Research Article

Analysis of Egg Poultry Enterprise in Southeastern Anatolia Region in Turkey

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ABSTRACT

In this paper, in Southeastern Anatolia of Turkey, the technical structure of enterprises engaged in the egg producing, such as firm characteristics, hens characteristics, egg farming and health-protection were investigated. For this purpose, in the Southeastern Anatolia Region, the provinces of Gaziantep, Diyarbakır, Şanlıurfa, Batman, Adıyaman, Mardin and Kilis were included in the study. The enterprises surveyed in these provinces were determined using the simple random sampling method. As a result of this statistical study, a survey was conducted in determined 17 enterprises. It was reported that in recent years an increase in the number of enterprises established has been determined in Southeastern Anatolia Region. The vast majority of them have modern enterprises. In general, the enterprises in the region are concluded to have similar properties, the structural and technical specifications. It was observed during the fields investigation that the main problems of the enterprises in the region are raised the disease, the feeding, the marketing, animal material, the education of workers and the climatic conditions. These mentioned egg poultry farming should be solved by supplying economical funds, educational programs and supporting the enterprises with leading edge technologies.

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INTRODUCTION

The egg poultry farming is definitely an important farming activity due to playing crucial roles in economic and political areas. The egg poultry farming also helps to reduce unemployment in the countries. The egg industry has been reported to be a part of the agriculture, as it has completed its industrialization, produces high-quality outputs, provides employment opportunities and export enterprises (Dogan *et al.*, 2018). Costantini *et al.* (2021), reported that more research is needed in order to understand

the performance of this sector that is still limited in some respects, which were highlighted. Also, economic and social aspects should have to be increasingly taken into consideration in the life cycle perspective. Among the livestock-based enterprises, poultry occupies an important position because of its enormous potential to bring about rapid food security, economic growth and development (Ekunwe, 2006). Poultry production is the easiest, fastest and most economic means of bridging the animal protein deficiency gap, unemployment and poverty in the developing countries (Ahmadu and Giroh 2013).

Promising developments are observed in the sector in egg production enterprises, especially through various enterprises and cooperatives established in some regions. Today, especially laying hens stay in the poultry house during the whole breeding period. Therefore, in the productivity, health and feed utilization abilities of chickens, in addition to rearing material and feeding, the control of indoor environmental conditions also has an important effect. The environmental conditions inside the shelter, which is called the shelter climate, consist of ventilation and lighting with ambient air temperature, relative humidity. The fact that these conditions are below or above the optimum limits negatively affects chicken health and thus yield (Alagöz, 1983). In another study carried out in Kastamonu region, it was reported that the structural traits of family or village poultry in the country show similarities with each other (Sarica *et al.,* 2020).

When the egg chickens' assets of various countries in the world are evaluated, it is seen that China ranks first with 3 137 132 000 laying hens. With this number of egg chickens, China alone meets 41.54% of the total egg chickens in the world. The number of egg chickens owned by the USA, which ranks second, is 399 656 000, which corresponds to 5.29% of the world's total egg chickens. India ranks third. India has 319 352 000 egg chickens, and this value corresponds to 4.23% of the world's total egg chicken assets. Our country, on the other hand, ranks eighth with its 120 725 000 egg chickens, which corresponds to 1.60% of the world's egg chickens. Our country is among the important countries in the world in terms of egg chicken's production. Egg chicken production quantities of various countries are shown in Table 1.

Table 1. Egg chicken production quantities of various countries (FAO, 2019).

Country ranking	Countries	Egg chicken (piece)	Ratio (%)
1	Çin	3 137 132 000	41.54
2	ABD	399 656 000	5.29
3	Hindistan	319 352 000	4.23
4	Endonezya	263 918 000	3.49
5	Brezilya	249 068 000	3.30
6	Meksika	207 182 000	2.74
7	Japonya	141 792 000	1.88
8	Türkiye	120 725 000	1.60
9	Ukrayna	97 800 000	1.30
10	Malezya	97 796 000	1.30
Top 10 countries total		5 034 421 000	66.67
Other countries		2 517 107 000	33.33
World total		7 551 528 000	100.00

When the asset of egg chickens in our country is evaluated according to the regions, Aegean region ranks first with its 41 672 296 egg chickens. While Central Anatolia Region ranks second with 27 716 371 egg chickens, the Marmara region ranks third with 17 913 022 egg chickens. Southeastern Anatolia Region, on the other hand, ranks fifth after the Black Sea region. The number of egg chickens of the Southeastern Anatolia Region is 9 460 376 and this amount corresponds to 7.80% of the total Turkish laying hens. Egg chicken assets of regions are given in Table 2.

Table 2. Number of egg chickens in our country by region (TÜİK, 2020).

Regions	2016	2017	2018	2019	2020
Ege	37 810 995	42 480 554	44 347 679	40 252 430	41 672 296
İç Anadolu	28 497 501	33 336 682	31 614 893	28 896 627	27 716 371
Marmara	17 467 376	19 635 656	18 409 881	19 698 242	17 913 022
Karadeniz	10 709 014	10 595 347	12 979 551	13 641 838	12 993 846
Güneydoğu Anadolu	5 661 601	6 228 252	7 078 669	8 049 182	9 460 376
Akdeniz	4 934 571	5 171 318	5 363 182	5 322 126	6 593 781
Doğu Anadolu	3 608 178	4 108 218	4 260 955	4 864 854	4 953 177
Total	108 689 236	121 556 027	12 405 4810	120 725 299	121302 869

A study has been carried out to estimate egg production rate of Gaziantep province in 2018-2025 periods, as the city may symbolize the Southeastern Anatolia Region, by observing the egg production in recent years, by using data of 1991-2017 periods (Uzundumlu and Kurtoglu, 2020). It was concluded that Gaziantep province has cost advantages for reasons like suitable climatic conditions for egg poultry, having a well-developed feed industry and also not being close to the leading cities of egg production. Gaziantep province gradually increasing its share in egg production has four organic fertilizer plants which were established 2015-2019 years. This shows that it is thought that the number and capacity of these plants will increase with the growing production in the coming years Uzundumlu and Kurtoğlu (2020).

Aydın and Çelen (2017), reported that GAP (Southeastern Anatolian Project) provinces are in an extremely important position in the egg export of Turkey, to the northern part of Iraq, and almost all of the egg demand of the region is met from Turkey. Thus, there is a demand for enterprises that produce eggs at a level that can meet their egg needs.

With this study, a research was conducted on the technical structure of egg poultry in the Southeastern Anatolia Region. With this research, the general structure of the poultry in the region was tried to be determined by collecting the information of the egg poultry enterprises in the provinces of Gaziantep, Diyarbakır, Şanlıurfa, Batman, Adıyaman and Mardin.

MATERIALS AND METHODS

Within the scope of this study, it was aimed to reveal the technical structure, management characteristics, poultry characteristics, breeding and health-protection forms and problems of the egg poultry enterprises in the region.

The data on the technical, structural and improvement aspects of the poultry houses in the provinces where the study was conducted were determined by the survey study. Ethics Committee Approval Decision was taken in the study.

The southeastern Anatolia region is one of the seven geographical regions of Turkey and includes the provinces of Gaziantep, Diyarbakır, Şanlıurfa, Batman, Adıyaman, Siirt, Mardin, Kilis and Şırnak. The southeastern Anatolia region is surrounded by Eastern Anatolia region to the East and North, Mediterranean region to the west, Syria to the south and Iraq with a short border (Anonymous, 2021). The map of the Southeastern Anatolia Region where this study was carried out in is shown in Figure 1.

Figure 1. Southeastern Anatolia Region provinces map (HGM, 2021).

The number of large-capacity and closed-type structure egg chicken breeding enterprises in the provinces located in the Southeastern Anatolia Region is 52. The total capacity of these enterprises is 6.105.450. The enterprises where laying hens are raised in the Southeastern Anatolia Region and their capacities are given in Table 3.

Table 3. Number and capacity of egg chicken breeding enterprises (Anonymous, 2018; Anonymous, 2020).

Provinces	Number of enterprises	Capacity
Gaziantep	19	4 330 500
Mardin	7	1 008 700
Diyarbakır	11	254 900
Şanlıurfa	8	248 900
Batman	3	190000
Adıyaman	1	40 000
Kilis	1	30 000
Şırnak	2	2 450
Siirt	0	0
Total	52	6 105 450

In this study, the simple random sampling method was used to determine the number of questionnaires that were carried out under field conditions. In this method, for a finite population of size N, if we want to do sampling according to the known or predicted ratio (p) of those having a certain property, our sample volume formula is as follows:

$$n = \frac{Np(1-p)}{(N-1)\sigma_{p_x}^2 + p(1-p)} \tag{1}$$

Here p is the population ratio of the feature we are working on. p can be derived from previous research or experience, or it can be predicted intuitively. To reach the maximum sample volume, it should be taken p=0.5. Less or higher values of p than 0.5 reduce the sample volume. Therefore, in the cases where p is not known, it can be suggested to take p=0.5, since working with maximum sample volume that will reduce the possible error. $\sigma_{p_x}^2$ is the variance of the ratio. Regardless of the actual rate, we might want this to extend the confidence interval at any desired probability level further by a certain r on either side of the sample rate. In this case, we can obtain the $\sigma_{p_x}^2$ parameter as follows:

$$Z_{\alpha/2}\sigma_p = r \tag{2}$$

For 95% confidence interval and 0.20 margin of error of population ratio, $1,96\sigma_p = 0.20$, $\sigma_p = 0.10204$ ([Miran, 2003]).

When we apply the mentioned equation to the total number of enterprises (N) it will be conclude that 17 enterprises should be included in the study.

$$n = \frac{52(0.5)(0.5)}{(52-1)(0.10204)^2 + (0.5)(0.5)} \cong 17 \text{ enterprices}$$

Şırnak province, which has a very low production capacity, and Siirt province, where there are no enterprises, are not included in the survey studies we conducted within the scope of the studies. The survey studies were carried out in 7 provinces, namely Gaziantep, Mardin, Diyarbakır, Şanlıurfa, Batman, Adıyaman and Kilis.

RESULTS AND DISCUSSION

In the number of daily egg production, Gaziantep province ranks first with 1 490 000 eggs, and it alone meets 59.89% of the total daily egg production. The daily egg production of the province of Mardin, which ranks second, is 330 000 pieces, and its ratio in total egg production is 13.26%. The province of Diyarbakır, which is in the third place, has a daily egg production capacity of 288 000 pieces and its rate in the total production is 9.16%. The total egg production of the enterprises in Gaziantep, Mardin and Diyarbakır provinces meets 82.31% of the total egg production of the enterprises examined in the region. The distribution of the production capacities of the egg enterprises in the Southeastern Anatolia Region according to the enterprises and provinces is shown in Table 4.

Table 4. Daily total egg production of the enterprises

Provinces	Enterprise capacity (Daily egg production)					Total	Ratio in total business
	Enterprise 1.	Enterprise 2.	Enterprise 3.	Enterprise 4.	Enterprise 5.		
Gaziantep	160 000	180 000	1 000 000	60 000	90 000	1 490 000	59.89
Mardin	60 000	60 000	210 000	-	-	330 000	13.26
Diyarbakır	50 000	28 000	150 000	-	-	228 000	9.16
Batman	90 000	40 000	60 000	-	-	190 000	7.64
Şanlıurfa	180 000	-	-	-	-	180 000	7.23
Adıyaman	40 000	-	-	-	-	40 000	1.61
Kilis	30 000	-	-	-	-	30 000	1.21
					Total	2 488 000	100.00

It has been determined that all enterprises are doing cage-type breeding throughout the region. Apartment cage method is used in all egg production enterprises. Generally, cage floors are 4 or above. It has been determined that more than half of the cages found throughout the region are consist of 4 or 6 floors. The number of cage floors is less than 4 only in 1 enterprise in Diyarbakır. It has been determined that businesses with relatively newer technology have 6 floors cages. In the province of Mardin, which generally has newer enterprises, the number of cage floors of the poultry houses is 6, which is higher than those in other provinces. The type of cultivation, cage type and distribution of the cage floor in the enterprises are shown in Table 5. The set up stage of an additional cage in Mardin Province is shown in Figure 2.

Table 5. Type of cultivation, cage type and distribution of cage floor in enterprises.

Provinces	Cultivation style	Cage type	Cage floor			
	Cage	Apartment	<4	4	5	6
Gaziantep	5	5	-	3	1	1
Mardin	3	3	-	-	-	3
Diyarbakır	3	3	1	-	1	1
Batman	3	3	-	1	2	-
Şanlıurfa	1	1	-	1	-	-
Adıyaman	1	1	-	1	-	-
Kilis	1	1	-	1	-	-
Total	17	17	1	7	4	5

Figure 2. Set up stage of additional cage in Mardin province.

When the cage type in the enterprises examined, it was observed that the closed-type cage system was applied in 15 enterprises. In 2 enterprises, open-type cage system was preferred. When the egg poultry enterprises are evaluated according to the long axis directions of the coops, it has been determined that the houses in 9 enterprises are located in the north-south direction, and the houses in 8 enterprises are located in the east-west direction. The distribution of cage type and structure long axis direction of are given in Table 6.

Table 6. Distribution of cage type and structure long axis direction of enterprises.

Provinces	Cage type		Structure long axis direction	
	Open	Closed	East-West	North-South
Gaziantep	-	5	3	2
Mardin	-	3	-	3
Diyarbakır	-	3	1	2
Batman	2	1	2	1
Şanlıurfa	-	1	-	1
Adıyaman	-	1	1	-
Kilis	-	1	1	-
Total	2	15	8	9

When the average cage widths of cage systems in poultry enterprises are examined; cage widths were determined to vary between 12.0 m and 15.6 m in general. The average cage widths of the poultry houses in Şanlıurfa province are above the general average of the region and measured as 50.0 m. The distribution of average cage widths by enterprises is shown in Table 7.

Table 7. Distribution of average cage widths by enterprises.

Provinces	Poultry enterprises					Average cage widths (m)
	Enterprise 1.	Enterprise 2.	Enterprise 3.	Enterprise 4.	Enterprise 5.	
Gaziantep	12	12	20	12	12	13.6
Mardin	12	16	19	-	-	15.6
Diyarbakır	14	10	18	-	-	14.0
Batman	16	12	15	-	-	14.3
Şanlıurfa	50	-	-	-	-	50.0
Adıyaman	12	-	-	-	-	12.0
Kilis	12	-	-	-	-	12.0

When the average cage lengths of cage systems in poultry enterprises are examined, cage widths were determined to vary between 57.3 m and 100.0 m in general. Cage lengths of poultry houses in Şanlıurfa province are greater than cage lengths of poultry houses in other provinces, and average cage lengths were measured as 100.0 m. The distribution of average cage lengths by enterprises is shown in Table 8.

Table 8. Distribution of average cage lengths by enterprises.

Provinces	Poultry enterprises					Average cage lengths (m)
	Enterprise 1.	Enterprise 2.	Enterprise 3.	Enterprise 4.	Enterprise 5.	
Gaziantep	60	60	80	60	60	64.0
Mardin	90	90	100	-	-	93.3
Diyarbakır	57	60	55	-	-	57.3
Batman	70	50	60	-	-	60.0
Şanlıurfa	100	-	-	-	-	100.0
Adıyaman	60	-	-	-	-	60.0
Kilis	60	-	-	-	-	60.0

Roof insulation has been used in most of the egg production enterprises in the Southeastern Anatolia Region. While insulation was applied on the roofs in 15 of the coops in the enterprises examined in the region, it was determined that no insulation was applied on the roofs of the coops in 3 enterprises in Diyarbakır and Batman.

In most of the Southeastern Anatolia Region egg production enterprises, the roofing material is polyurethane panel (PU panel). Roof tile was used only in 1 enterprise in Batman, galvanized sheet in 2 enterprises and galvanized sheet roof cover material in was used 1 enterprise in Diyarbakır. Existence of roof insulation and type of roof covering material of enterprises are given in Table 9.

Table 9. Existence of roof insulation and roofing material of enterprises.

Provinces	Roof insulation		Roof material		
	Available	Not Available	Roof tile	Polyurethane panel	Other
Gaziantep	5	-	-	5	-
Mardin	3	-	-	3	-
Diyarbakır	2	1	-	2	1
Batman	1	2	1	-	2
Şanlıurfa	1	-	-	1	-
Adıyaman	1	-	-	1	-
Kilis	1	-	-	1	-
Total	14	3	1	13	3

It has been determined that the use of polyurethane panels as wall construction material is preferred in most of the poultry houses in the enterprises examined within the scope of field studies. While polyurethane panels were used in 11 (64.71%) of the existing poultry houses in the region, it was observed that briquettes were preferred as wall construction material in 6 (35.29%) poultry houses. Briquette is generally used as wall material in Batman and Diyarbakır. Approximately 1 meter of polyurethane panel wall building material were used in most of the enterprises in Gaziantep, Şanlıurfa, Mardin, and Adıyaman provinces. The distribution of the type of wall building material used by provinces is given in Table 10. Figure 3 shows the polyurethane panel wall building material in Mardin Province. Figure 4 shows briquette wall material used in Diyarbakır Province.

Table 10. Distribution of wall building material type.

Provinces	Wall building material	
	Briquette	Polyurethane panel
Gaziantep	-	5
Mardin	-	3
Diyarbakır	3	-
Batman	3	-
Şanlıurfa	-	1
Adıyaman	-	1
Kilis	-	1
Total	6	11

Figure 3. Polyurethane panel wall building material in Mardin province.

Figure 4. Briquette wall building material used in Diyarbakır province.

The average indoor temperature required for hen type Lohmann is between 18-22°C. There is a decrease in egg size, thinning in the shell, and a decrease in appetite in the temperature values after 22°C for the hen type Lohmann (Grashorn, 2016). When the temperature is low, the animal tries to warm up by consuming more feed to keep warm.

The Lohmann type is used in the vast majority of enterprises in the GAP region. Therefore, when looking at the values obtained from the enterprises, it has been determined that the average temperature values are between 18-22°C. House temperatures are regularly checked to keep them at the same values. Therefore, the heading, the middle and the end of the house were controlled with at least 3 thermometers mounted 50 cm above the floor. Natural ventilation systems were used in poultry house along with fans located at the center and ends of the poultry houses. Besides, poultry houses of all enterprises were located in the direction of wind. The proper ventilation of the poultry house will remove the pollutant and poisonous gases from the house that is it another crucial point to be considered.

It has been determined that all enterprises in Mardin, Batman, Adıyaman and Kilis use Lohmann breeds. It has been determined that only 1 enterprise in Gaziantep and Diyarbakır and Şanlıurfa use supernick chicken. The reasons why the Lohmann breed is preferred in the Southeastern Anatolia Region are that it is an industrial breed, has an annual yield of 280-320 eggs, eats less feed and gives more eggs, in other words, its high profit rate. In addition, its high adaptation to the climatic conditions of the region is also an important factor (Gavril and Usturoi, 2012). In the Southeastern Anatolia Region, it has been observed that approximately 82.35% of the laying hen species preferred by egg enterprises are Lohmann and 17.65% supernick. Different animal genotypes used in enterprises are shown in Table 11.

Table 11. Animal genotype used in enterprises.

Province	Genotype of the animals	
	Lohmann	Supernick
Gaziantep	4	1
Mardin	3	-
Diyarbakır	2	1
Batman	3	-
Şanlıurfa	-	1
Adıyaman	1	-
Kilis	1	-
Total	**14**	**3**

While pullets and chicks are generally preferred in the egg production enterprises in the Southeastern Anatolia Region, some enterprises have preferred the 2nd egg laying period chickens. Large enterprises produce their own chicks. For example, some enterprises in Gaziantep have very large production enterprises. Some enterprises use pullets. Unlike chicks and pullets, in Batman province, large enterprises buy laying hens whose egg yield has decreased due to the lack of capital, that is, the 2nd laying period chickens, and produce eggs by forced moulting method. The distribution of animal material used in the enterprises according to the provinces is given in Table 12.

Table 12. Distribution of animal materials used in enterprises by provinces.

Provinces	Animal materials		
	Chicks	Pullets	2nd laying hens
Gaziantep	5	-	-
Mardin	-	3	-
Diyarbakır	-	3	-
Batman	-	1	2
Şanlıurfa	-	1	-
Adıyaman	1	-	-
Kilis	1	-	-
Total	7	8	2

Since 88.24% of the visited egg production enterprises use closed cage system, they deploy an average of 16 hours of lighting per day with artificial lighting. Differently, 50% of surrounding of the poultry house in 2 enterprise in Batman province are open windows. For this reason, these two enterprises in Batman make their lighting only with sunlight. Therefore, the duration of lighting is shorter than other enterprises. The average lighting duration of chicken coops in the enterprises in Batman is 10 hours.

When the average egg production time of the enterprises was evaluated, it was seen that the egg production times ranged between 8 and 17 months. While the lowest average egg production period was 8 months in Batman, the highest average egg production period was recorded in Diyarbakır with 17 months. Egg enterprises want to feed their chickens during the period when egg yield is high. It is desirable to dispose of chickens in periods when egg production is low. in Batman province, unlikely, due to lack of capital, 2 enterprises use the chicken of the second laying period and the egg yield period is nearly 50% less. Average egg production periods of the enterprises are presented in Table 13.

Table 13. Average egg production period of the enterprises.

Provinces	Average egg production period (months)
Gaziantep	15.0
Mardin	15.0
Diyarbakır	17.0
Batman	8.0
Şanlıurfa	16.0
Adıyaman	16.0
Kilis	16.0
Average	14.7

The egg production efficiency of each enterprise was changed according to reason such as the selection of chicken breed, the adaptation of the breed to the geographical conditions, the feeding patterns and facility conditions. It is an expected result that the yields of each egg facility in the Southeastern Anatolia region will differ. However, except for the two enterprises in Batman, the egg production yield of the region showed an almost homogeneous distribution. While the highest average egg yield was recorded in Gaziantep and Mardin with 85%, the lowest average egg production was recorded in Batman with 65%. Since the enterprises in Gaziantep and Mardin provinces have relatively newer and more modern technology, the egg yield of the poultry houses in these enterprises is higher than the enterprises in other provinces. Due to the lack of capital of two of the enterprises in Batman province, the second laying hens use the forced way method. For this reason, egg yields of poultry houses in this province remained at lower levels compared to other provinces. Average egg yields of poultry enterprises are shown in Table 14.

Table 14. Average egg yield of poultry houses in enterprises.

Provinces	Average egg yield (hen house^{-1})
Gaziantep	85%
Mardin	85%
Diyarbakır	75%
Batman	65%
Şanlıurfa	80%
Adıyaman	80%
Kilis	80%
Average	**79**%

Since the purpose of the egg production enterprises is to reach the highest efficiency, the necessary, protein, energy, vitamin, mineral and anticoccidial content of the feed ration during the spawning period should be controlled and balanced. Egg yield increases or decreases at the rate of adaptation to these factors. The spawning period consists of 3 different periods in itself. In accordance with these periods, the enterprises should prepare the chicken feed in a controlled manner. In other words, the chicken should be fed appropriately in according to lifecycles and their weights. In order to obtain the highest amounts of eggs, the appropriate daily feeding must be applied by taking into account the conditions.

The average daily feed consumption of the enterprises during the spawning period has remained quite close to each other throughout the region. Considering the average feed consumption of the provinces, it has been identified that the highest feed consumption rate is in the enterprises in Şanlıurfa and Mardin with 130 and 126 gr. It has been determined that the lowest average feed consumption is applied in the enterprises in Diyarbakır province. It has been determined that the average daily feed consumption of the enterprises in the whole region is 117 g. The daily feed consumption values of the spawning period of the enterprises are given in Table 15.

Table 15. Daily feed consumption during the spawning period.

Province	Daily feed consumption during the spawning period (g)					
	Enterprise 1.	Enterprise 2.	Enterprise 3.	Enterprise 4.	Enterprise 5.	Average
Gaziantep	115	110	110	105	110	110
Mardin	120	150	110	-	-	126
Diyarbakır	110	100	115	-	-	108
Batman	120	120	110	-	-	116
Şanlıurfa	130	-	-	-	-	130
Adıyaman	120	-	-	-	-	120
Kilis	110	-	-	-	-	110
Average						117

There are 3 different feeding periods in laying hens. The first period of these is 19-45 weekly feed time, second period covers the 46-65 weekly feed time, and the third period covers the 65 weekly feed time and after. Since egg yield decreases after 65th week and the cost increases, egg production enterprises usually apply 1st and 2nd feeding periods. However, some enterprises also provide 3rd period feeding. Two of the enterprises in Batman province use the laying hens in the 3rd laying period with the moulting method because of the lack of capital. Feeding periods applied in production are presented in Table 16.

Table 16. Feeding periods applied in feeding during the production period.

Province	Feeding periods	
	Period 1 or period 2	Period 3
Gaziantep	5	-
Mardin	3	-
Diyarbakır	3	-
Batman	1	2
Şanlıurfa	1	-
Adıyaman	1	-
Kilis	1	-
Total	15	2

When the enterprises are evaluated according to the cage disinfection method, it has been determined that all of the enterprises use disinfectants for the cleaning of the cages, and none of the enterprises applies calcification or burning.

It has been observed that all businesses in the region use disinfectant drugs in the disinfection process. Before the animals came to the egg production facilities, it was determined that while the coops were empty in the facility, every equipment in the coop and the coop itself was cleaned, disinfected with necessary medicines, and dried. In addition, all enterprises except only 1 Enterprise in Gaziantep subject their tools and equipment to disinfection with disinfectant drugs.

All businesses in the region apply combination vaccines. In egg production enterprises, vaccination is usually performed on the first day of the pullet or chicks. The vaccination schedule and application patterns vary according to the environment and house conditions. For this reason, the needed vaccines are made at the appropriate time in a controlled manner. Since it can be applied easily in egg enterprises located in the Southeastern Anatolia Region and does not cause stress in animals, the vaccination method with drinking water is preferred. The types and periods of vaccines used are not fixed. Plague, typhoid fever, mixed vaccines can be made according to the need for a single vaccine and period in the interviews with the employees of the enterprise.

However, all enterprises make an initial vaccine upon arrival of the animals. The vaccine programs applied are given in Table 17.

Table 17. Vaccine application program in enterprises.

Provinces	Vaccine program	
	Initial vaccine	4 months of lower
Gaziantep	5	5
Mardin	3	3
Diyarbakır	3	3
Batman	3	3
Şanlıurfa	1	1
Adıyaman	1	1
Kilis	1	1
Total	17	17

CONCLUSION

In this study, the technical structure, management characteristics, poultry characteristics, breeding and health-protection characteristics of the egg poultry enterprises in the provinces of Gaziantep, Mardin, Diyarbakır, Batman, Şanlıurfa, Adıyaman and Kilis in the Southeastern Anatolia Region were revealed.

It has been determined that all enterprises are doing cage-type breeding throughout the region. Apartment cage method is used in all egg production enterprises. It has been determined that more than half of the cages found throughout the region are 4 floors and the remaining ones consist of 6 floors. It has been determined that businesses with relatively newer technology have 6-storey cages.

Especially in Gaziantep, there are enterprises with very high capacity. These enterprises have increased the egg production capacity of the region. The total daily egg production capacity of the enterprises visited in the whole region has been determined as 2 488 000 eggs. 59.89% of this capacity is located in the province of Gaziantep. The egg production capacity of the region has increased by 160% in the last 2 years.

Roof insulation has been used in most of the egg production enterprises in the Southeastern Anatolia Region. Roof insulation is not available only in 3 enterprises, 1 in Diyarbakır and 2 in Batman. The roofing material in most of the coops is polyurethane panel. Roof tile was used only in 1 enterprise in Batman, galvanized sheet in 2 enterprises and galvanized sheet roof cover material in 1 enterprise in Diyarbakır and Batman.

In the Southeastern Anatolia Region, it has been observed that approximately 82.35% of the laying hen species preferred by egg enterprises are Lohmann and 17.65% supernick. While pullets and chicks are generally preferred, some enterprises have preferred the second laying hen.

Average egg yield of all enterprises in the region has been determined as 79%. Since the enterprises in Gaziantep and Mardin provinces have relatively newer and more modern technology, the egg yield of the poultry houses in these enterprises is higher than the enterprises in other provinces with 85%. It has been determined that the average daily feed consumption of the enterprises in the whole region is 117 g.

It has been observed that all enterprises in the region use disinfectant drugs in the disinfection process. All enterprises in the region apply combination vaccines. In egg production enterprises, vaccination is usually carried out on the first day of the pullet

or chicks. The vaccination schedule and application patterns vary according to the environment and house conditions.

DECLARATION OF COMPETING INTEREST

The authors declare that they have no conflict of interest.

CREDIT AUTHORSHIP CONTRIBUTION STATEMENT

The authors declared that the following contributions are correct.
Fadile Aydın: Writing of original manuscript draft, data collection, writing and editing of manuscript, investigation.
Mehmet Fatih Celen: Conceptualization, methodology, data analysis, validation, analysis.

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