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ASSESSMENT OF THE ADIYAMAN LIVESTOCK INDUSTRY FROM THE PERSPECTIVES OF INDUSTRIALIZATION AND DEVELOPMENT

ABSTRACT

Türkiye's bovine livestock sector is vital to the economy and agricultural industry as it utilizes crops and products. The country's climate and geographical position enable simultaneous agricultural and livestock production, boosting profitability and job creation in rural areas. Livestock production also contributes to the production of essential commodities like meat, milk, eggs, and honey, which improve human nutrition. A study analyzing the livestock industry in Adıyaman province from 2015 to 2023 reveals its current and future growth potential, providing insights into agricultural development and sustainability. The study area is home to various animals, including beehives, mules, donkeys, turkeys, ducks, and rabbits. The results showed varying rates of growth. The study assessed the current and future growth potential of the sector by analyzing livestock, livestock enterprises, egg production, and honey production in Adıyaman province. It provided insights into agricultural development and sustainability with the number of enterprises and the number of livestock in enterprises from the central and 8 districts of Adıyaman province. The research aimed to provide a comprehensive understanding of the livestock industry's potential for growth and sustainability.

Keywords: Livestock Sector, Agriculture Sector, Sustainability, Enterprises-Economy and Agriculture, Livestock Sector in Adiyaman

1. INTRODUCTION

Optimal economic usage of the sectors is even more crucial in light of the rising demand for employment, the continued increase of our population, and the need to provide a healthy diet to the general public. It is the potential of local circumstances that dictate the disparities in regional development levels. Should be reduced by promoting economic activity and boosting employment [1]. To identify regional socioeconomic disparities, several characteristics must be considered, including population density and mobility [2].

When looking at the pastures' vegetation cover and the geographical circumstances of Türkiye, ovine breeding stands out as the most suited livestock activity. While fewer people are living in rural areas, there has been a corresponding drop in demand for goods made from sheep and goats [3]. Instead, a large percentage of Türkiye's livestock consists of sheep and goats. Not only does Türkiye have the highest concentration of sheep in Europe, but the percentage of cattle that are considered ovine ranges from 50 to 85 percent, with some variation among regions [4]. Türkiye's red meat production—a projected 2 million tons in 2021—ovine meat accounted for 24.6%, while 19.8% came from sheep and 4.8%

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from goats. Similarly, ovine animals accounted for 7.6% of the 23.2 million tons of raw milk output, while sheep and goats each contributed 4.9% and 2.7%, respectively [5]. Around the globe, 141 million people work in the milk production industry, which uses 253 million cows to generate 782 million tons of milk. Each firm has 2.5 milking cows. As a whole, cows produce an average of 1.774kg of milk each year. When we look at the economic indicators of the livestock sector; Adıyaman is ranked 66th in the ranking survey of provinces and regions for socio-economic development. It has one of the lowest national incomes among the provinces. The Adıyaman national income per capita is less than 1.500 dollars as a whole [6].

Domestic commerce in Adıyaman is mostly driven by agriculture, similar to other provinces in the Southeastern Anatolia Region. The current industrial structure has also progressed in tandem with the potential of agricultural resources. At 10.1% of GDP, the trade sector is a major player. Given the trade sector's potential to contribute significantly to the province's economy via its two-way relationship with industrialization and urbanization, as well as the national revenue and jobs it creates, this proportion positions it favorably. Today, there are 5 organized industrial zones in Adıyaman, 4 of which are mixed and one specialized in marble. In addition to the expansion of Adıyaman Central OIZ, efforts are underway to establish a mixed OIZ in the central district [7].

The data for the years 2015-2023 were obtained from the Adıyaman Provincial Directorate of Agriculture and Forestry and Turkish Statistical Institute [8 and 9].

The purpose of this research is to analyze the present situation of livestock operations in the central and district regions of Adıyaman province and to track the changes in the quantity of bovine and ovine animals from 2015-2013. Additionally, by examining both old and new beehives, the research hopes to deduce how the output of meat and milk has changed through the years. To provide a thorough evaluation of the livestock sector's impact on regional development, this context will examine elements such as the economic contribution of animal husbandry in Adıyaman, the efficiency of local producers, and animal welfare.

The findings from this research will help to plan the development of the livestock sector and provide recommendations on how to keep livestock production in Adıyaman strong in the future. More specifically, this report examined data-driven methods to improve local agricultural policies by identifying the reasons for changes in business activities, the distribution of cattle and sheep by region, and the development of the beekeeping sector.

2. RESEARCH SIGNIFICANCE

Improvements in Türkiye's livestock industry have a direct bearing on the country's progress, industrialization, and general social welfare, making it an integral part of the country's economy. This research endeavors to ascertain the extent to which Adıyaman province has contributed to the growth and industrialization of the Southeastern Anatolia Project (GAP) region, examine the variables impacting the livestock industry, and underscore the livestock potential of the area. The number of crossbred and cultural breed animals has significantly increased in recent years in Adıyaman, one of the regions where livestock production is a major source of income. Milk and meat output have both increased noticeably as a result of this surge. As a result, the results suggest that the intensive livestock production industry can propel the economic growth of Türkiye and Adıyaman [6].

The present state of the livestock industry in Adıyaman province's central and districts was investigated in this research, which also

aimed to assess specific data on livestock operations including cattle, sheep, goats, poultry, and beekeeping. The primary goal of the research is to uncover Adıyaman's livestock potential and increase awareness to make better use of it. Keeping livestock operations sustainable in the area, promoting regional development, and boosting local producers' competitiveness are some of the study's key goals. District-level analysis was conducted on data related to the number of animal enterprises in Adıyaman, the number of bovine and ovine animals, the existence of poultry, beekeeping operations, the number of hives, and the output of honey. Understanding the existing state of affairs and projecting potential future changes depend on the tabular presentation of these facts and the statistical analysis that backs them up [7].

Highlights

- **Sectoral Analysis and Data Collection:** Each district in Adıyaman province has statistics on cattle, sheep, goats and poultry, as well as the number of beekeeping enterprises. By analyzing this data, the current livestock potential of the region can be better understood and areas where the sector is lacking can be identified. Therefore, data-driven policies can be implemented. Importance for national and local animal husbandry initiatives.
- **Guidance for Producers:** Livestock farmers and businesses in the area would do well to consult the report's recommendations. Problems encountered by producers, such as poor productivity and lack of competitiveness, are discussed and remedies are offered. Producers must enhance their productivity and output by using the most advanced techniques.
- **Sustainability and Regional Development:** When it comes to long-term sustainability, the livestock industry—the backbone of Adıyaman's rural economy—is paramount. In accordance with sustainable principles, livestock operations may be developed, according to the research. Long-term advantages include the preservation of the area's natural resources and the implementation of ecologically friendly manufacturing methods. Consequently, this research will provide noteworthy benefits for the livestock industry in the province of Adıyaman.

  The study's immediate effects on the industry include achieving its goals, which include guiding farmers, promoting sustainable growth in the industry, and helping the area's livestock potential to be realized. In this approach, the region's economic growth will benefit and the productivity of livestock operations in Adıyaman would rise.

3. ANALYTICAL STUDY

3.1. Statistical Analysis

Information on the number of holdings and number of animals taken from the districts of Adıyaman province was presented. Since this information was collected as quantitative variables, it was summarized as frequency (percentage). Mean, standard deviation, and 95% confidence intervals were calculated and evaluated for quantitative variables. The Shapiro-Wilk test was applied to check whether the data fit the normal distribution. For variables that did not fit the normal distribution, statistical analyses were performed using the Mann-Whitney U test. Correlation analysis was performed to determine the relationships between variables. In addition, multiple regression analysis was applied to the variables deemed appropriate to facilitate the understanding of the data. These analyses helped to summarize the data more clearly and to understand the relationships. All data were analyzed using SPSS version 26.

3.2. Trends and Developments

The province and districts of Adıyaman greatly rely on livestock breeding, particularly ovine breeding, for economic growth. Since the geography and vegetation are favorable for the breeding of ovines, the breeding of sheep and goats is commonplace. Particularly in rural regions, rising demand and production patterns in this industry have produced a stable source of income in recent years. Adıyaman's rural development and economic stability are favorably impacted by the growth of ovine breeding.

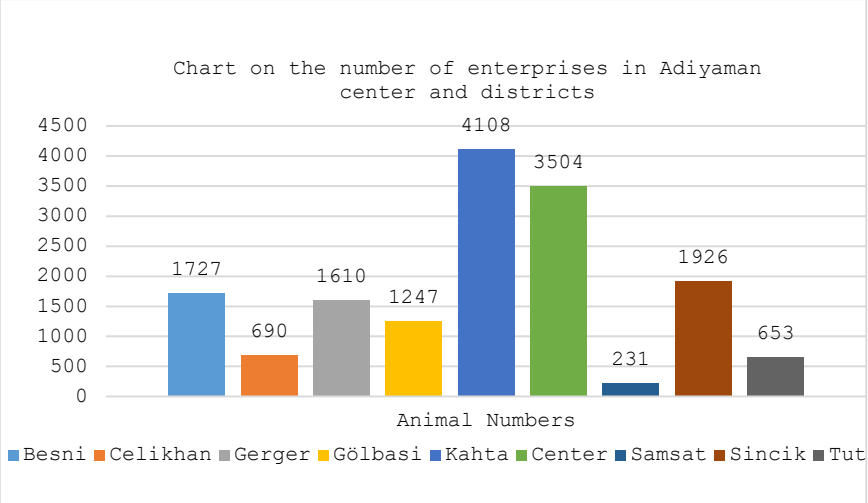

Figure 1. Number of Bovine and Ovine Animal Assets between 2015-2023

4. FINDINGS AND DISCUSSIONS

The distribution of bovine and ovine holdings in various categories from 2015 to 2023 is shown in Table 1.

Table 1. Distribution of the number of bovine and ovine animals by category between 2015-2023

Group	Years	Number of animals 0-50 heads	Number of animals 51-100 heads	Number of animals 101-200 heads	Number of animals 201-500 heads	501 or more animals	Total
		n(%)	n(%)	n(%)	n(%)	n(%)	
Number of bovine head holdings	2015	14397(99.47%)	51(0.35%)	130(0.09%)	12(0.08%)	1(0.01%)	14474
	2016	17227(99.49%)	58(0.33%)	19(0.11%)	10 (0.06%)	2(0.01%)	17316
	2017	20941(99.44%)	69(0.33%)	27(0.13%)	17 (0.08%)	5(0.02%)	21059
	2018	21786(99.32%)	99(0.45%)	21(0.10%)	24 (0.11%)	6(0.03%)	21936
	2019	21725(99.16%)	122(0.56%)	34(0.16%)	22 (0.10%)	6(0.03%)	21909
	2020	20797(99.15%)	124(0.59%)	28(0.13%)	21 (0.10%)	5(0.02%)	20975
	2021	17649(99.17%)	92(0.52%)	24(0.13%)	23 (0.13%)	9(0.05%)	17797
	2022	15158(99.02%)	97 (0.63%)	27 (0.18%)	19(0.12%)	7(0.05%)	15308
	2023	14940(99.01%)	92 (0.61%)	31 (0.21%)	200.13%)	6(0.04%)	15089
Number of ovine head holdings	2015	2180(50.64%)	1080(25.09%)	774 (17.98%)	249(5.78%)	22(0.51%)	4305
	2016	2022(42.13%)	1787(37.24%)	736 (15.34%)	223(4.65%)	31(0.65%)	4799
	2017	1590(44.23%)	1054(29.32%)	654 (18.19%)	270(7.51%)	27(0.75%)	3595
	2018	721(44.59%)	415 (25.66%)	332 (20.53%)	130(8.04%)	19(1.18%)	1617
	2019	1619(69.04%)	493 (21.02%)	148 (6.31%)	80(3.41%)	5(0.21%)	2345
	2020	1319(37.40%)	793 (22.48%)	869 (24.64%)	495(14.03%)	51(1.45%)	3527
	2021	1150(34.27%)	829 (24.70%)	900 (26.82%)	424(12.63%)	53(1.58%)	3356
	2022	935(32.05%)	702 (24.07%)	828 (28.39%)	404(13.85%)	48(1.65%)	2917
	2023	756(33.93%)	614 (27.56%)	411 (18.45%)	411(18.45%)	36(1.62%)	2228

The number of 0-50 head holdings is dominated by the number of bovine head holdings, with a very high proportion observed in all years. The number of bovine head holdings in this category increases from 99.47%

in 2015 to 99.01% in 2023. The number of bovine head holdings in other groups is very small. Small ruminant holdings show a more diverse distribution. The 51-100 head category shows a significant increase in 2016 and 2019, while the group with 0-50 head holdings generally has the largest proportions. Nonetheless, there will likely be fewer small ruminant holdings in 2018 and 2023. These statistics demonstrate that while the number of small ruminant holdings has fluctuated over time, the number of bovine head holdings has remained stable.

In holdings of varying sizes, the number of bovine heads and meat output within a certain period are summarized statistically in Table 2. The median number of businesses with a capacity of 0 to 50 employees is 19.657, with a standard deviation of 3.058 as indicated by the table. The results are statistically significant and the model has a very good explanatory power, as seen by the 95% confidence interval for this variable, which is between-0.025 and 0.938. It is clear that the model offers a very strong fit because the R-squared value of 0.91 indicates that the independent variables in the model account for 91% of the dependent variable. Based on statistical significance and the non-randomization of the data, the p-value of 0.024 is lower than the commonly used significance level of 0.05 or 5%. In this case, while the theoretical validity of the model can be considered strong, the data analysis reveals important findings. A 95% confidence interval ranging from 0.555 to 2.869 was used to calculate the average number of enterprises with a capacity of 101-200. The standard deviation is 264. When enterprises with a capacity of 201-500 persons and enterprises with a capacity of 501 persons or more are combined, the average number of enterprises is 355 and the standard deviation is 160. The 95% confidence interval for this group is calculated as follows: -1.289 to 0.315. As a result, the variable representing meat production (tons) has a mean value of 2.425, a standard deviation of 1.243 and a 95% confidence interval ranging from 0.542 to 0.921. This table, together with the confidence intervals of the relevant statistical variables, assesses the effects of various business capabilities on meat production.

Table 2. Numerical distribution of enterprises with different capacities and statistical analysis on meat production (2015-2023)

Variables	Mean	Standard Deviation	95.0% Confidence Interval	R-Square	p-value
0-50 head Enterprises	19657	3058	-0.025-0.938	0.91	0.024
51-100 head Enterprises	952	395	-1.101-0.264		
101-200 head Enterprises	653	264	0.555-2.869		
Number of 201-500 bas and 501 and head enterprises	355	160	-1.289-0.315		
Meat production (tons)	2425	1243	0.542-0.921	-	-

The effects of the number of businesses of varying sizes on the production of meat are examined by multiple regression analysis, which is summarized in Table 3. The impacts of other factors on meat output were assessed, despite the model's constant coefficient being non-significant. There is a positive and marginally significant effect (p=0.058) on meat output from businesses with a capacity of 0–50 heads. The p-value of 0.164 indicates that the influence of businesses with a 51–100 head capacity is not significant. A statistically significant p-value of 0.015 indicates that the impact of businesses with a capacity of 101–200 heads on meat output is quite robust and favorable. Businesses that can accommodate 201–500 heads and 501 and above, on the other hand, have a negative and significant effect (p=0.010). When the values of the Collinearity Statistics are examined, the number of 101–200 head enterprises' VIF value has a high value of 7.523, while the other variables' VIF values are at more moderate levels. This demonstrates how

closely connected other factors are to the number of businesses with a capacity of 101–200 heads. All things considered, the model's variables have varying and generally diverse effects on meat production; some have substantial, positive benefits, while others have major, negative consequences.

Table 3. The effect of number of enterprises on meat production according to multiple regression analysis results

Table of Coefficients for Multiple Regression Analysis							
Model		Unstandardized Coefficients		t	p-value	Collinearity Statistics	
		B	Std. Error			Tolerance	VIF
1	(Constant)	1.941×10^{-17}	0.143	-	-		
	0-50 head Enterprises	0.457	0.174	2.631	0.058	0.767	1.304
	51-100 head Enterprises	-0.419	0.246	-1.703	0.164	0.382	2.616
	101-200 head Enterprises	1.712	0.417	4.107	0.015	0.133	7.523
	Number of 201-500 bas and 501 and head enterprises	-0.802	0.175	-4.576	0.010	0.194	5.148

Table 4 shows the p-values for the statistical significance of the differences between various size groups according to the number of bovine head and ovine head holdings and the median values for these numbers. In the case of ovine head holdings holdings, the median value of this number was 49 (IQR 73), while it was 1560 (IQR 1242) for 0-50 head Enterprises. This difference is statistically significant at $p<0.001$ level. While the median number of bovine head holdings was 5 (IQR 13), the median number of ovine head holdings was 39 (IQR 74) for 51-100 head Enterprises. $p=0.006$ level of statistical significance. There is a significant difference ($p<0.001$) between ovine head holdings with 101-200 heads and ovine head holdings with a median of 30 (IQR 82). This difference is significant at $p<0.001$ level. The median ovine head holdings in small ruminant holdings is 30 (IQR 82) while the median for bovine head holdings in 201-500 head Enterprises is 0 (IQR 4). Finally, the median number of bovine head holdings in firms with 501 or more animals is 0 (IQR 1), while it is 1 (IQR 8) in small ruminant enterprises. The difference is not statistically significant in this group, $p=0.094$. The number of bovine head and ovine head median values vary statistically based on the size of the company, as seen by these data; however, the biggest enterprise group did not find this variation to be significant.

Table 4. Comparison of the number of bovine and ovine animals in animal enterprises of different sizes by districts

Variables	Group		p-value
	Number of bovine head holdings	Number of ovine head holdings	
	Median (IQR)	Median (IQR)	
0-50 head Enterprises	1560(1242)	49(73)	<0.001*
51-100 head Enterprises	5(13)	39(74)	0.006*
101-200 head Enterprises	1(3)	30(82)	<0.001*
201-500 head Enterprises	0(4)	30(82)	<0.001*
501 and overhead Enterprises	0(1)	1(8)	0.094*
*Mann-whitney u test			

Table 5 shows the total number of livestock (Sum) and the mean±standard deviation (Mean±Std) for various districts in Adıyaman province. The distribution of holdings at the district level varies according to holding size; districts such as Besni, Kahta, and Province Center have the largest concentration of holdings, especially those

between 0-50. Among holdings with 501 or more heads of livestock, it is relatively low in all districts.

Table 5. Average distribution of the number of animals in different enterprise sizes in the districts of Adıyaman province

Districts	0-50 head Enterprises		51-100 head Enterprises		101-200 head Enterprises		201-500 head Enterprises		501 and overhead enterprises	
	Sum	Mean±Std	Sum	Mean±Std	Sum	Mean±Std	Sum	Mean±Std	Sum	Mean±Std
Besni	1727	864±985	175	88±117	106	53±74	105	53±74	9	5±6
Celikhan	690	345±447	16	8±10	11	6±8	11	6±8	0	0±0
Gerger	1610	805±1082	48	24±21	32	16±21	32	16±21	1	1±1
Gölbasi	1247	624±791	79	40±23	101	51±60	97	49±63	11	6±6
Kahta	4108	2054±2761	103	52±53	33	17±19	35	18±18	3	2±1
Province Center	3504	1752±2099	233	117±112	126	63±64	118	59±69	15	8±6
Samsat	231	116±144	9	5±4	4	2±3	4	2±3	2	1±1
Sincik	1926	963±1329	33	17±23	10	5±7	10	5±7	0	0±0
Tut	653	327±392	10	5±6	19	10±13	19	10±13	1	1±1
Std: Standard Deviation										

Table 6 presents the data illustrating the variations in the total, mean, and standard deviation values of the various animal species' populations throughout time. Sheep populations peaked in 2020 and then decreased in the years that followed, but goat and sheep numbers have typically been rising. Specific numbers-wise, the largest percentages of all animals are found in domestic sheep and hair goats. Over the years, the quantity of cattle has fluctuated significantly, with the rise in farmed cattle being especially notable. Hens that lay eggs are still a very stable and abundant breed of fowl. A rising tendency has also been seen in other species throughout time, such as ducks and geese. A rise in beekeeping operations is also shown by the fact that the number of new-type hives has grown annually, while the number of old-type hives has stayed at low levels. The table's overall analysis demonstrates the necessity for close observation of developments in the cattle and beekeeping industries, both between species and ultimately.

Table 6. Statistics on the number of animals in Adıyaman province between 2015-2023

Years	2015	2016	2017	2018	2019	2020	2021	2022	2023	Sum	Mean	Std.
Sheep	147.379	118.733	136.270	163.943	167.537	193.540	186231	163086	143390	1.420.109	157.790	23854.17
Merino sheep	0	0	0	2.145	2.075	1.852	1435	1085	877	9.469	1.052	893.0071
Native	147.379	118.733	136.270	163.943	164.462	191.688	184796	162001	142513	1.411.785	156.865	23187.12
Goat	158.345	174.811	181.323	193.035	181.856	198.314	182981	170419	161418	1.602.502	178.056	13315.06
Hair goat	158.345	174.811	181.323	193.035	181.856	198.314	182981	170419	161418	1.602.502	178.056	13315.06
Totle cattle	81.732	87.147	117.414	139.691	139.477	128.823	110451	100618	102.415	1.007.768	111.974	21188.86
Culture cattle	36.320	38.090	52775	61.629	63.504	47.234	43701	38306	38109	419.668	46.630	10473.36
Hybrid cattle	31.032	32.815	57450	70.046	68.873	72.150	60302	58026	59366	510.060	56.673	15069.57
Native cattle	14.380	16.242	7189	8.016	7.064	9.403	6448	4286	4940	77.968	8.663	4088.797
Horse	4.624	4.624	4.938	4.938	4.926	120	151	150	148	24.619	2.735	2463.068
Mule	1.007	1.007	1.033	1.033	1.029	11	0	6	6	5.132	570	535.5989
Donkey	2.668	2.668	2.111	2.111	2.105	33	38	35	33	11.802	1.311	1230.275
Lainge hens hen	255.721	226.400	266.500	266.500	267.127	269.330	275180	278188	230.258	2.335.204	259.467	18751.26
Turkey	5.950	5.875	4060	4060	4.327	4.683	4786	4.983	5.001	43.725	4.858	694.1005
Duck	1.624	1.800	1652	1652	1.710	1.875	1910	2.058	2.230	16.511	1.835	206.557
Goose	3.220	3.400	3479	3479	3.534	4.135	4258	4.468	2.150	32.123	3.569	687.8068
Quail	2.500	2.150	1800	1800	1.830	3.460	3215	3.618	1.200	21.573	2.397	853.571
Pigeon	4.800	4.200	3500	3500	3.535	4.215	4122	4.322	3.200	35.394	3.933	519.641
Rabbit	3.330	3.200	2700	2700	2.692	2.635	2608	2647	1.990	24.502	2.722	381.1214
Old-type beehive	500	300	400	400	400	578	440	900	900	4.818	535	220.3543
New-type beehive	72.160	65.500	70.870	71.800	74.000	74.825	75.200	80.100	80.100	664.555	73.839	4563.183
Sdt: Standard Deviation												

Table 7 demonstrates the relationship between Laying hen output and the quantity of eggs they lay in a specific amount of time. The number of hens and egg production have a linear link (0.825) based on the results shown in the table. Higher egg yields can be achieved by increasing the hen population. The development rates of the two variables do differ, though; for instance, the egg production rate is the greatest at 13.89%. Merely 11.78% more hens were grown throughout this time frame. This implies that adding more variables to a production process yields better results.

Table 7. Investigation of the relationship between egg production and ratio and number laying hens between 2015-2023

Egg production number(ratio)	Number of laying hens (ratio)	Correlation
8.679.000 (8.77%)	255.721 (10.95%)	0.825
9.786.000 (9.89%)	226.400 (9.70%)	
10.726.000 (10.84%)	266.500 (11.41%)	
11.849.612 (11.97%)	266.500 (11.41%)	
12.680.734 (12.81%)	267.127 (11.44%)	
12.862.210 (13.00%)	269.330 (11.53%)	
13.751.373 (13.89%)	275.180 (11.78%)	
13.431.700 (13.57%)	278.188 (11.91%)	
5.200.500 (5.25%)	230.258 (9.86%)	

The number of old and new type hives and honey production (kg) in Adıyaman province are interrelated as shown in Table 8. The table includes various data including honey production percentages and several beehives. 71.270 beehives were used to produce 926.302kg of honey, placing the third highest honey production. The amount of honey produced generally fluctuates with the number of beehives. In the years when the number of beehives was the highest at 81.000, 434.158kg of honey was produced, while in the years after, 327.000 kg of honey was produced. You can use the table to analyze the relationship between changes in honey production and the number of beehives.

Table 8. Number of old and new hives and honey production in Adıyaman province

Honey production (kg)	Number of beehives (old and new-type)
408.690 (8.93%)	72.660 (10.85%)
445.500 (9.74%)	65.800 (9.83%)
926.302 (20.24%)	71.270 (10.65%)
359.163 (7.85%)	72.200 (10.79%)
516.614 (11.29%)	74.400 (11.11%)
393.908 (8.61%)	75.403 (11.26%)
764.300 (16.70%)	75.640 (11.30%)
434.158 (9.49%)	81.000 (12.10%)
327.000 (7.15%)	81.000 (12.10%)

Table 9 shows the total number of various animal species and beehive types in Adıyaman province. The animal species with the highest total numbers include laying hens (2.335.204), sheep (1.420.109), and goats (1.602.502). The total numbers of other animal species are also included in the table, such as cattle (1.007.768), cultivated animals (419.668), and hybrids (510.060). The total number of old and new-type beehives is also given: 4.818 old-type beehives and 664.555 new-type beehives. The table presents the distribution of animals and beehives in Adıyaman in detail.

Table 9. Total number of animal species in Adıyaman province

Animals	Total
Mule	5.132
Donkey	11.802
Laying Hen	2.335.204
Turkey	43.725
Duck	16.511
Goose	32.123
Quail	21.573
Pigeon	35.394
Rabbit	24.502
Old-type beehive	4.818
New-type beehive	664.555
Sheep	1.420.109
Merino sheep	9.469
Domestic animal	1.411.785
Goat	1.602.502
Hair goat	1.602.502
Total cattle	1.007.768
Culture cattle	419.668
Hybrid cattle	510.060
Native cattle	77.968
Buffalo	72
Horse	24.619

In this study, relevant statistical results were obtained by examining the data of the livestock sector from the center and 8 districts of Adıyaman province between 2015-2023. The rates and numbers of "Mule, Monkey, Laying Hen, Turkey, Duck, Goose, Quail, Pigeon, Rabbit, Old type beehive, New type beehive, Sheep Merino, Domestic animal, Goat, Hair goat, Total cattle, Culture cattle, Hybrid cattle, Native cattle, Buffalo, Horse" in the center and districts of Adıyaman province are respectively: 5132(0.045%), 11802(0.045%), 2335204(20.69%), 43725(0.387%), 16511(0.146%), 32123(0.284%), 21573(0.191%), 35394(0.313%), 24502(0.217%), 4818(0.042%), 664555(5.890%), 1420109(12.58%), 9469(0.083%), 1411785(12.51%), 1602502(14.20%), 1602502(14.20%), 1007768(8.932%), 419668(3.719%), 510060(4.521%), 77968(0.691%), 72(0.001), 24619(0.218%).

Statistically, the median number of enterprises with a capacity of 0 to 50 employees is 19.657 and the standard deviation is 3.058. The results are statistically significant and the model has a very good explanatory power for this variable as shown by the 95% confidence interval between -0.025 and 0.938. It is clear that the model is a very strong fit because the R-squared value of 0.91 indicates that the independent variables in the model explain 91% of the dependent variable. Based on statistical significance and the non-randomization of the data, the p-value of 0.024 is lower than the 5% significance level.

There has been a marked shift in Türkiye's livestock industry since the Republic was established. Significant population growth was seen from the start of the Republic until the Second World War; during that time, the pace of rise slowed down, and several species even saw a decline. In the post-war period, the population growth surged once again, peaking in species-specific numerical levels between 1960 and 1980. In the 1980s, the population of all kinds of animals surged significantly before beginning to decline. Our country's geographical qualities make it ideal for many types of animal rearing [10].

Adıyaman relies on livestock rearing as a means of subsistence. The number of animals in Adıyaman that are hybrid or culture-bred has been on the rise. The output of both meat and milk therefore rises. All these factors point to the cattle sector—which engages in intensive production—as the engine driving the economy of Adıyaman and Türkiye [6].

There are notable disparities in the prevalence of bovine and ovine holdings among livestock operations of varying sizes in the Adıyaman province center and its regions. In firms with a capacity of 0-50 heads, the prevalence of cattle is substantial (median 1560), while the prevalence of ovine holdings is very little (median 49). As we go towards larger-scale operations, the prevalence of bovine head ownership diminishes significantly, but the prevalence of ovine head holdings remains more stable. In firms with a capacity of 201 heads or more, bovine head holdings are almost absent (median 0), but ovine head holdings are maintained at a moderate level (median 30-82). The findings reveal that small-scale farms are significant for bovine breeding in Adıyaman province, while ovine breeding has expanded to larger-scale operations. Values of statistical significance ($p<0.001$). Our findings indicated that animal husbandry regulations in the area must account for these structural disparities.

Adıyaman province has considerable livestock potential, however, structural limitations such as lack of funding, market challenges, and qualified labor force prevent its use. Notwithstanding unfavorable events like the worldwide pandemic in 2020 and the Kahramanmaraş earthquake in 2023, statistics from 2015 to 2023 demonstrate that overall animal output has increased. However, substantial investments must be made to address the sector's issues and put suggested solutions into practice if sustainable growth is to occur. By taking these actions, Adıyaman's livestock industry may achieve its full potential and contribute to regional development.

In the study titled "Livestock Potential and Development Opportunities of Adıyaman Province," it is emphasized that the province has significant potential for both plant and livestock production, due to its geographical structure, location, and climate. As of 2012, the population of the province was 593.931, with an elevation of 669 meters and an area of 761.40 hectares. Adıyaman possesses 2.520.961 decares of total agricultural land and 460.912 decares of permanent pasture and meadow land. These pasture and meadow areas are directly linked to livestock production, and the fact that 15.5% of the province's land is covered by such areas provides an advantage in meeting the forage needs for conventional production. Adıyaman has the potential to produce its own feed, and the development of modern agricultural and livestock facilities in the region is crucial for utilizing this potential, which is of great importance for both the local economy and the livestock sector [11].

The prevalence of livestock farms with a capacity of 0-50 animals in these districts may be because government support over the past 10 years has generally focused on small family farms. Additionally, the Ministry of Agriculture’s rural development grants, which provide additional incentives to farms with 5 or more animals for capacity expansion, could also have contributed to this situation. The limited number of livestock farms with a capacity of over 500 animals in the province may be because agricultural land is either scarce or hilly, making it difficult for producers to grow their own feed. As a result, they often have to source feed externally, leading to high production costs. Some parts of Adıyaman are mountainous, while others consist of plains. Although the plains have extensive farmland, the amount of irrigable land is limited, which negatively impacts the yield of crops per unit area. However, with the completion of ongoing dam projects in the region, the plains will have access to irrigation, reducing the costs of crop and feed production. This is expected to increase the region's livestock production capacity.

The poultry sector in the province has not reached its deserved potential. The primary reason for this is the lack or insufficiency of

integrated facilities necessary for both meat and egg production, such as feed mills, slaughterhouses, large-capacity poultry houses, and an effective marketing network. Despite being a sector that could significantly contribute to rural development and employment, it has struggled to attract the interest of investors. However, the climate and geographical conditions of Adıyaman's mountainous regions are well-suited for poultry farming, and the province's easy access to major cities highlights its strong potential in this field.

5. CONCLUSION AND RECOMMENDATIONS

There is significant economic potential for the region's growth in the livestock industry in Adıyaman. Nevertheless, concentrating on several investment sectors is required to fully realize this potential. Firstly, via effective use of local natural resources, aquaculture production and processing facilities may boost the local and national economies. Investments in honey production and beekeeping may also provide a steady stream of revenue appropriate for the region's geographic circumstances. Investments may be made for a variety of animal species in the area of animal husbandry, including the breeding of silkworms, Angora goats, egg poultry, broiler turkeys, geese, quail, and ostriches. These plants have a large production potential for export and local use. Enhancing the production of milk and dairy products, namely via Saanen goat and dairy cow breeding, may broaden Adıyaman's agricultural output potential. Furthermore, investments in livestock and meat production, as well as the creation of meat processing facilities, may help to generate jobs and improve the industry by allowing local producers greater access to markets. Furthermore, establishing livestock-specific marketing and sales units will assist farmers in reaching a larger audience. These projects may boost regional economic growth by using Adıyaman's livestock potential.

- **Solution proposals for the problems of Adıyaman Province:** The resolution of challenges encountered by the livestock industry in Adıyaman province might significantly influence the regional economy and sectoral development. Several strategic proposals to address these difficulties are as follows:
- **Financing Support and Encouragement of Entrepreneurship:** State-backed lending and incentive schemes may help expand livestock businesses. By offering manufacturers loans at competitive interest rates, investments may be made possible. Additionally, to promote entrepreneurship, local producers should be given access to training programs and consulting services to increase their knowledge of risk management and market strategies.
- **Enhancing Export Potential and Market Access:** To address issues with the market, regional and national cooperatives may be formed and reinforced. Products may reach larger markets by way of cooperatives. To open up to global markets with confidence, expenditures should also be made in certification and standardization operations that adhere to international norms. The export potential of animal products in Adıyaman can be enhanced.
- **Investments in R&D and Technology by Sector:** Following and applying technical improvements in the livestock business is crucial to improving production. University-industry collaboration should be promoted, and state-sponsored research and development money should be made available to local businesses so they may better access sectoral technology. Universities' veterinary, zootechnics, and agricultural faculties, as well as local livestock firms, should work together closely.

- **Supporting competent Labor Force:** Organize training and certification programs to increase the number of competent workers in the livestock industry. Enterprises need to provide more appealing working conditions and better financial and social rights to recruit and retain this skilled workforce. Additionally, contemporary animal husbandry skills may be imparted to the local workers via vocational training programs.
- **Feed Production and Cost Reduction:** In Adıyaman, local solutions for feed production should be created. Farmers in the area need to be encouraged to grow feed crops rather than importing feed raw materials. Local producers' profitability may rise and production expenses can be decreased in this fashion.
- **Promotion and Marketing Strategies:** In the marketing of animal goods, promotional efforts have to be bolstered. To allow them to compete in domestic and international markets, local manufacturers should get assistance with branding and advertising. Digital platforms may be used to generate opportunities for mass communication.
- **Improving Pasture Management and Supporting Beekeepers:** Increasing farmers' access to pasture land may lead to more effective application of the Pasture Law. The effective utilization of pastures will save money by adding to the natural nourishment of animals. Furthermore, lodging should be built to facilitate nomadic beekeeping operations, and safety and welfare conditions should be enhanced.
- **Professional Management and Certification:** Implementing professional management systems is crucial for the long-term success of livestock operations. Enterprises should be encouraged to earn national and international quality certifications, and these procedures should be aided by government backing. These credentials will improve firms' competitiveness in both local and international markets.

These solutions may assist the Adıyaman livestock industry in addressing its difficulties. As a result, the industry will be able to maintain a sustainable growth rate and contribute more to the local economy.

CONFLICT OF INTEREST

The authors have no conflicts of interest to be disclosed.

FINANCIAL DISCLOSURE

The authors declare that this study has received no financial support.

DECLARATION OF ETHICAL STANDARDS

The authors of this article declare that the materials and methods used in this study do not require an ethical committee.

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