JOURNAL OF ANIMAL PRODUCTION
Hayvansal Üretim
ISSN 1301-9597
e-ISSN 2645-9043
Published by Ege Animal Science Association
www.journalofanimalproduction.com

Research Article

Received: 05.05.2025 Accepted: 01.07.2025 Final Version: 01.07.2025

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Egg Poultry in Türkiye and Egg-Feed Relationship#

ABSTRACT

Objective: The aim of this study was to analyze the current situation of the laying hen sector and the egg-feed relationship in Türkiye between 1996 and 2024.

Materials and Methods: In this study, the amount of compound feed produced for laying animals (tons), compound feed price (dollar), number of laying animals (number) and amount of eggs produced (thousand eggs) obtained from the Ministry of Agriculture and Forestry and TURKSTAT data for the period 1996-2024 were evaluated. Quadratic regression model was preferred and Pearson correlation analysis was also used.

Results: The p-values of all models used were significant. The effects of layer feed production (ton) on egg production (R2 0.881), layer feed production (ton) on the number of laying hens (R2 0.921) and the number of laying hens on egg production (R2 0.921) were highly significant and positive. In Türkiye, all the relationships between the variables of egg feed, egg feed price, number of laying hens and quantity of eggs produced were found to be significant and high. The highest correlation was found between the amount of eggs produced and the number of laying hens (0.966). Egg feed price was found to be a determining factor with a decreasing effect relative to the other factors.

Conclusion: Although fluctuations in the price of eggs in Türkiye have a negative effect on feed production and the number of laying animals and eggs produced, this level was not statistically significant. In Türkiye, chicken eggs are highly preferred as a cheap source of protein and their consumption can be expected to increase in the coming years with the increase in population.

Keywords: Laying hens, eggs, compound feed, compound feed price, egg-feed relationship

Türkiye'de Yumurta Tavukçuluğu ve Yumurta-Yem İlişkisi

ÖZ

Amaç: Bu çalışmanın amacı, 1996-2024 yılları arasında Türkiye'de yumurta tavukçuluğu sektörünün mevcut durumunu ve yumurta-yem ilişkisini analiz etmeyi amaçlamaktadır.

Materyal ve Method: Bu çalışmada, 1996-2024 yılları arasında Tarım ve Orman Bakanlığı ile TÜİK verilerinden elde edilen yumurtacı hayvanlar için üretilen karma yem miktarı (ton), karma yem fiyatı (dolar), yumurtacı hayvan sayısı (adet) ve üretilen yumurta miktarı (bin adet) değerlendirilmiştir. Kuadratik regresyon modeli tercih edilmiş ve ayrıca Pearson korelasyon analizlerinden yararlanılmıştır.

Bulgular: Kullanılan tüm modellerin p değeri önemli bulunmuştur. Yem-yumurta paritesinin yumurta üretimine (R2 0,881), yumurta yemi paritesinin yumurta tavuğu sayısına (R2 0,921) ve yumurta tavuğu sayısının yumurta üretimine (R2 0,921) etkileri yüksek düzeyde ve pozitif yönde belirlenmiştir. Türkiye'de yumurta yemi, yumurta yemi fiyatı, yumurta tavuğu sayısı ve üretilen yumurta miktarı değişkenleri arasındaki tüm ilişkiler önemli ve yüksek bulunmuştur. En yüksek korelasyon ise üretilen yumurta miktarı ile yumurta tavuğu sayısı arasında belirlenmiştir (0.966). Yumurta yem fiyatı ise diğer faktörlere nisbi olarak düşürücü bir eki yapmış ve belirleyici bir faktör olarak ortaya çıkmaktadır.

Sonuç: Türkiye'de yumurtanın fiyatında meydana gelen dalgalanmalar her ne kadar yem üretimini ve yumurtalayan hayvan ve üretilen yumurta sayısına olumsuz etki yapsa da bu düzey istatistiki açıdan önemli bulunmamıştır. Türkiye'de tavuk yumurtası, ucuz protein kaynağı olarak çok fazla tercih edilmektedir ve tüketiminin önümüzdeki yıllar itibarıyla da nüfusun artması ile birlikte artış eğiliminde olması beklenebilir.

Anahtar Kelime: Yumurta tavuğu, yumurta, karma yem, karma yem fiyatı, yumurta-yem ilişkisi

How to cite:

Mert S. (2025) Egg poultry in Türkiye and egg-feed relationship. Journal of Animal Production, Vol: 66 (1): 65-72 https://doi.org/10.29185/hayuretim.1692006

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INTRODUCTION

Chicken breeding in Türkiye started in 1930s with the establishment of the Central Poultry Institute in Ankara. In the 1950s, efforts were made to develop village poultry farming. In the 1970s and 1980s, production and research institutions were established for the development of modern poultry production, and the establishment of modern production facilities was encouraged through the Resource Utilization Support Fund and feed support. During this period, an important structural change was achieved with the increase in integrated facilities and the introduction of contract production. With the investments made in the sector in the 1990s, the number and production capacity of modern production facilities increased rapidly and high standard production became widespread. In the 2000s, investments continued and production at European standards became widespread.

Today, the poultry sector in Türkiye has become an important production branch that can make its own production planning and meet a large part of the country's animal protein requirement in a cheap, healthy and high quality way. In Türkiye, 98.6% of the 374 million poultry population in 2023 was composed of chickens with the largest share (Gülaç, 2024a; TÜİK, 2025). It can be said that egg poultry in Türkiye has an integrated production structure with good organization. However, the import of input resources such as raw feed materials and hatching eggs slows down the growth momentum in the sector. The fact that domestic consumption of egg poultry is lower compared to developed countries ranks first among the other factors hindering its growth (Gülaç, 2024a; USDA, 2024). The production of chicken eggs in Türkiye in 2023 was 20.6 billion eggs and 11.4% of the incubated eggs were for laying hen chick production and 83.3% of the 222 thousand tons of shell egg exports in the same year were chicken eggs (TÜİK, 2025).

According to FAO data, world chicken egg production decreased by 0.6% to 82 million tons in 2022 compared to the previous year, while Türkiye saw a 2.7% increase (FAO, 2024). The Netherlands, which meets a significant portion of world chicken egg exports, is the leader with 238 thousand tons of chicken egg exports in 2022. Türkiye ranks ninth in production and third in exports, with a per capita egg consumption of 156 eggs.

The effects of the COVID-19 pandemic and avian influenza, which had a worldwide impact but have diminished in recent years, continue to affect the poultry sector through labor cost increases and feed costs (USDA, 2023a).

This study aims to analyze the current situation of the laying hen sector in Türkiye and the egg-feed relationship in detail. The study aims to assess the impact of feed prices on egg production and consumption, hence the effects of foreign dependency on sectoral growth and the sustainability of egg poultry.

MATERIAL and METHODS

The relationships between egg production, number of laying hens and egg feed costs related to egg poultry in Türkiye were examined in this study. The data reported by the Turkish Statistical Institute (TurkStat, 2025) on egg poultry production between 1996 and 2024 were used (Table 1). For this purpose, quadratic regression model was preferred as it provided the best fit in explaining the relationships between egg production, number of laying hens and egg feed costs and Pearson correlation analysis was also used. IBM SPSS v25 program was used in statistical analyses.

Quadratic regression models

In order to examine the relationship between layer feed production (tons) and the number ofeggs produced (pieces), the quantity of eggs produced (Y) was taken as the dependent variable, and the amount of layer feed (tons) (X) was taken as the independent variable.

Model 1

$$Y= 7871287{,}292 + 10{,}940\ X - 2{,}497E(-6)\ X2$$

Model 2 was created to analyze the effect of ayer feed production (ton) on the number of laying hens. The number of laying hens (Y) was selected as the dependent variable and layer feed production (ton) (X) was used as the independent variable.

Model 2

$$Y = 28627311{,}086 + 85{,}412\ X - 2{,}076\ E(-5)\ X2$$

To evaluate the effect of the number of laying hens on egg production, the amount of eggs produced (Y) was selected as the dependent variable and the number of laying hens (X) was used as the independent variable.

Model 3

$$Y = -273612{,}450 + 0{,}234\ X - 5{,}471E(-10)\ X2$$

Table 1. Egg poultry production in Turkey between 1996 and 2024 (TUİK, 2025)
Tablo 1. Türkiye'de 1996-2024 yılları arasında yumurta tavukçuluğu (TÜİK, 2025)

Years	Layer Feed (tons)	Layer Feed Cost (tons TL)	Number of Layer Hens	Eggs Produced, 1000 pieces
1996	561498	26	53 883 070	9787220,00
1997	510944	52	61 401 783	12089341,00
1998	603624	71	69 722 271	13887864,00
1999	581701	108	71 885 207	14090023,00
2000	535408	135	64 709 040	13508586,00
2001	484152	232	55 675 750	10575046,00
2002	411610	323	57 139 257	11554910,00
2003	429451	390	60 399 520	12666782,00
2004	411592	431	58 774 172	11055556,73
2005	360771	401	60 275 674	12052455,11
2006	316054	415	58 698 485	11733572,20
2007	419362	495	64 286 383	12724958,56
2008	437838	594	63 364 818	13190696,28
2009	461701	590	66 500 461	13832726,47
2010	502646	640	70 933 660	11840396,04
2011	564910	740	78 956 861	12954685,67
2012	638583	810	84 677 290	14910773,95
2013	805766	910	88 720 709	16496751,18
2014	1340217	1020	93 751 470	17145389,09
2015	1957692	1040	98 597 340	16727509,63
2016	1337224	1070	108 689 236	18097604,95
2017	1719070	1220	121 556 027	19281195,84
2018	1859413	1540	124 054 810	19643711,48
2019	2080774	1720	120 725 299	19898126,08
2020	1688035	2190	121 302 869	19788062,82
2021	1984519	3310	121 000 775	19297591,48
2022	1951311	7340	109 806 327	19808538,82
2023	1849782	9110	114 476 843	20637732,44
2024	1957319	12960	116 516 879	21831896,00

Correlation Analysis

Pearson correlation analysis was applied to evaluate the relationships between variables. The analysis was performed between the variables of layer feed production (ton) (feed_egg), feed price-egg parity (feed_price_egg), number of laying hens (egg_animal_number) and quantity of eggs produced (produced_egg). The significance of the correlation coefficients was tested at 0.01 level (2-tailed).

RESULTS and DISCUSSION

The statistical significance of each model was evaluated with the F-test and the p-value of all models was found to be less than 0.05 (Sig. = 0.000), indicating that the models were significant. The explanatory level of the models was measured by R^2 values. The effect of layer feed production (ton) on egg production in Türkiye is highly and positively explained by Model 1 (R2 0.881). It is observed that as the production of egg feed increases, the number of eggs produced also increases, reaching a peak of approximately 20 million eggs with a feed production capacity of approximately 2 million tons (Figure 1).

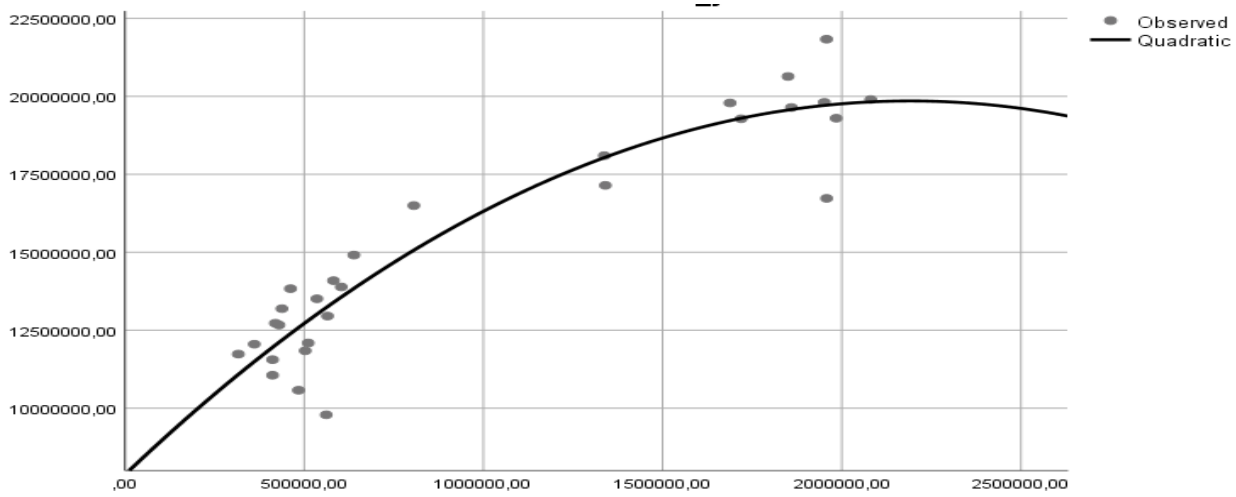

Figure 1. Effect of layer feed production (ton) on egg production
Şekil 1. Yem-yumurta üretiminin yumurta üretimine etkisi

The effect of Türkiye's egg feed parity on the number of laying hens has been determined to be high (R2 0.921) and positive with Model 2.

The effect of Türkiye's egg feed parity on the number of laying hens has been determined to be high (R2 0.921) and positive with Model 2. As the number of laying hens increases, egg feed also increases, reaching approximately 118 million laying hens with an approximate feed production capacity of 2 million tons (Figure 2).

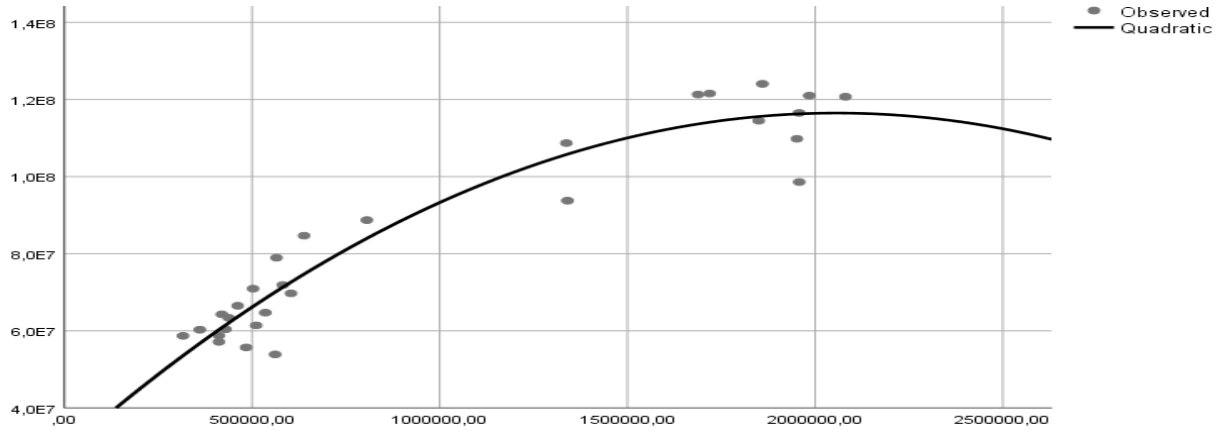

Figure 2. Effect of layer feed production (ton) on the number of laying hens
Şekil 2. Yem-yumurta üretiminin yumurta tavuğu sayısına etkisi

As seen in Figure 1 and Figure 2, there is a relative decrease in the increases that occur when the egg feed production approaches 2.5 million tons. The decrease in the same egg feed capacity after the peak can be explained by the fact that due to the economic crisis and the avian flu in recent years, the growth in the egg poultry industry has stopped and this has affected both the number of laying hens and the number of eggs produced.

When the effect of the number of laying hens on egg production was evaluated, the relationship between them was explained at a high level (R2 0.921) and positively (Model 3). As the number of laying hens increases, egg production also increases (Figure 3). This is only possible when there is maximum utilization of laying hens. Therefore, it can be concluded that managerial tasks such as feeding and health protection are carried out properly in laying hen farms in Türkiye.

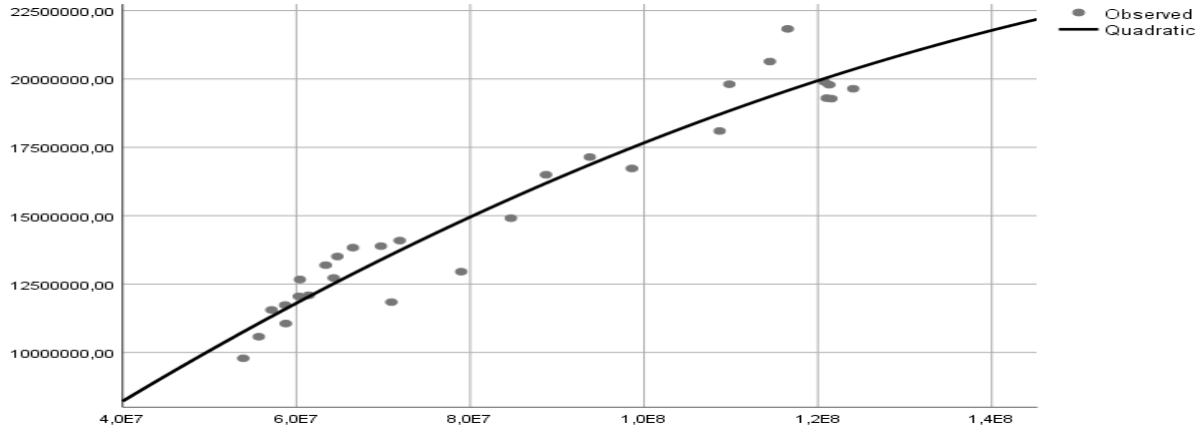

Figure3. Effect of number of laying hens on egg production
Şekil 3. Yumurta tavuğu sayısının yumurta üretimine etkisi

In Türkiye, all the relationships between the variables of egg feed, egg feed price, number of laying hens and quantity of eggs produced were found to be significant and high. The highest relationship was found between the amount of eggs produced and the number of laying hens (0.966). In the next ranking, the relationships between egg feed, number of laying hens and quantity of eggs produced were highly significant. Egg feed price was found to be a determining factor with a decreasing effect relative to the other factors (Table 2).

Table 2. Relationships between the variables of egg feed, egg feed price, number of laying hens and amount of eggs produced
Tablo 2. Yumurta yemi, yumurta yemi fiyatı, yumurta tavuğu sayısı ve üretilen yumurta miktarı değişkenleri arasındaki ilişkiler

		feed_egg	feed_price_egg	egg_animal_count	produced_egg
feed_egg	Pearson Correlation	1	,625**	,947**	,929**
	Sig. (2-tailed)		,000	,000	,000
	N	29	29	29	29
feed_price_egg	Pearson Correlation	,625**	1	,568**	,682**
	Sig. (2-tailed)	,000		,001	,000
	N	29	29	29	29
egg_animal_count	Pearson Correlation	,947**	,568**	1	,966**
	Sig. (2-tailed)	,000	,001		,000
	N	29	29	29	29
produced_egg	Pearson Correlation	,929**	,682**	,966**	1
	Sig. (2-tailed)	,000	,000	,000	
	N	29	29	29	29

****. Correlation is significant at the 0.01 level (2-tailed).**

Feed costs constitute the largest part of the production costs of the poultry sector in Türkiye with 68.0%. Chick expenses account for 15.9% of production costs. Egg feed constitutes 33.1% of the poultry feed produced (TÜRKİYEM-BİR, 2023). Corn and soybean are the main feed raw materials used in poultry farming. The fact that most of these raw materials are imported increases feed costs. In 2023, corn production in Türkiye increased by 25.9% compared to the previous year and reached 8.5 million tons, while corn imports increased by 18.1% compared to the previous year and reached 2.7 million tons. Soybean production in 2023 decreased by 14.8% year-on-year to 155 thousand tons. The amount of soybeans imported was 2.9 million tons, an increase of 15.8% compared to the previous year. In 2023, 24.1% of domestic corn and 94.9% of soybeans were imported (Gülaç, 2024a; TÜİK, 2025). This situation increases the cost of production and reduces the chance of competition in foreign trade. Feed and raw material prices in Türkiye have generally been on an upward trend over the years. Since compound feed prices also increase in line with feed raw material prices, a similar upward trend is also observed here. In 2023, the ton price of egg feed in Türkiye increased by 24.1% to 9,110 TL (TÜRKİYEM-BİR, 2023). Since Türkiye is foreign-dependent in terms of feed raw materials, the increase in exchange rates greatly affected feed prices in 2021 and 2022 and the highest increase was observed in this period. Recently, the increasing demand from Russia and the Middle East has led to a significant increase in imported breeding prices. This leads to increased costs for producers in Türkiye (USDA, 2023b; Gülaç, 2024a).

Although the number of laying hens in Türkiye is decreasing today, it has continued to increase since 2010, reaching its highest level of 121 million in 2020 and 2021. The number of laying hens, which has stagnated for the last three years and constitutes 29.9% of poultry, decreased by 9.3% in 2022 compared to the previous year and reached 110 million. The embargo imposed by Iraq on egg exports is one of the factors for the decrease in the number of laying hens. In 2023, it increased by 4.3% compared to the previous year and reached 114 million (TurkStat, 2025).

In 2023, 59% of the laying hen population was concentrated in three regions of Türkiye. The Aegean Region is the leader in terms of the number of laying hens, with 36.9 million, accounting for nearly one third of Türkiye's total. Western Anatolia ranks second with 17.6 million and Eastern Marmara ranks third with 12.9 million. In 2023, the highest decline is observed in the Northeast Anatolia and Aegean Regions, especially in the Western Black Sea Region (Gülaç, 2024a; TÜİK, 2025).

Almost all of the shell eggs exported in Türkiye are chicken eggs. In 2022, 86.9% of these eggs were table (fresh) eggs, while 17.4% were hatching and breeding eggs. In 2023, fresh egg exports declined to 78% while breeder exports increased to 22% (TurkStat, 2025). The amount of chicken egg exports in Türkiye decreased significantly in 2020-2022. While export losses with Iraq were effective in this decrease, the decrease could not be prevented even though exports to different countries increased. Iraq's ban on egg imports in order to increase domestic production is the most important reason for this decline (Gülaç, 2024a).

The export value of chicken eggs in Türkiye was 403.3 million dollars in 2023 (TÜİK, 2025). Türkiye is a self-sufficient and exporting country in terms of chicken eggs, and while 29.7% of eggs produced in 2018 were exported, this ratio has decreased in the last four years. In 2023, 15.6% of the eggs produced were exported. The amount of egg imports in Türkiye has decreased. Türkiye is dependent on imports in terms of breeder eggs and all of its egg imports consist of hatching/breeder eggs. Hatching eggs are mostly imported from the UK, the US and Canada, while day-old chicks are imported from Germany, the UK and the US. These imports are of great importance for the sustainability of the domestic market (USDA, 2023b). In 2023, the amount of imported hatching/breeding eggs was 2,248 tons. Türkiye produces enough eggs to meet domestic demand and egg consumption is met only from domestic production. Iraq, which has an important place in world egg imports, continues to decrease its egg imports as of 2024. Türkiye's egg production started to increase in 2022 and 2023 after the decrease in 2021 (Gülaç, 2024b).

In some studies, on egg consumption in Türkiye, quality, price, taste, production date, producer company, packaging and advertisement are the most important factors in consumption preference (Parlakay et al., 2017). Durmuş et al. (2007) and Avcılar et al. (2023) reported that the packaging was effective and that the gelatin-coated 30-cell trays were more demanded. However, consumers now prefer ecological chicken products because of their “healthiness and reliability” (Armağan and Özdoğan, 2005; Avcılar et al., 2023). It has been determined that shell color is mostly ignored when purchasing eggs, while egg yolk is mostly preferred as dark yellow (Avcılar et al., 2023).

Egg consumption in Türkiye in 2022 increased by 3.5% compared to the previous year and reached 1 million tons (TÜİK, 2025). Per capita egg consumption increased by 27% compared to the previous year and reached 15.1 kg. In 2020 and 2021, the supply and utilization of eggs tended to decline, but then started to increase in 2022 and onwards. In 2023, the supply and use of eggs in Türkiye was 1.2 million tons (Gülaç, 2024a; TÜİK, 2025).

When the chicken egg/feed parity is analyzed, it is observed that the parity decreases in 2023 and 6.55 kg of egg feed, 4.17 kg of soybean and 10.44 kg of corn can be purchased with 1 parcel (30 eggs) of chicken eggs in 2023. In 2023, chicken egg/egg feed parity increased by 61.9%, chicken egg/soya parity by 46.6% and chicken egg/corn parity by 10.4% compared to the previous year (based on the producer price of 1 carton of chicken eggs) (Gülaç, 2024b; TÜİK, 2025). The increase in costs continues to have an impact on prices.

However, the egg sector continues to be the most affected by the outbreak of highly pathogenic avian influenza (HPAI) in Türkiye as in the world (USDA, 2023a).

In Türkiye, rising feed prices, import dependency, avian influenza, and export restrictions are affecting growth in the egg poultry sector. Sarıözkan (2022) noted that imported raw materials account for more than 70% of feed production and that exchange rate fluctuations increase feed prices, thereby reducing competitiveness.

Erdem and Şahin (2023) reported that highly pathogenic avian influenza (HPAI) caused 5-7% losses in egg production between 2020 and 2023 and, combined with Iraq's import bans, slowed sectoral growth. In terms of consumption habits, there has been an increase in demand for organic eggs; Parlakay and Yılmaz (2024) reported that this demand increased by 15% in the Aegean and Marmara regions and that health and safety concerns shaped consumption. Additionally, Çelik and Koç (2023) emphasized that Iraq's import ban caused a 10-15% decrease in egg exports and that foreign trade policies require regional cooperation for sustainability (Gülaç, 2024a; TÜİK, 2025).

CONCLUSIONS

In Türkiye, chicken eggs are highly preferred as a cheap source of protein and their consumption is expected to increase in the coming years with the increase in population. The increase in avian influenza, which is widespread in Türkiye, in recent years, coupled with the economic crisis, has hindered the progress of the egg poultry sector. This led to an increase in egg prices in the first quarter of 2025, and if exports continue to decline, excess supply is expected to slow the rate of increase in egg prices.

Although fluctuations in the price of eggs in Türkiye had a negative impact on feed production and the number of laying animals and eggs produced, this level was not statistically significant. However, the prices of feed raw materials play a major role in the formation of feed prices in Türkiye. Since most of the feed raw materials are imported, exchange rate increases are also the most important factor in determining feed prices. The realization of the maximum egg production that can be obtained from laying hens raised in laying hen houses is an indication that both the appropriate breeds are used and the managerial conditions are carried out under optimum conditions.

Acknowledgements: We are grateful for the support of Baran Medical (Ankara, Türkiye) in the analysis of antioxidant defence mechanism, oxidative stress and immune response.

Data availability: Data will be made available upon reasonable request.

Author contributions: -

Competing interests.: -

Ethical statement: The author declares that there is no need for an animal experiment ethics committee for this research article.

Financial support.: -

Article description: This article was edited by Editor Çağrı KANDEMİR.

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