

ALFALFA PRODUCTION COSTS AND PROFITABILITY STATUS IN AKSARAY PROVINCE IN TURKEY

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Abstract

This study aims to determine alfalfa's production costs and profitability in Aksaray Province. Clover producers were visited directly, and prepared forms related to the subject were applied to 70 clover producer enterprises. The surveyed enterprises were selected by chance. Data from clover-growing enterprises cover the 2019 production season. On average, the cost of clover per decare is 0.90 TL/kg, the sales price is 1.09 TL/kg, and the profit margin is 0.19 TL/kg for clover-producing enterprises. The relative profit in enterprises was calculated as 1.21. The average value of gross profit and absolute profit for enterprises was determined as TL 890.11 and TL 373.70, respectively.

Key words: alfalfa, production cost, profitability, relative profit, Turkey

INTRODUCTION

Alfalfa (*Medicago Sativa L.*), the most widely grown forage plant globally [11], is known as the Queen of forage plants and has a higher forage value than the Queen of forage plants in almost all forage plants cultivated. Dry and wet alfalfa grass, which has a high protein yield per unit area, is delicious for all kinds of animals, nutritious, and rich in vitamins [25]. Meat, milk, eggs, and products obtained by processing these raw materials are of great importance in human nutrition. Because of this, an animal production is an important place in agricultural production. In order to meet the need for coarse feed needed for healthy and adequate nutrition in animal production, it is necessary to make optimal use of pastures and give importance to feed plant production. In Turkey's animal husbandry, the production of forage crops in the supply of coarse feed also has a significant share [15].

Beneficial for both humans and animals and sensitive alfalfa roots and leaves dried (powder, tablets, and tea used to lose weight) are long used in traditional Indian medicine for the treatment of central nervous system disorders [12]. One of the most important

sources of high-quality feed, which is alfalfa, forage crops, and feed for animals, is grown all rich in minerals and vitamins and has a value between high yield and reproductive performance of animals with their impact on this feature is Lamech [18, 4].

Alfalfa is also an important plant source of pollen and nectar for honey bees [22].

Healthy macro and microdata are needed when planning future sustainable production in agricultural enterprises. Microdata occupies a vital place when calculating costs at the business level. Micro-data is a substantial base, especially in the profitability status of enterprises, input costs, investment projects, and future planning [19].

The agricultural activity requires more capital, the necessity of enterprises to keep up with market conditions, and the rapid development of technology makes the management of agricultural farms even more complex [6].

In this context, enterprises' essential characteristics, determination of aquaculture practices, attitudes, and judgments [1].

Turkey's alfalfa harvested area increased by 74% in 2019-2021 compared to 2004-2006. Turkey's alfalfa area was 379,676.5 ha in 2004-2006 and 659,049.6 ha in 2019-2021. Alfalfa production increased 810% in 2019-

2021 compared to the 2004-2006 average. Alfalfa production, which was 2,071,663 tons in 2004-2006, increased to 11,762,867 tons in 2013-2015 and rose to 18,850,247 tons in 2019-2021. Alfalfa yield in Turkey is per hectare increased from 2,028 kg to 2,623 kg in 2013-2015 and reached 2,877 kg in 2019-2021. This rise is due to the high efficiency of alfalfa seeds used next to the width of the machine park and the fact that the producers who planted alfalfa in the past process have become more knowledgeable and conscious. The most important alfalfa production provinces in Turkey were Konya, Iğdır, Muş, Aksaray and Aydın, respectively. Konya ranks first in production with 1,883,423 tons

and 9.99% of Turkey's production. Aksaray was followed Konya by with 1,652,096 tons and 8.76% share, Iğdır with 1,505,204 tons and 7.99%, Muş was 1,184,297 tons and 6.28%, Aydın was 1,023,682 tons and 5.43% share, respectively (Table 1).

Aksaray alfalfa forage plant cultivated areas were concentrated in three districts. The Central district area was 120,200 ha, and its share was 44.95% of the alfalfa planted areas. Eskil district was 74,200 ha, and the share was 27.75%. Sultanhani district's cultivated area was 62,500 ha, and the share was amounted to be 23.37%. The alfalfa area share in Aksaray of other districts was about 3.93%.

Table 1. Development of alfalfa production in some provinces in Turkey

Provinces	2004-2006	2007-2009	2010-2012	2013-2015	2016-2018	2019-2021
	Production quantity (tonnes)					
Konya	438,635	222,015	977,320	1,099,340	1,196,809	1,883,423
Iğdır	71,750	69,879	386,734	453,529	1,371,901	1,505,204
Aksaray	150,180	76,017	166,895	785,442	1,216,785	1,652,096
Muş	0	173,183	1,354,607	1,289,558	1,325,062	1,184,297
Aydın	4,575	22,310	526,685	687,810	745,209	1,023,682
Turkey	2,071,663	1,763,094	11,762,867	13,333,035	16,940,172	18,850,247
Index (2004-2006 = 100)						
Konya	100	51	223	251	273	429
Iğdır	100	97	539	632	1,912	2,098
Aksaray	100	51	111	523	810	1,100
Muş	0	100	782	745	765	684
Aydın	100	488	2,361	15,034	16,289	22,376
Turkey	100	85	568	644	818	910
The share of Turkey (%)						
Konya	21.17	12.59	8.31	8.25	7.06	9.99
Iğdır	3.46	3.96	3.29	3.40	8.10	7.99
Aksaray	7.25	4.31	1.42	5.89	7.18	8.76
Muş	0.00	9.82	11.52	9.67	7.82	6.28
Aydın	0.22	1.27	4.48	5.16	4.40	5.43
Turkey	100.00	100.00	100.00	100.00	100.00	100.00

Source: [24].

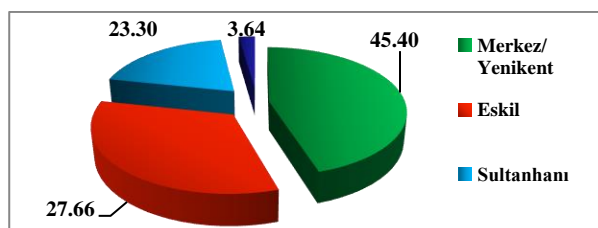


Fig. 1. Alfalfa production quantities in Aksaray districts

Source: Own results and design.

The Central district met 45.40% of Aksaray alfalfa production with 913,520 tons. On the other hand, the Eskil district had 556,500 tons of alfalfa production and met 27.66% of the province's production. The share of alfalfa production in Sultanhani district in the

province was 23.30%, and its production was 468,750 tons. Other districts' production amounts had 73,330 tons and accounted for 3.64% of the total production (Figure 1).

Various research has stated that feed costs are the most important production cost factor in enterprises engaged in multiple livestock activities. For example, [7] on sheep farms; [13], [3, 10, and 16] on buffalo farms, and [26] on dairy farms stated that feed expenses were the highest cost factor on animal farms.

[21] interviewed the method of stratified sampling of 129 forage producers, and intensive doers of forage production Gevas district of Van in the province. Research data from the 2008 production period was

collected through a survey from interviewed business owners in villages.

[5] evaluated the rapid increase in red meat prices in Turkey in 2010 regarding animal feed costs and offered suggestions that may render the feed production quality and cheap. They stated that the problem in question could end with sustainable solutions that spread to the base, that would comfort all producers and consumers, instead of instant and temporary solutions such as animal import.

[23] reported that the coarse feed needed by livestock in Van was obtained from meadows and pastures, straw, and forage crop farming. They stated that the livelihood of a significant portion of the people in Van province is based on agriculture and their livestock breeding potential is high.

[27] analysed the current state of organic forage production in Turkey. They stated that one of the most important requirements of organic animal production activities is to meet the need for organic roughage.

They said that in meeting the demand for organic roughage, organic meadow pastures and organic forage plants production areas are of great importance.

As a matter of fact, 93% of the organic roughage production areas in the world are organic meadow-pasture areas. They stated that 7% are met from organic feed plants production areas, as of the year 2012 in Turkey, that no organic pasture detected the presence of an organic field in about 22 provinces.

This study aims to analyse the costs and profitability of alfalfa-producing farms in Aksaray province.

MATERIALS AND METHODS

Materials

Aksaray province was included in the scope of the study. Therefore, the study's data was created from the information obtained from farmers that grow alfalfa in Aksaray province. The received data covers the 2019 production period. In addition, statistical data from the Aksaray Provincial Directorate of Agriculture and Forestry and data from TUIK were also used. Districts where alfalfa production was

intensive, the Central, Yenikent, Sultanhani, and Eskil districts of Aksaray were represented by its technical staff's opinions. These districts met approximately 96.36% of Aksaray alfalfa production. In this context, these districts' farmer registration system data made up the primary audience by applying the stratified Neyman sampling method to this population. The sample volume was calculated as 70 with a confidence interval of 99% and a margin of error of 10%. A face-to-face survey technique was applied as a data collection tool. According to the calculated sample, farmers from the main audience were randomly selected.

Farm groups were based on alfalfa cultivated areas (I. group had less than 50.00 decares alfalfa cultivated areas; II. group had alfalfa cultivated areas ranged 50.00 decares to 99.99 decares; III. group had 100 decares or more) and cross-tables between costs and profitability variables interpreted the data. The existence of the relationship was questioned by analysing variance between continuous variables and business groups.

Since the "Neyman method" applied in the sampling takes more samples from the layer with high variance, the application of the arithmetic means in the calculations will not reflect the research area average. Therefore, the total width of the frequency of the operation groups by the number of falling in proportion to the number of frequencies was obtained. A coefficient for each layer of the data obtained in the study while evaluating the overall coefficient obtained by multiplying the calculated values for each layer was calculated as the weighted average value for each layer [8, 9].



Map 1. Research region
Source: [28].

According to the data for 2021, the research area covers about 3.97% of the alfalfa-

growing area in Turkey. It accounts for 7.18% of the alfalfa production in Turkey (TURKSTAT, 2022) [24]. The research area was given in Map 1.

Methods

Statistical package programmes were utilised to analyse the respondents' socio-economic and farm characteristics using descriptive statistics such as percentages, mean, frequency distribution, and tabulation. The alfalfa producers' production cost was calculated using a single Farm Budget Analysis, and their profitability was utilised to assess their production performance.

In an agricultural enterprise, production activities carried out through various inputs and services constitute the expenditure, which is termed production costs. Production costs in a farming enterprise are called expenses for inputs and services used to perform production activities during the production period. Production costs are divided into variable and fixed costs. Variable costs are increasing or decreasing costs depending on the volume of production. These costs arise when production is carried out and vary depending on the amount of production [17]. 3 percent of the total variable expenditures is used to calculate the general administration cost. The interest rates charged differ by production activity, reflecting the capital's potential cost [2].

The cost of establishment is computed by applying half (4%) of the interest rates charged by Ziraat Bank on agricultural production loans (8 percent in 2019). In the research area, the interest rate on bare land was 5% of the current trading value.

After calculating total production costs, gross margin, net profit, and relative profit, these indicators were calculated as follows:

Total Production Cost = Variable cost (VC) + Fixed cost (FC)

Gross Margin (GM) = Gross Production Value (GPV) - Variable cost (VC)

Net Profit (NP) = Gross Margin (GM) - Fixed Cost (FC)

Relative Profit (RP) = Gross Production Value (GPV) / Total Production Cost (TPC)

[2, 20, 14].

RESULTS AND DISCUSSIONS

The ages of the alfalfa producers interviewed were between 26 and 78 years. Their mean age was 48.33 years. The level of education of alfalfa growers was between 5 and 14 years. On average, their education level was 7.6 years. The household size of the producers varied between 2 and 7 people. The average household size was calculated as 4.1 people. 18.6% of the farmers were engaged in only plant production. 81.4% of them were doing both plant production and animal production together. The agricultural experience of the producers ranged from 2 years to 60 years. Their average agricultural experience was calculated as 24 years. 70% of the alfalfa farmers interviewed had computers, and 98.6% of them had internet. 74.3% of the interviewed farmers also had social security. 52.9% of alfalfa producers stated that they have a non-agricultural job besides agricultural activity. 47.1% of the farmers stated that they only engage in agricultural activities. The main reason for the farmers to produce alfalfa is to meet the needs of the enterprise (meeting the needs of the animal branch) and both to meet the needs of the enterprise and to sell it (74.3% of the farmers). 25.7% of the businesses have grown alfalfa to sell it. The farmers stated that they cultivated the alfalfa plant for 4 to 8 years in the same plot. It was determined that alfalfa producers in Aksaray irrigate the alfalfa plant 3 to 4 times during one harvesting time (84.3% of the farmers).

Alfalfa GPV share in the study area was recorded to be 36.53 percent in the 2019 production season in the research region average. Group III had the highest alfalfa GPV share with 53.92 percent, followed by group II with 16.18 percent. For Group I, the share of GPV from other crop products was the highest, with 34.10 percent. For Group II, the GPV from the animal production branch was the highest, at 57.76 percent. Therefore, the GPV from the animal production branch was higher in smallholder groups.

Table 2. Gross production value of alfalfa farms (%)

Groups	Alfalfa	Other crops	Animal	Total
I	12.28	34.01	53.71	100.00
II	16.18	26.06	57.76	100.00
III	53.92	30.33	15.76	100.00
FA	45.95	30.26	23.79	100.00
RA	36.53	30.43	33.04	100.00

FA: Farms average; RA: Research region average

Source: Own results

The average farm size in the study area was 328.59 decare. Alfalfa land share in the study area was recorded to be 46.17 percent in the research region average. Group III had the highest alfalfa planted area share with 56.63 percent, followed by Group II with 31.10 percent and Group I with 19.49 percent of farmland. Farms generally carried out their agricultural activities on their own land. In their agricultural activities, it was also possible for them to rent land or to shareholder land (Table 4).

Table 3. Farmland structure of investigated farms (%)

Group	Property land	Rental land	Shareholder land	Total
I	87.39	12.61	0.00	100.00
II	90.75	7.08	2.18	100.00
III	75.46	24.00	0.53	100.00
FA	77.27	22.13	0.60	100.00
RA	79.75	19.61	0.65	100.00

Source: Own results

The monetary worth of the inputs necessary for alfalfa production can be characterised as production costs. As a result, Table 4 shows the alfalfa production cost per decare (1 decare equals 0.1 hectares). The production costs per decare in alfalfa were found to range from 1,736.91 TRY to 2,351.70 TRY, with the farms average being 1,775.38 TRY and the examined area average of production cost per decare being 1,839.13 TRY (Table 4).

The cost items were examined under the variable and fixed costs, of which variable

cost had the highest modal production cost with 1,309.86 TRY, while fixed cost amounted to 529.28 TRY (Table 4).

Machine rental, labour, fertiliser, agrochemical, water charge, electricity, marketing, and revolving fund interest were the variable cost factors in alfalfa production. Variable costs are those that change based on the amount of the production. Electricity prices are the biggest modal, accounting for 27.14 percent of total variable costs, followed by fertiliser (19.59 percent), agrochemicals (9.28 percent), machinery rental costs (4.31 percent), and labour expenses (4.00 percent) (Table 4).

Administrative costs, labour, land rent, interest and depreciation costs of establishment capital were all fixed costs in alfalfa production. The land renting cost accounted for 20.01 percent of the overall fixed cost, followed by 3.75 percent and 2.14 percent for depreciation and administrative costs, respectively (Table 4).

Large farms have drillings systems for irrigation, and this situation decreases water charges.

In the research region, the gross production value (GPV) was ranged between 2,177.67 and 2,357.09 TRY. The average gross production value in the investigated farms average was 2,301.93 TRY, whereas the research region average was 2,298.37.

The gross margin (GM) was ranged from 400.20 TRY to 1,090.28 TRY, with an average of 1,051.05 TRY and 988.51 TRY in the research area.

The net profit (NP) variation was varied from -155.35 TRY to 568.50 TRY, with a mean average of 459.24 TRY. The relative profit was ranged from 0.93 to 1.33, with a mean of 1.25 for the research area.

On average, the firms had a relative profit of 1.25. For a 100-unit production cost, the surveyed farms obtained 125 units of GPV. In other words, alfalfa producers made a profit of 0.25 TRY on a 1.00 TRY cost.

Table 4. Production cost in alfalfa production

Cost items	Farms group			FA	RA
	I	II	III		
Cost per decare (TRY)					
Machine rental	144.38	112.10	69.35	72.91	79.19
Labour (hired)	97.69	90.76	69.32	70.87	73.50
Fertiliser	526.19	777.96	299.98	323.91	360.33
Agrochemical	145.33	123.44	178.03	175.12	170.58
Water fee	219.10	126.88	8.86	18.77	36.27
Electricity	504.33	443.70	504.52	502.22	499.16
Marketing	68.80	34.28	38.33	38.97	40.44
Revolving fund interest	68.23	68.36	46.74	48.11	50.38
Variable cost total	1,774.05	1,777.48	1,215.13	1,250.87	1,309.86
General administrative expenses	53.22	53.32	36.45	37.53	39.30
Land rent	320.30	327.13	376.96	373.61	367.99
Labour (permanent and family workforce)	94.47	61.21	30.71	33.52	38.56
Depreciation cost	89.60	94.35	64.35	66.14	69.03
Establishment cost interest	20.06	19.53	13.31	13.72	14.40
Fixed cost total	577.65	555.55	521.78	524.50	529.28
Production cost	2,351.70	2,333.02	1,736.91	1,775.38	1,839.13
Ratio (%)					
Machine rental	6.14	4.80	3.99	4.11	4.31
Labour (hired)	4.15	3.89	3.99	3.99	4.00
Fertiliser	22.37	33.35	17.27	18.24	19.59
Agrochemical	6.18	5.29	10.25	9.86	9.28
Water fee	9.32	5.44	0.51	1.06	1.97
Electricity	21.45	19.02	29.05	28.29	27.14
Marketing	2.93	1.47	2.21	2.19	2.20
Revolving fund interest	2.90	2.93	2.69	2.71	2.74
Variable cost total	75.44	76.19	69.96	70.46	71.22
General administrative expenses	2.26	2.29	2.10	2.11	2.14
Land rent	13.62	14.02	21.70	21.04	20.01
Labour (permanent and family workforce)	4.02	2.62	1.77	1.89	2.10
Depreciation cost	3.81	4.04	3.70	3.73	3.75
Establishment cost interest	0.85	0.84	0.77	0.77	0.78
Fixed cost total	24.56	23.81	30.04	29.54	28.78
Production cost	100.00	100.00	100.00	100.00	100.00

Source: Own results.

The requirement for the aforementioned measure is that relative profit be more than one (1), and relative profit was 1.25 in the study region, indicating that alfalfa production is profitable.

In the study area, 1 kilogramme of alfalfa cost was amounted to be 0.91 TRY on average. On farms, the cost of producing a kilogramme of alfalfa varied between 0.48 and 2.36 TRY (Figure 2).

In the 2019 crop season, the mean alfalfa (as dry grass) yield in the research area was 2,013.06 kg per decare. Group I recorded the modal output of about 2,186.21 kg per decare of alfalfa per year, followed by group III with 2,000.68 kg per decare.

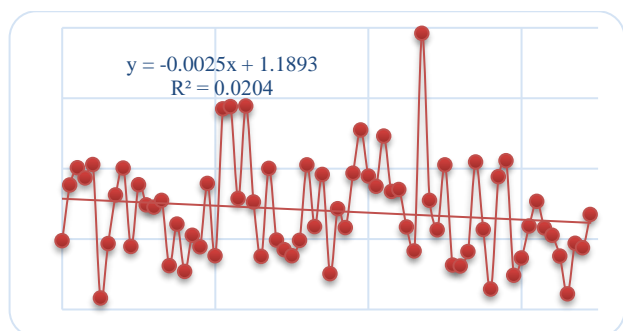


Fig. 2. Alfalfa production cost per kg in enterprises
 Source: Own results.

1.25 was found to be the relative profit. The relative profit ranged from 0.48 to 2.22 for 70 alfalfa enterprises. Although the increase in alfalfa cultivation area seems to increase the relative profit (Figure 3), we have determined that this situation is not significant statistically.

Relative profit and also kg production cost had a bigger standard deviation or variance in the farms' groups, which might be due to the differences in farm management practices of the alfalfa farmers, mechanisation structures, farm size, and varying capital amounts and their basic production goals.

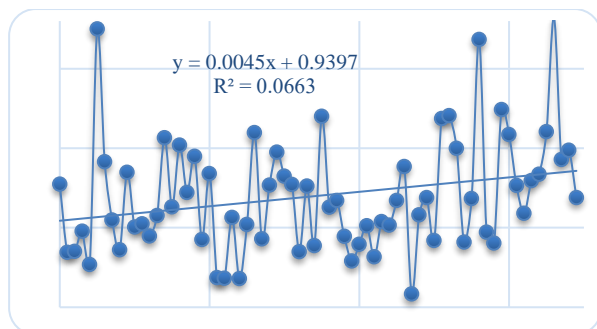


Fig. 3. Relative profit in alfalfa production
 Source: Own results

Table 5 showed the farms' relative profit status for the alfalfa growing. Group III had the highest share with 69.23 percent relative profit (equal to 1 or more), followed by the group I with 43.33 percent.

Table 5. Relative profit status in the alfalfa-growing farm (%)

Groups	Relative profit		Total
	Less than 1	Equal 1 or more	
I	56.67	43.33	100.00
II	57.14	42.86	100.00
III	30.77	69.23	100.00
Total	47.14	52.86	100.00

Source: Own results.

In the negotiations with farms, the low rainfall and the decreasing or changing direction of the groundwaters cause a water problem. The high input prices, parallel to this, the lack of the same high price in the product price, climate change, and price differences were among the problems encountered in alfalfa production.

CONCLUSIONS

In this study, input usage levels, costs, and profitability status of production periods were determined using data obtained by survey method from 70 enterprises producing alfalfa in the central district Yenikent town,

Sultanhani district, and Eskil districts, where alfalfa production is heavily carried out in Aksaray province (about 97.72% of Aksaray alfalfa production).

When the cost elements of enterprises were examined the variable costs were 70%, and the fixed costs are around 30%.

The share of the variable cost for large enterprises was less than for small enterprises, due to the high level of mechanisation of enterprises.

But the high level of mechanisation has also ensured that fixed costs for large enterprises were higher than for other enterprises.

Among the variable costs, electricity costs were 28.67%, and fertilisers were 18.49%. Among fixed costs, the highest expense item was the land rent with 21.01%.

When the profitability status of enterprises was examined, the decare yield was 2,004.35 kg, average GPV was 2,190.93 TRY, gross profit was 952.08 TRY, absolute profit was 438.91 TRY, relative profit was 1.25, kg cost was 0.87 TRY, the average kg sales price was 1.09 TRY. Here it is understood that small and medium-sized enterprises have difficulty in saving their costs, and solving the problem of mechanisation, especially large enterprises that reduce labour costs earn more.

The manufacturer has stated that the product loses value when the product is in excess. Some alfalfa trading enterprises also said that unfair competition has been made by breaking the price.

A cooperative such as Konya Karapınar Alfalfa Producers Association established here to determine the market price, it becomes easier to create solutions to problems.

It has become clear that most of our farmers do not have clear information about the water problem. In the project of bringing water from the Hirfanlı dam, which is still working at the moment and will be completed soon, to the region via the Ağağören district with large pipes, the process of transporting pipes and digging pits into which pipes will enter is progressing very quickly.

Infrastructure work will be completed to bring water to the region in the near future. According to the rate at which enterprises use

mechanisation in alfalfa farms, their profitability status increases.

REFERENCES

- [1]Acar, M., Gül, M., 2015, Technical structure and change of carrot production: The case of Konya province (in Turkish). Mustafa Kemal Üniversitesi Ziraat Fakültesi Dergisi, 20 (1), 43-53.
- [2]Açıl, A. F., Demirci, R., 1984, Agricultural Economics Courses (in Turkish). Ankara University Agricultural Faculty Publications: 880, Ankara.
- [3]Akpınar, M.G., Gül, M., Tascioğlu, Y., Karlı, B., Bozkurt, Y., 2018, Factors affecting development and profitability of buffalo husbandry: The case of Turkey. Custos e @gronegocio online, 14(1) 211-233.
- [4]Anonymous, 2022, Importance of Forage Crops (in Turkish). www.adanatarim.gov.tr/Yayinlarimiz/yem_bitkileri. Pdf, Accessed on 15.03.2022.
- [5]Arslan, M., Erdurmuş, C., 2012, An overview of livestock and roughage problems in our Country (in Turkish). Ziraat Mühendisliği, (359), 32-37. <https://dergipark.org.tr/tr/pub/zm/issue/52107/680890>, Accessed on 15.03.2022.
- [6]Bozoğlu, M., Ceyhan, V., Cinemre, H.A., 2001, Economic structure and risks faced by dairy enterprises in Tonya district: Risk measurement and appropriate risk management strategies (in Turkish). Türkiye Ziraat Odaları Birliği, Publication No. 228, Ankara.
- [7]Dağistan, E., Koç, B., Gül, A., Gül, M., 2008, Factor analysis of sheep production: A case study of Middle-South Anatolia (in Turkish). Yüzüncü Yıl Üniversitesi Tarım Bilimleri Dergisi, 18, (2), 67-77.
- [8]Gül, M., 1998, Production cost and producer problems of maize in irrigated areas of Yüreğir province (in Turkish). MSc. Thesis, Çukurova University, Adana.
- [9]Gül, M., 2005, Economic analysis of apple farming in the trans-Taurus mountains region (in Turkish). PhD. Thesis, Çukurova University, Adana.
- [10]Gül, M., Akpınar, M. G., Taşcıoğlu, Y., Karlı, B., Bozkurt, Y., 2018, Economic analysis of buffalo breeding in Turkey. Custos e Agronegocio On Line, 14, 305-335.
- [11]Hatipoğlu, R., Avcioğlu, R., Karadağ, Y., 2009, Forage crops, 'General Section', Section 1.1, Definition and History of Forage Crops (in Turkish). TR Ministry of Agriculture and Rural Affairs, TÜGEM, Vol. 1, 5-10.
- [12]Karimi, E., Oskoueian, E., Oskoueian, A., Omidvar, V., Hendra, R., Nazeran, H., 2013, Insight into the functional and medicinal properties of *Medicago sativa* (Alfalfa) leaves extract. Journal of Medicinal Plants Research, 7(7), 290-297.
- [13]Karlı, B., Gül, M., Akpınar, M. G., Taşcıoğlu, Y., Bozkurt, Y., Şirikçi, B. S., 2021, Analysis of economic structure in water buffalo breeding by geographical regions in Turkey. Buffalo Bulletin, 40, 135-150.
- [14]Kiral, T., Kasnakoglu, H., Tatlıdil, F.F., Fidan, H., Gundogmus, E., 1999, Cost Calculation Methodology and Database Guide for Agricultural Products (in Turkish). Agricultural Economics and Research Institute, TEPGE Report No: 1999-13, p. 143.
- [15]Kuşvuran, A., Tansi, V., Sağlamtimur, T., 2005, Determination of adaptation of alfalfa (*Medicago sativa* L.) and some grasses under the irrigated conditions of Turkish Republic of Northern Cyprus (in Turkish). Turkey VI. Field Crops Congress, 5-9 September 2005, Antalya, Vol. II, 1181-1186.
- [16]Işık, M., Gül, M., 2016, Economic and social structures of water buffalo farming in Muş province of Turkey. Revista Brasileira de Zootecnia, 45(7), 400-408.
- [17]İnan, İ. H., 1998, Agricultural Economics and Management (in Turkish). Extended 4th. Ed., Tekirdağ.
- [18]Marten, G. C., Buxton, D. R., Barnes, R. F., 1988, Feeding Value (forage quality), Chapter 14 in Alfalfa and Alfalfa Improvement, Publisher: Madison, Wisconsin, USA, 463-491.
- [19]Özkan, B., Yılmaz, İ., 1999, Production cost calculations for annual crops: Current situation, problems and suggestions (in Turkish). Tarım Ekonomisi Dergisi, 1999-4, 64-80.
- [20]Rehber, E., 1993, Agricultural Business and Planning (in Turkish). Uludağ Üniversitesi Güçlendirme Vakfı Yayın No 84, Bursa.
- [21]Şahin, K., Keskin, B., 2011, Current situation and problems of forage-producing farms in Gevaş district of Van (in Turkish). Alinteri, 19(2), 7-13. <https://dergipark.org.tr/tr/pub/alinterizbd/issue/2375/30418>, Accessed on 15.03.2022.
- [22]Taha, E. A., 2015, A study on nectar and pollen sources for honeybee *Apis mellifera* L. in AlAhsa Saudi Arabia. Journal of Entomology and Zoology Studies, 3(3), 272-277.
- [23]Turan, N., Altuner, F., 2014, The roughage production potential, problems and suggestions in Van province (in Turkish). Türkiye Tarımsal Araştırmalar Dergisi, 1(1), 91-97. DOI: 10.19159/tutad.29481
- [24]TURKSTAT, 2022, Turkish Statistical Institute, Agriculture database. <https://biruni.tuik.gov.tr/medas/?kn=92&locale=tr>, 2022, Accessed on 15.03.2022.
- [25]Yılmaz, M., 2011, Determination of forage yield and quality of some alfalfa (*Medicago sativa* L.) cultivars under Isparta ecological conditions (in Turkish). MSc. Thesis, Suleyman Demirel University, Isparta.
- [26]Yılmaz, H., Gül, M., Akkoyun, S., Parlakay, O., Bilgili, M. E., Vurarak, Y., Hizli, H., Kılıçalp, N., 2016, Economic analysis of dairy cattle farms in east Mediterranean region of Turkey. Revista Brasileira de Zootecnia, 45, 409-416.
- [27]Yolcu, H., Okcu, M., Tan, M., 2014, Current Situation of organic roughage production in Turkey (in Turkish). Yüzüncü Yıl Üniversitesi Tarım Bilimleri Dergisi, 24(2), 201-209. DOI: 10.29133/yyutbd.235934
- [28]Wikipedia, Aksaray in Turkey, https://ro.m.wikipedia.org/wiki/Fi%C8%99ier:Aksaray_in_Turkey.svg, Accessed on March 15, 2022.