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How Does the Change in Feed Prices Affect Meat Prices? A Case Study of Turkey

Yem Fiyatlarındaki Değişim Et Fiyatlarını Nasıl Etkiler? Türkiye Örneği

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ABSTRACT

This study aims to understand the relationship between meat and meat product prices and feed prices. For this purpose, causality and long-run relationship between variables are examined using the Granger causality test and autoregressive distributed lag model approaches. The data of the study is formed from the Meat Consumer Price Index and Feed Price Index shared by the Turkish Statistical Institute. The data set is composed of 70 observations covering the period from January 2016 to October 2021. The results of the Granger causality test show that the Feed Price Index is the Granger cause of the Meat Consumer Price Index. According to the long-run estimation results of the autoregressive distributed lag model, a 1% increase in the Feed Price Index increases the Meat Consumer Price Index by 0.97%. It is estimated that the deviations from the long-run equilibrium will be adjusted in approximately 4 months. Considering the results of the study showing that the prices of meat and meat products are significantly affected by feed prices, it can be concluded that the subsidies to the feed crops and feed industry has the potential to impact meat prices positively.

Keywords: ARDL model, Consumer Price Index, feed prices, Granger causality test, meat prices

ÖZ

Bu çalışma, et ve et ürünleri fiyatları ile yem fiyatları arasındaki ilişkiyi anlamayı amaçlamaktadır. Bu amaçla değişkenler arasındaki nedensellik ve uzun dönem ilişkileri Granger nedensellik testi ve ARDL modeli yaklaşımları kullanılarak incelenmiştir. Çalışmanın verileri, Türkiye İstatistik Kurumu tarafından paylaşılan Et Tüketici Fiyat Endeksi (MCPI) ve Yem Fiyat Endeksi'nden (FPI) oluşturulmuştur. Veri seti, Ocak 2016 ile Ekim 2021 arasındaki dönemi kapsayan 70 gözlemden oluşmaktadır. Granger nedensellik testi sonuçları, FPI'nin MCPI'nin Granger nedeni olduğunu göstermektedir. Otoregresif Dağıtılmış Gecikme (ARDL) modelinin uzun dönemli tahmin sonuçlarına göre, FPI'deki %1'lik bir artış MCPI'yi %0,97 artırmaktadır. Yaklaşık 4 ayda kısa dönemdeki sapmaların düzeleceği ve sistemin uzun dönem dengesine yakınsayacağı tahmin edilmektedir. Et ve et ürünleri fiyatlarının yem fiyatlarından önemli ölçüde etkilendiğini gösteren çalışmanın sonuçları dikkate alındığında, yem bitkileri ve yem sanayine yönelik teşviklerin et fiyatlarını olumlu yönde etkileme potansiyeline sahip olduğu ifade edilebilir.

Anahtar Kelimeler: ARDL modeli, Tüketici Fiyat Endeksi, yem fiyatları, Granger nedensellik testi, et fiyatları

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Introduction

Animal feed has a high importance in terms of animal husbandry as it constitutes a significant part of the variable costs in production activities (Albez, 2018; Tandoğan & Çiçek, 2016). Turkey, whose meat consumption is increasing every year due to the increasing population and changing consumption habits, is not at the desired level in feed production, which is the main input of production activity. According to Organisation for Economic Co-operation and Development (OECD) (OECD, 2021), meat consumption in Turkey was 1566.5 thousand tons in the 2000s, reaching 2859.6 in the 2010s with an increase of 82.55% compared to the previous period. Although there are substantial increases in feed crop production and compound feed production in the same period, it can be stated that there are many problems that need to be overcome considering the fact that 45%–50% of the mixed feeds produced depend on imported feed raw materials; unlike the developed countries, the use of compound feed in livestock is 60% on a dry matter basis in the livestock sector and the current roughage production in Turkey cannot meet the total need in this regard (Özkan & Şahin Demirbağ, 2016; TÜRKİYEM-BİR, 2019).

As the need for feed cannot be met in the market, the increases in feed prices cause an increase in meat prices which affects the consumer negatively, while this situation triggers meat imports and affects the producer negatively. Although the increments in feed prices significantly increase the expenses of the producers, the fact that the producer sales prices do not increase significantly prevents the producers from making investments to improve the product quality and production capacity. In this respect, it can be stated that the increase in feed prices has the potential to pose a threat to food security in meat. Due to the critical impact that feeds can have on meat prices, meat consumption, and the livestock sector, it is possible to come across many studies examining the relationship between meat consumption and/or meat prices and feed production/feed prices.

For instance, Arıkan et al. (2019) examined the relationship between broiler meat prices and broiler feed prices in Turkey. They found that there was a cointegration relationship between variables. Mat et al. (2020) analyzed the causality relationship between the red meat consumer price in Turkey and the factors that affect it. They ascertained that the prices of fattening feed are the Granger cause of red meat consumer prices and carcass red meat prices. Yalçınkaya and Aktaş (2019) investigated the effect of the abolition of Value-Added Tax (VAT) on animal feed prices and meat prices, which has been implemented since 2016, through the Granger causality test and Johansen cointegration analysis. They reported that the VAT exemption applied to animal feed did not statistically affect meat prices. In a study examining whether there is a cointegration relationship between beef consumption in Turkey and beef price, chicken meat price, and per capita income (Erdoğdu & Çiçek, 2017), it is stated that increases in beef prices, in the long run, will affect consumption negatively following with the economic theory. It has been concluded that the increases in chicken meat prices will affect consumption positively. Özer (2013) examined the factors affecting beef carcass meat prices in Turkey with the autoregressive distributed lag (ARDL) approach. The results show that cattle feed prices have a positive and statistically significant effect in the short and long run. Musunuru (2017), investigating the relationships between grain prices, meat prices, and exchange rates in the USA, used the Johansen cointegration test, the Granger causality test, and Vector autoregression (VAR) analysis. While the results of the Johansen cointegration test revealed no long-run relationship between the variables, the results of the Granger causality test showed a feedback relationship between corn prices and lean hog prices, and live cattle prices were the Granger cause of corn prices. Arıkan et al. (2022) analyzed the factors affecting broiler chicken prices using the boosting regression method. They found that their prices are affected by raw material prices of feed as well as economic conditions in Turkey. A general evaluation of the literature suggests that, as expected, numerous empirical findings support the significant impact of feed prices on meat prices. Therefore, studies that address the possible effects of feed prices on meat prices from different perspectives and provide a better understanding are particularly important.

This study aims to understand the relationship between meat prices and feed prices. For this purpose, the causality relationship and long-run relationship between the Meat Consumer Price Index (MCPI) and the Feed Price Index (FPI) are examined with the Granger causality test and the ARDL model. The primary motivation for using indexes instead of direct product prices in the study is to perform a comprehensive analysis by understanding the effects of developments in feed prices on meat and meat products rather than revealing the relationship between feed prices only with carcass meat or some meat products. The MCPI shared by the Turkish Statistical Institute (TURKSTAT) (2022), based on 2015 (2015 = 100), increased by 230.50% in October 2021. This price increment makes it more difficult to access animal products, which are already not accessible enough for all segments of society (Akın et al., 2020). It is thought that the results of the study can be used by decision-makers to develop policies to prevent price increases by explaining the relationship between feed prices and meat prices. In addition, the results of the study can be used to make long-run investment planning for the livestock sector and the sectors that provide input to the livestock sector.

Methods

The main materials of the study are the MCPI which is among the sub-headings of the Consumer Price Index (CPI), and the FPI, which is one of the sub-headings of the Agricultural Input Price Index (AIPI) shared by TURKSTAT. The data set consists of monthly data and covers the period from January 2016 to October 2021. When the TURKSTAT database is scanned, it is seen that 2003 (2003 = 100) is accepted as the base year for the CPI and the index starts from January 2003, while the AIPI starts from January 2016 based on the year 2015 (2015 = 100). In order to standardize the CPI and AIPI data, the CPI data are recalculated based on 2015 (2015 = 100). For the variables used in the study, first, logarithmic transformation was applied, and then seasonal adjustment was made with the moving average (additive) technique.

The MCPI constitutes 5.19% of the item weight in the general CPI and includes the items in Table 1. The FPI, on the other hand, has the subheadings of roughage and concentrated feed.

Descriptive statistics for MCPI and FPI are given in Table 2. The MCPI and FPI data for the January 2016 and October 2021 periods are given in Figure 1.

To estimate the effect of FPI on MCPI, the equation presented below is formed.

$$lnMCPI = \beta_0 + \beta_1 lnFPI + \varepsilon_t \tag{1}$$

It is expected that FPI will have a positive and statistically significant impact on MCPI, taking into account the fact that feed expenditures are among the main expense items in livestock and the results obtained from previous studies.

The study uses the ARDL model to examine the long-run relationship between MCPI and animal feed prices. Thanks to the ARDL model proposed by Peseran et al. (2001), if the variables are I(0) or I(1), the long-run relationship between the variables can

Table 1.
Weights for Items of MCPI

Item Name*	Weight in CPI (%)	Weight in Food and Non-alcoholic Beverages CPI (%)	Weight in MCPI (%)
Veal	2.15	8.50	41.48
Lamb	0.91	3.61	17.64
Poultry	1.40	5.54	27.04
Offal	0.06	0.23	1.11
Garlic-flavored sausage (Sucuk)	0.43	1.70	8.28
Sausage	0.05	0.19	0.91
Salami	0.08	0.33	1.60
Prepared meat dishes	0.10	0.40	1.95
Total	5.19	20.49	100.00

Source: TURKSTAT, 2022; Original Calculations.
CPI = Consumer Price Index; MCPI = Meat Consumer Price Index.
*The items specified for the MCPI and the weights of these items may change over time. For example, the first data shared for Prepared Meat Dishes in the TURKSTAT database is based on 2019M01.

Table 2.
Descriptive Statistics

Variables	Mean	Standard Deviation	Maximum	Minimum
MCPI	151.0500	36.18147	231.9200	105.4000
FPI	144.8291	36.54755	230.4600	102.8800

Source: TURKSTAT, 2022; Original Calculations. Period: 2016MM01–2021M10.
FPI = Feed Price Index; MCPI = Meat Consumer Price Index.

be examined. Another important advantage of the ARDL model is that this technique is more robust for small sample sizes (Narayan, 2004).

There are a number of steps that must be followed before making long-run and short-run (error correction model (ECM) estimations with the ARDL model. One of the first steps is to determine the order of integration for the series to be included in the model. Although the ARDL model can provide robust results for I(0) and I(1), this is not the case for I(2) and higher order of integration. Another critical step is to decide on the appropriate lag length and conditional ECM for ARDL(p,q) model dependent variable and its regressors. Akaike Information Criteria (AIC), Schwarz criterion (SC), or Hannan–Quinn criterion are generally used when determining the appropriate lag length. For the estimation results of the selected model to be acceptable, there should be no serial correlation, heteroscedasticity, specification error, or normality problems in the relevant model, and attention should be paid to the stability of parameter estimations (Mert & Çağlar, 2019).

The representation of ARDL with a constant term and no trend variable can be formulated as follows:

$$LnMCPI_t = \beta_0 + \sum_{i=1}^{p} \beta_{1i} lnMCPI_{t-i} + \sum_{i=0}^{q} \beta_{2i} lnFPI_{t-i} + \varepsilon_t \qquad (2)$$

where p represents the optimal lag order for the MCPI variable, q is the optimal lag order for the FPE variable, and β_0 represents the constant term.

Pesaran et al. (2001) proposed five different conditional ECMs for cointegration analysis with the ARDL approach. Case 1 is recommended for special cases such as both the dependent and independent variables fluctuate around the zero mean, whereas case 2 is a more reliable option when some variables have a nonzero

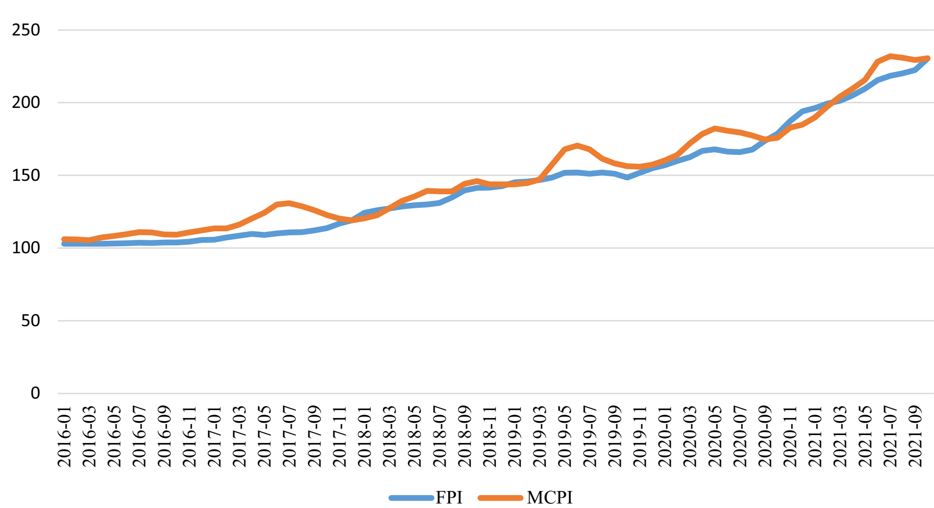

Figure 1.
Meat Consumer Price Index and Feed Price Index for January 2016–October 2021 Periods (2015 = 100).

mean (Kripfganz & Schneider, 2018). Cases 4 and 5 contain a trend, and no significant results were obtained for the trend variable in the preliminary examination made for the model developed. For this reason, case 3, which has common use in the literature (Kripfganz & Schneider, 2018; Mert & Çağlar, 2019), is preferred. The model can be formulated with the variables used in the study as follows;

$$\Delta lnMCPI = \beta_0 + \sum_{i=1}^{p} \beta_{1i} \Delta lnMCPI_{t-i} + \sum_{i=0}^{q} \beta_{2i} \Delta lnFPI_{t-i} + \beta_3 lnMCPI_{t-1} + \beta_4 lnFPI_{t-1} + \varepsilon_t \quad (3)$$

where, Δ represents the operator of the first difference. The existence of a long-run relationship between the variables is tested with the bounds test. In this test, the null hypothesis ($H0 = \beta_3 = \beta_4 = 0$) stating that there is no cointegration relationship is against the alternative hypothesis ($H1 \neq \beta_3 \neq \beta_4 \neq 0$) (Bölük & Mert, 2015). The existence of cointegration can be accepted if the calculated F-statistics values are above the upper critical bounds determined for I(0) and I(1). There are alternative critical values for I(0) and I(1) in the literature. It is recommended to perform the test by selecting the most appropriate critical values according to the sample size. Due to this study's relatively small sample size, critical values calculated by Narayan (2005) are used.

After examining the estimation results for the long run, the ECM estimation is used to understand whether the deviations from the short-run equilibrium can be compensated. The ECM, which is also defined as short-run estimation, can be formulated as follows:

$$\Delta lnMCPI_t = \delta_0 + \sum_{i=1}^{p} \delta_1 \Delta lnMCPI_{t-i} + \sum_{i=0}^{q} \delta_2 \Delta lnFPI_{t-i} + \omega ECT_{t-1} + \varepsilon_t \quad (4)$$

Here, *ECT* represents the error correction term and ω is the speed of adjustment parameter. Suppose the coefficient is negative and statistically significant. In that case, it indicates a deviation from the long-run equilibrium due to many reasons, such as an increase in energy prices or import/export restrictions, will be corrected.

After examining the long-run relationships in the study, the causality relationship between the variables is examined with the Granger causality test developed by Granger (1969). According to this approach, when estimating an X_t variable, if a better result is obtained by using all the available information than when using the information except the information that the Y_t variable has, it is stated that the Y_t variable causes the X_t variable (Granger, 1969; 1980). The Granger causality model formed for the study can be expressed with the following equation on the condition that the variables are stationary in the first-order difference:

$$\Delta lnMCPI_t = \sum_{i=1}^{p} \alpha_i \Delta lnMCPI_{t-i} + \sum_{i=1}^{p} \beta_i \Delta lnFPI_{t-i} + \varepsilon_t \quad (5)$$

$$\Delta lnFPI_t = \sum_{i=1}^{p} \alpha_i \Delta lnFPI_{t-i} + \sum_{i=1}^{p} \beta_i \Delta lnMCPI_{t-i} + \varepsilon_t \quad (6)$$

Here, *i* is the number of lags and is usually determined by information criteria such as AIC and SC. Rejection of the generated $\beta_1 = \beta_2 = ... = \beta_i = 0$ hypothesis; for Equation 5, it means that FPI is the Granger cause of MCPI, while for Equation 6, it means that MCPI is the Granger cause of FPI. When both of these situations are valid, it can be stated that there is feedback (Granger, 1969).

Results

Unit Root Tests

Stationarity analysis is essential for the methods planned to be applied for the series in this study. While the Granger causality test requires stationary variables, determining the order of

Table 3.
ADF and PP Unit Root Test Results for Series

	ADF Unit Root Test Results (Constant)		PP Unit Root Test Results (Constant)	
Variables	**Test Critical Values**	**ADF Test Statistics**	**Test Critical Values**	**PP Test Statistics**
lnMCPI	1% (−3.531592)	1.189280	1% (−3.528515)	1.497722
	5% (−2.905519)		5% (−2.904198)	
	10% (−2.590262)		10% (−2.589562)	
D(lnMCPI)	1% (−3.531592)	−5.882170*	1% (−3.530030)	−4.304283*
	5% (−2.905519)		5% (−2.904848)	
	10% (−2.590262)		10% (−2.589907)	
LNFPI	1% (−3.530030)	1.966187	1% (−3.528515)	3.423265
	5% (−2.904848)		5% (−2.904198)	
	10% (−2.589907)		10% (−2.589562)	
D(lnFPI)	1% (−3.530030)	−4.527846*	1% (−3.530030)	−4.376264*
	5% (−2.904848)		5% (−2.904848)	
	10% (−2.589907)		10% (−2.589907)	

ADF = augmented Dickey–Fuller; FPI = Feed Price Index; MCPI = Meat Consumer Price Index; PP = Phillips–Perron.
ADF and PP test statistics values; *if $p < .01$.

integration for the variables is necessary for the ARDL model. For this reason, unit root tests are performed. Augmented Dickey–Fuller and Phillips–Perron unit root tests, which are widely preferred as unit root tests, are chosen (Table 3).

When the unit root test results in Table 3 are examined, it is seen that both series are stationary at first difference. For this reason, the first-order difference series is used for the Granger causality test. Since both variables are stationary in I(0) or I(1), it can be stated that there is no obstacle for the ARDL model in terms of stationarity.

Autoregressive Distributed Lag Model

After the stationarity test, the ARDL model is estimated. The maximum lag length is determined as 12, and AIC is used to select the most appropriate lag length. Estimation results and diagnostic tests are shown in Table 4.

When the estimation results in Table 4 are examined, the appropriate lag length for the MCPI is 2 and the appropriate lag length for the FPI is 6. While the adjusted R^2 value of the model is calculated as 0.99, the *F*-statistic value is statistically significant at the 1% significance level. When the diagnostic tests are reviewed, it is determined that the model does not have heteroscedasticity, model specification, normality, and serial correlation problems.

In order to test the stability of parameters, the CUSUM and CUSUM of squares graphs in Figure 2 are examined.

Since the plots remain within the critical bounds for both CUSUM and CUSUM of squares, it can be stated that the parameter estimations meet the stability condition.

After obtaining the estimation results and performing the diagnostic tests, the bounds test is performed to test whether there is a cointegration relationship between the series. Bounds test results and the long-run estimation results are given in Table 5.

In Table 5, the *F*-statistic value is calculated as 11.15, which is above the upper critical values at all significance levels. Therefore,

Table 4.
ARDL(2,6) Model Estimation Output and Diagnostic Tests

Variable	Coefficient	Standard Error	*t*-Statistic
lnMCPI (-1)	1.163130	.110208	10.55393*
lnMCPI (-2)	−0.419519	.104940	−3.997704*
lnFPI	0.430594	.144179	2.986532*
LNFPI(-1)	−0.351851	.267661	−1.314543
LNFPI(-2)	−0.004547	.292940	−0.015522
LNFPI(-3)	0.087795	.294681	0.297934
LNFPI(-4)	0.121176	.293157	0.413349
LNFPI(-5)	−0.497551	.280256	−1.775343**
LNFPI(-6)	0.463039	.161307	2.870537*
C	0.061915	.042359	1.461671
Adj R^2	.99	*F*-Statistic	2514.422 (p = .00)
Residual Diagnostics			
Heteroscedasticity Test: Breusch-Pagan-Godfrey		F = 1.09	p = .38
Ramsey RESET Test (Number of fitted terms = 1)		F = 0.99	p = .32
Normality Test (Jarque-Bera)		JB = 1.01	p = .60
Breusch-Godfrey Serial Correlation LM Test		*F*-stat = 0.86	p = .59

ARDL = autoregressive distributed lag; FPI = Feed Price Index; MCPI = Meat Consumer Price Index.
t-Statistics values; *if p < .01, **if .01 < p < .10.

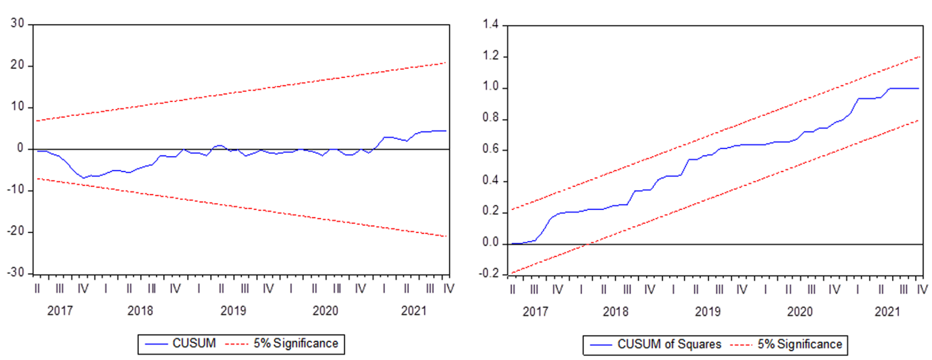

Figure 2.
CUSUM and CUSUM of Squares Graphs for Autoregressive Distributed Lag(2,6) Model.

Table 5.
F-Bounds Test and Estimation Results for Long-Run

***F*-Bounds Test**			
***F*-Statistic Value**	**Significance Level**	**I(0)#**	**I(1)#**
11.14656	10%	4.175	4.93
	5%	5.13	5.98
	1%	7.32	8.435
Estimation Results for Long-Run			
Variable	Coefficient	Standard Error	*t*-Statistic
LNFPI	0.969832	.032492	29.84801*

FPI = Feed Price Index.
t-Statistics values; *if $p < .01$.
#Critical values (for $n = 65$) generated by Narayan (2005) are used.

the H0 (no cointegration) hypothesis is rejected and it is concluded that there is a cointegration relationship between the series.

After examining the bounds test results, long-run estimations are evaluated. The estimation results presented in Table 5 reveal that the results obtained for the FPI are statistically significant at the 1% significance level. According to the results, in the long run, a 1% increase in the FPI increases the MCPI by 0.97%.

The estimation results of the ECM showing the short-run relationships between the variables are given in Table 6. Since the *p*-value obtained for the CointEq(-1) variable is not incompatible with the t-Bounds distribution, the t-Bounds test is performed.

When the results shared in Table 6 are examined, it is seen that the error correction coefficient is negative and statistically significant at the 1% significance level according to the ECM. In line with the results, it can be stated that the deviations from the long-run equilibrium will be adjusted in approximately 4 months (1/0.256389 = 3.90).

Table 6.
Short-Run Estimation Results (Error Correction Model) and t-Bounds Test

Variable	**Coefficient**	**Standard Error**	***t*-Statistic**
C	.061915	.012329	5.021724*
D(lnMCPI(-1))	.419519	.103926	4.036726*
D(lnFPI)	.430594	.137152	3.139534*
D(lnFPI(-1))	–.169912	.179060	–0.948915
D(lnFPI(-2))	–.174459	.173008	–1.008389
D(lnFPI(-3))	–.086664	.169561	–0.511109
D(lnFPI(-4))	.034512	.168543	0.204768
D(lnFPI(-5))	–.463039	.153806	–3.010539*
CointEq(-1)#	–.256389	.053806	–4.765077*
t-Bounds Test			
Test statistic value	Significance level	I(0)	I(1)
–4.765077	10%	–2.57	–2.91
	5%	–2.86	–3.22
	2.5%	–3.13	–3.5
	1%	–3.43	–3.82

FPI = Feed Price Index; MCPI = Meat Consumer Price Index.
t-Test statistics values; *if $p < .01$.
#*p*-Value incompatible with t-Bounds distribution.

Table 7.
Results of the Granger Causality Test

Null Hypothesis	***F*-Statistics**	**Probability**
D(lnFPI) does not Granger Cause D(lnMCPI)	3.66737	.0599
D(lnMCPI) does not Granger Cause D(lnFPI)	0.06914	.7934

FPI = Feed Price Index; MCPI = Meat Consumer Price Index.

Granger Causality Test

The Granger causality test results for the models presented in Equations 5 and 6 are in Table 7. Considering the SC criterion, the test is performed at the first lag for both variables.

The results showed that the FPI is the Granger cause of the MCPI at the 10% significance level, whereas the MCPI is not the Granger cause of the FPI. While the results support the hypothesis that feed prices affect meat prices, they reveal no feedback process between the variables.

Discussion

This study investigates the relationship between FPI and MCPI using econometric methods. The ARDL model estimated for this purpose shows that the FPI has a statistically significant effect on the MCPI in the long run. When the literature is examined, it is seen that there is a cointegration relationship between feed prices and meat prices in previous studies conducted for Turkey, similar to this study. Arıkan et al. (2019) reached a cointegration relationship between broiler feed prices and broiler meat prices, while Çoban et al. (2019) found a cointegration relationship between corn prices and wholesale beef prices. Although cointegration relations have been determined for various feed materials and meats, no study has been found that investigates the effect of feed prices on meat and meat product prices for Turkey from a general perspective.

The long-run elasticity of FPI is very close to the unit elasticity, but it is inelastic (0.97). In a recent study examining the long-run effect of the AIPI on the FCPI (Food and Non-alcoholic Beverages Price Index, the agricultural input price elasticity was calculated in the range of 1.30–1.36 (Işık & Özbuğday, 2021). The dissimilarity of these results may be related to the differences between the datasets used for the studies. Further studies examining the effect of agricultural input prices on food consumer prices will contribute to a better understanding of the relationships between the variables.

While the Granger causality test shows that the FPI is the Granger cause of the MCPI, it is determined that the MCPI is not the Granger cause of the FPI, that is, there is no feedback relationship between the variables. The results obtained are consistent with the previous study for Turkey since the direction of causality is from feed price to meat price (Mat et al., 2020). When the studies conducted in the USA on this subject are examined, it has been found that meat prices are the Granger cause of grain prices used as feed, and there is a feedback relationship between these types of variables (Musunuru, 2017; Pozo & Schroeder, 2012). The one-way Granger causality relationship obtained in the Turkish example can be associated with the high rate of input imports in the feed market in Turkey. It is quite possible that the FPI will be affected by the world price of the imported goods rather than the supply–demand mechanism in the country because of imports for feedstuffs. However, the differences observed between the two markets can also be explained by the fact that the data used in other studies (Musunuru, 2017; Pozo & Schroeder, 2012) are futures prices, and the data used in this study are MCPI prepared based on consumer prices. Therefore, more studies are needed to understand the effect of meat prices on feed prices in Turkey.

Conclusion and Recommendations

When the results are evaluated in general terms, it can be stated that feed prices have a significant effect on meat prices. Therefore, policies that prevent increases in feed prices are very important in preventing increases in meat consumer prices. Considering the studies predicting red meat consumption and poultry meat consumption would increase significantly in the coming years (OECD, 2021; Özen, 2019), the feed crop production and feed industry should be supported effectively. In this context, policies should be implemented to ensure stability in diesel and fertilizer prices, which constitute a significant part of the input costs in feed crop production. In addition, reducing the import of red meat and butchery animals is beneficial, which is another problem that negatively affects the producer. However, considering that the demand for meat will increase and it will take time to solve the structural problems in the livestock sector, it makes sense to reduce imports within time so that consumers are not adversely affected by this situation.

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