processes carried out to obtain stationary data. In general, the ARIMA model (p,d,q).

Testing steps before using the ARIMA forecasting method include:

Stationarity Test (Unit Root Test) This test is carried out to prove the stability (normality) of the relationship pattern for each variable so that the resulting regression results are not skewed (false) and thus produce a correct interpretation. For stationarity testing, the ones most frequently used are the Augmented Dickey-Fuller (ADF Test) and the Philip-Perron (PP Test). In the ADF test, the Schwarz Info Criterion is used and the maximum lag is 9. Meanwhile, the PP Test uses Newey-West Banwidth. Identification of the AR and MA models. The notation used is ARIMA (p,d,q) where:Autoregressive Model (AR) is a general form of autoregressive model with order p (AR(p)) or ARIMA model (p,0,0)

The best model estimate uses the smallest standard error estimate. Apart from the standard error estimate value, the average percentage forecasting error (MAPE) value can also be used as consideration in determining the best model by using the smallest Akaike info Criterion and Schwarz criterion values and residual diagnostics testing to see whether the probability obtained can interpret the data. predicted from each AR and MA modeling estimate to continue the forecasting process. The best model estimate uses the smallest standard error estimate. Apart from the standard error estimate value, the average percentage forecasting error (MAPE) value can also be used as consideration in

determining the best model by using the smallest Akaike info Criterion and Schwarz criterion values and residual diagnostics testing to see whether the probability obtained can interpret the data. predicted from each AR and MA modeling estimate to continue the forecasting process.

Forecasting with the ARIMA model uses the general notation used by the ARIMA model (0,1,1)(0,1,1) which in its use requires an elaboration of a more general regression equation for the model: then to predict a future period, namely Xt–1 then as in

The value of et+1 is unknown, because the expected value for random errors in the future must remain equal to 0. However, from the adjusted model we can replace the e values with values determined empirically. X value, at the start of the forecasting process and the X value will be a predicted value, not known past values.

3.RESULTS AND DISCUSSION

PT Satwa Indo Perkasa (Breeding Farm), which was founded in 2006, has general criteria for a Breeding Farm company to have a location far from residential areas, but currently the agricultural area in Borong Pa'lala Village is starting to be converted into mortgage housing for residents who can This means that growth in Borong Pa'lala Village is starting to develop. PT Satwa Indo Perkasa is a subsidiary of the PERKASA Group which operates in several fields, namely breeding, selling chickens or distributing livestock that produce Day Old Chicks (DOC) which was established in 2006 in Borong Pa'la'la Village, Pattallassang District, Gowa Regency, Sulawesi Province Selatan as a chicken breeding company (Breeding Farm) which in a relatively short period of time PT Satwa Indo Perkasa succeeded in producing quality DOC and chicken eggs and was able to position itself as a well-known poultry business player in eastern Indonesia. The PT Satwa Indo Perkasa company has a production site in Bolong Palala Village, Pattalang District, Gowa Regency. PT Satwa Indo Perkasa currently has approximately 10 (ten) hectares of land with a cage capacity of 20 units with a hatching machine capacity of 13 (thirteen) units with production capacity every week with a yield of approximately 2000 (two thousand) boxes with distribution area throughout the provinces of South Sulawesi, Central Sulawesi and Southeast Sulawesi.

Based on the results of forecasting analysis that has been carried out on 52 days of data from August 2021 to October 2021, namely August 14 2021 is the 1st day and October 7 2021 is the 60th day, with data processed using Eviews 9 software. .The ARIMA model (autoregressive integrated moving average) or what is often known as the Jenkins box model, the results of this research are as follows:

Stationarity Test Results

The results of the stationarity test at level and first difference are depicted in table 1 as follows:

	Level		***first difference***	
	Augmanted Dickey-Fuller Prob.	**annotation**	***Augmanted Dickey-Fuller Prob.***	**annotation**
Egg production	0,9476	Non stationary	0,0000	stationary

Table 1. outturn Unit Root Test (Source: Processing results using Eviews 9)

Table 5.1.1 shows the results of the unit root test using the Augmented Dickey Fuller Test at a non-stationary level with a probability value of 0.9476. At the First Difference level the egg production variable has a probability level of less than 5%, namely 0.0000 and is stationary at the first difference level. Unit Root Test results are attached in attachments 1 and 2. Identify the AR and MA models of Order p and q using Correlogram identification showing the cutoff at the first lag, then the modeling possibility is if p=1, then q=0 and if p=0 then q=1. Identification of order d is used based on the level of stationarity based on the following table:

Stationary	*d*
Level	0
first difference	1
Second difference	2

Table 2. d order value of the stationarity level (Source: Processing results using Eviews 9)

AR(1) and MA(1) Model Estimation

With the stationary level of the first difference in this research data having a value of d=1, the model identification includes: AR(1) is (1,1,0) and MA(1) is (0,1,1).Model estimates in this study, the best model estimates from each AR(1) and MA(1) modeling estimate are as follows:

percentage	AR(1)	MA(1)
Akaike info criterion	10.8738	10.8748
Schwarz criterion	10.9874	10.9885

Table 3 the precentage of Akaike info criterion dan Schwarz criterion (Source: Processing results using Eviews 9)

Day	Egg quantity production	Day	Egg quantity production
1	3450	16	3460
2	3360	17	3461
3	3371	18	3462
4	3372	19	3463
5	3373	20	3464
6	3374	21	3464
7	3375	22	3465
8	3376	23	3466
9	3380	24	3370
10	3381	25	3371
11	3460	26	3372
12	3461	27	3374
13	3462	28	3375
14	3463	29	3376
15	3464	30	3376

Day	Egg quantity production	Day	Egg quantity production
31	3310	46	2965
32	3311	47	2917
33	3312	48	2892
34	3270	49	2886
35	3270	50	2860
36	3270	51	2854
37	3270	52	2848
38	3180	53	2825
39	3180	54	2823
40	3180	55	2820
41	3128	56	2818
42	3128	57	2816
43	3087	58	2814
44	2999	59	2811
45	2965	60	2808

Table 4 Number of egg production and predicted values on day 53 to day 60 according to ARIMA results as follows:

Description: Results of Forecasting Number of Egg Production Using is The forecast results using the ARIMA method compared with the actual production amount have a small difference, namely less than 10%, with the absolute amount in the positive or negative value of the production value. This means that the use of forecasting using the ARIMA method in egg production in this study has a value difference of less than 10%, whether greater or less than the actual production amount. On the 53rd to the 58th day the egg production value was higher than the predicted value estimated using the ARIMA method, then on the 7th day On the 59th and 60th day, the egg production value was lower than the forecasting value carried out in this study. This shows that with slight differences, the ARIMA method can be used and is relevant in predicting the value of egg production at PT Satwa Indo Perkasa.

Based on the results of value processing from the Akaike info criterion, the AR(1) model has a value of 10.8738, which is smaller than the MA(1) model value of 10.8748 and the Schwarz criterion value of the AR(1) model is

10.9874, which is smaller than the MA(1) model.) of 10.9885. So the best model to use is the AR(1) model to continue the forecasting process. In the residual diagnostics test, both models, both AR(1) and MA(1), have probability values greater than 5%, so forecasting can be continued using these models. Model forecasting using ARIMA based on model forecasting using ARIMA, the number of egg production on days 53 to 60 is as follows:

4.CONCLUSION

Based on the results of the analysis that has been carried out, the conclusion in this research is that egg production data can be predicted using the ARIMA model with stationary criteria at the first difference level with an Augmanted Dickey-Fuller Prob value of 0.0000 and has the best model AR(1) with Akaike info criterion and Schwarz values. smallest criterion, namely the AR(1) (1,1,0) model. Based on the comparison table between the forecasting results, it has a difference of less than 10% from the actual production value and is relevant for use in predicting the production value of egg production in the future. The advice that can be given to PT Satwa Indo Perkasa with this research is that it is hoped that it will be able to predict the amount of egg production using the ARIMA (Autoregressive Integrated Moving Average) method in each period of chicken egg production. The use of egg production forecasting calculations is to determine performance that can influence production activities. If there is a change in the production scale, namely when the amount of production can be estimated or predicted not to be in accordance with the target that has been determined, then the evaluation of the Forecasting value of egg production can be used as a consideration in taking the company's policy to avoid this through a better maintenance system.

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