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ORIGINAL PAPER

Determination of herbage quality and mineral matter in some pastures of the Sivrice District of Elazig Province in Turkey*

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Abstract

Investigating the herbage quality and mineral composition of pastures is crucial for understanding the nutritional dynamics of grazing ecosystems. This study analyzed the quality of herbage and mineral content in four unique natural pasture regions of the Sivrice District (Hazar Lake) in Elazig Province between 2022 and 2023. The average values determined in dry herbage over two years are as follows: crude protein content in leguminous plants was (CP) 21.21%, acid detergent fibre (ADF) 18.21%, and neutral detergent fibre (NDF) 33.89% of the sample consists of digestible dry matter (DDM) with a content of 74.71% and a dry matter intake (DMI) of 3.58%. The relative feed value (RFV) is 207.79%, while the potassium (K) content is 2.71%, magnesium (Mg) is 0.32%, calcium (Ca) is 2.66%, and phosphorus (P) is 0.42%. In grasses, the crude protein (CP) content is 13.75%, acid detergent fibre (ADF) is 27.49%, neutral detergent fibre (NDF) is 51.30%, with DDM of 67.49%, DMI of 2.37%, RFV of 124.32%, and K, Mg, Ca, and P contents of 2.54%, 0.20%, 0.54%, and 0.40%, respectively. In other plant families, the CP content is 18.30%, ADF is 25.22%, NDF is 35.21%, with DDM of 69.26%, DMI of 3.47%, RFV of 187.10%, and K, Mg, Ca, and P contents of 2.66%, 0.32%, 1.46%, and 0.32%, respectively. The two-year study indicated that all the pastures studied were in generally good condition in terms of herbage quality, but Pasture-4 (Surek village) had higher values than the other pastures in terms of HP, ADF, NDF, DDM, DMI, RFV, Ca and Mg, especially in legumes and plants belonging to other families; and Pasture-3 (Guney village) had higher values than the other pastures in terms of the same characteristics in grasses.

Keywords: Elazig, Sivrice, pasture, crude protein, ADF, NDF mineral substances

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INTRODUCTION

In Turkey, animal husbandry has predominantly developed as pasture animal husbandry, with natural meadows and pastures as the main source of fodder. For many years, irregular, excessive and early grazing has greatly reduced the productivity of our natural meadows and pastures. Additionally, the lack of development in fodder crops agriculture has resulted in the herbage produced by our meadows and pastures being insufficient to feed our animals (Bakir, Acikgoz 1976). The meadow and pasture land in Turkey covers 14.6 million hectares. The Eastern Anatolia Region accounts for 37.53% of the meadow and pasture areas in Turkey, with 5.5 million hectares (TSI, 2023).

Feed quality has a direct impact on animal performance, feed value and ultimately profitability or gain. Feed quality can be defined in a number of ways. Feed quality is related to nutritional value, energy value, protein content and quality, digestibility, fiber content, mineral content, vitamin content and ratios, and sometimes animal yield. The nutritional value of feed is usually related to the available energy content, the total digestible nutrient (TDN) and the crude protein ratio. Although feed quality is a broad term, it includes not only the nutritional value but also the feed intake and consumption. In practice, the performance of grazing animals reflects the quality of the forage. The quality of forage crops is determined according to the milk yield and milk yield increase, live weight gain and animal performance (Newman et al. 2009). In addition to the botanical composition of pastures, which are the cheapest source of roughage for animals, it is important to know the chemical components of the plants in the pasture or the forages derived from these plants. In animal husbandry, the quality of roughage is of great importance and the quality of forage varies according to the content of nutrients and mineral elements and the distribution of balance in the forage. The feed value of pasture herbage, i.e. the nutrient and mineral content, varies according to the composition of the herbage (legumes, grasses and other families), the climate and soil characteristics, and the utilization (grazing) factors. The quality of the herbage has an effect on feed consumption, with good and high quality herbage being more preferred, consumed and digested by animals and even leaving the digestive tract more quickly than low quality herbage (Ensminger et al. 1990).

In the studies conducted on forage quality in pastures, the crude protein value in legume family plants was 13.50-36.23%, ADF 13.50-37.79%, NDF 25.80-52.00%, DDM 59.50-78. 40%, DMI 2.31-4.65%, RFV 111.4-283.0 (Canbolat, Karaman 2009, Acikbas et al. 2017, Basbag et al. 2019, Tan et al. 2019, Karahan 2023). K 0.67-3.82%, Ca 0.56-2.09%, Mg 0.11-0.51% and P 0.20-1.28% (Gursoy, Macit 2017, Basbag et al. 2019, Karahan 2023). In grasses, the following were determined: CP 6.20-20.24%, ADF 22.9-43.2%, NDF 33.4-74.6%, DDM 55.3-71.0%, DMI 1.61-3.59%, RFV 68.9-196. 9%

(Gursoy, Macit 2014, Can, Ayan 2017, Sayar et al. 2018, Tan et al. 2019, Ozduven et al. 2021, Karahan 2023), K 1.63-3.25%, Ca 0.09-1.15%, Mg 0.07-0.35% and P 0.30-1.19% (Can, Ayan 2017, Gursoy, Macit 2017, Karahan 2023). In plants belonging to other families, the determined values were: CP 10.74-25.37%, ADF 17.31-40.99%, NDF 26.39-56.34%, DDM 57.0-75.4%, DMI 2.13-4.55%, RFV 94.1-251.2%, K 1.20-3.78%, Ca 0.94-2.01%, Mg 0.22-0.63% and P 0.14-0.40% (Basbag et al. 2018, 2020, Karahan 2023).

The aim of this study was to determine the quality (crude protein, ADF, NDF), digestibility, relative feed value and macronutrient (Ca, Mg, P and K) content of grass from four different pastures in Sivrice district of Elazıg province.

MATERIALS AND METHODS

The research was carried out in the pastures of Guney, Kurk, Haftasar and Surek villages of the Sivrice District of Elazig province, which is located in the East Anatolian Region of Turkey, about 30-40 km away from the western side of Hazar Lake, between 15 May and 30 May in 2022 and 2023. Some geographical data of the study area are given in Table 1.

Table 1

Some geographical and topographical location information of the studied pasture areas

Pastures	Villages	Altitude (m)	Latitude (°N)	Longitude (°E)
1	Haftasar	1487	38°26′2.27890”	39°17′13.26650”
2	Kurk	1300	38°26′28.83730”	39°16′3.34420″
3	Guney	1300	38°29′46.17570″	39°20′23.06060″
4	Surek	1276	38°26′31.74780”	39°19′29.39890″

May temperatures in the study area in both years were close to the long-term average (17°C). In the spring period, when the vegetation started to revive, the total rainfall was 275.3 mm in the first year of the study and 387.3 mm in the second year. The total rainfall in the spring period for many years was 169.6 mm (GDM, 2023).

Soil samples were taken for analysis in four different pastures in both years. For this purpose, soil samples were taken randomly from each pasture at a depth of 0-30 cm from eight different locations representative of that pasture and, after homogeneous mixing, were analyzed at the Soil Analysis Laboratory of the Elazig Provincial Directorate of Agriculture and Forestry. According to the results of the soil analyses, it was found that the composition class of the examined pasture areas did not differ between the pasture orientations and had a clayey-loamy structure (Table 2).

Table 2

Two-year average soil analysis results of the studied pasture areas for the years 2022 and 2023*

Soil property	Pasture				Mean
	1	2	3	4	
Saturation (%)	59.40	50.60	63.25	50.6	55.96
pH	6.50	7.00	7.20	6.9	6.90
Total salt (%)	0.02	0.02	0.02	0.02	0.02
Lime (%)	1.09	0.59	1.09	0.99	0.94
Organic matter (%)	2.84	2.69	2.32	2.82	2.67
Available phosphorus (P_2O_5 kg ha^{-1})	9.19	13.63	7.02	9.22	9.77
Potassium available (K_2O kg ha^{-1})	33.62	102.57	44.46	23.38	51.01
Soil composition	clayey-loamy				

* Soil analyses were carried out at the Soil Analysis Laboratory of Elazig Provincial Directorate of Agriculture and Forestry.

The pasture where the research was conducted was found to have a clay loamy-loamy structure, neutral pH, salt-free environment, medium level of organic matter, lack of lime, and a high content of available phosphorus and potassium.

Green herbage samples were taken from four separate pastures. Each pasture was represented by two fifty0-meter-long lines. These lines were at least 30 meters apart and each pasture was replicated four times. At 8 points on each line, 10 m apart, herbage samples were collected using 33x33 cm frames. Each replicate was created by evenly mixing the collected samples. The plant samples were classified into three groups based on their family: grasses, legumes and other families. The sample collection as described above was carried out on all the plots, with a total of 4 replicates. For each pasture investigated, green herbage samples were collected from 32 different locations that were representative of the specific pasture (a total of 128 green herbage samples for 4 pastures). The green herbage samples in each frame were collected by mowing at a height of 5 cm above ground level. The samples were dried at room temperature for 10 days. Once the dry herbage was homogeneously mixed, small random samples were selected for grinding. The samples were ground in a laboratory mill (IKA A11 Basic) and sieved through a 1 mm laboratory sieve (Retsch, DIN-ISO 3310/2) at the Seed Laboratory of the Faculty of Agriculture, Dicle University. Then, the crude protein (CP), acid detergent fibre (ADF), neutral detergent fibre (NDF), calcium (Ca), magnesium (Mg), phosphorus (P) and potassium (K) values were measured by NIRS (Near Infra-red Spectroscopy, Foss model 6500) in the laboratory of the Dicle University Science and Technology Application and Research Centre (DUBTAM). The C-0904FE Hay and Fresh Forage Calibration set of the NIRS instruments was used to determine the above

parameters (Basaran et al. 2011, Cinar 2012, Basbag et al. 2018, 2019, 2020). In the study, by using the ADF and NDF values, the DDM, DMI and RFV values of the plant species were calculated using the following equations (Schroeder 1994, Morrison 2003).

$$DDM = 88.9 - (0.779 \times ADF),$$
$$DMI = 120 / NDF,$$
$$RFV = (DDM \times DMI) / 1.29.$$

The results obtained from the research were evaluated by the analysis of variance according to the four replicate randomized blocks experimental design using the statistical package JMP. Following the results of the analysis of variance, statistically significant factor means were compared using the LSD (5%) multiple comparison test according to Steel and Torrie (1980).

RESULTS AND DISCUSSION

Crude protein (CP)

The crude protein content in forage is desired to be as high as possible since it improves the quality of roughage. In the four different pastures studied, the two-year average crude protein (CP) values varied between 20.16-22.97% (mean 21.21%) in the legumes, 11.60-16.42% (mean 13.75%) in the grasses and 17.74-18.74% (mean 18.30%) in the plants belonging to other families. In accordance with the quality standards established by Lacefield (1988), feeds comprising legumes, grasses and their mixtures are classified as "prime" when the crude protein value exceeds 19%. In this regard, it can be observed that legumes are classified as belonging to the "prime" group, while other family plants are placed in the "1st quality" group, and grasses is categorised as belonging to the "2nd or 3rd quality" group. According to the results, the highest CP values were obtained from pasture 4 (22.97%) for legumes, pasture 2 (16.42%) for grasses, and pasture 4 (18.74%) for other families. The lowest values were obtained from pastures 1, 2 and 3, which were statistically in the same group in legumes (Table 3). During the field study, it was observed that pasture 4 exhibited a higher concentration of legumes. Consequently, the protein value of the grass obtained from this pasture was found to be higher.

In similar studies on the CP value in pastures, CP values varied between 13.50-36.23% (Canbolat, Karaman 2009, Acikbas et al. 2017, Basbag et al. 2019, Tan et al. 2019, Karahan 2023) in plants belonging to legume family, 6.20-20.24% (Gursoy, Macit 2014, Can, Ayan 2017, Sayar et al. 2018, Tan et al. 2019, Ozduven et al. 2021, Karahan 2023) in plants belonging to grasses family and 10.74-25.37% (Basbag et al. 2018, Basbag et al. 2020, Karahan 2023) in plants belonging to other families. The findings obtained in our study regarding the crude protein value were found to be compatible with the findings of the literature.

Acid detergent fibre (ADF)

In the studied pastures, two-year average ADF values were obtained between 16.16-19.75% (mean 18.21%) for legumes, 26.23-28.21% (mean 27.49%) for grasses and 24.35-26.19% (mean 25.22%) for other families. In accordance with the quality standards established by Lacefield (1988), when the ADF value is below 31% in legume, grasses and their mixture feeds, they are classified as "prime," or the best quality group. This classification is applicable to legumes, grasses, and other family plants.The best ADF values were obtained from pasture 4 for legumes and other families, and pasture 3 for grasses. In general, the ADF value of legumes is lower than that of grasses and other family plants. Given that pasture 4 exhibited a higher concentration of legumes than the other pastures, the ADF value of the grass obtained from this pasture was found to be lower.

In similar studies, ADF values ranged between 13.50-37.79% in legumes (Canbolat, Karaman 2009, Acikbas et al. 2017, Basbag et al. 2019, Tan et al. 2019, Karahan 2023), 22.9-43.2% in grasses (Gursoy, Macit 2014, Can, Ayan 2017, Sayar et al. 2018, Tan et al. 2019, Ozduven et al. 2021, Karahan 2023) and 17.31-40.99% in other families (Basbag et al. 2018, 2020, Karahan 2023). The results from our investigation into the ADF value align with the literature findings.

Neutral detergent fibre (NDF)

Two-year average NDF values in the studied pastures varied between 30.92-36.86% (mean 33.89%) in legumes, 48.67-53.32% (mean 51.30%) in grasses, and 32.85-38.29% (mean 35.21%) in other families. In accordance with the quality standards established by Lacefield (1988), a NDF value below 40% in legumes, grasses, and their mixtures indicates that they are in the "prime" category, which represents the optimal quality group. In this regard, it can be observed that legumes and other related plants are classified as belonging to the "prime" quality group, while grasses are placed in the "second" quality group. Pasture 4 for legumes, pasture 3 for grasses and pasture 4 for other families gave the best NDF values in the studied pastures. In general, the NDF value of legumes is lower than that of grasses and other family plants. Given that pasture 4 exhibited a higher concentration of legumes than the other pastures, the NDF value of the grass obtained from this pasture was found to be lower.

In comparable studies, the values of neutral detergent fibre (NDF) exhibited substantial fluctuation. Specifically, NDF values were between 25.80 and 52.00% for legumes (Canbolat, Karaman 2009, Acikbas et al. 2017, Basbag et al. 2019, Tan et al. 2019, Karahan 2023) between 33.4 and 74.6% for grasses (Gursoy, Macit 2014, Can, Ayan 2017, Sayar et al. 2018, Tan et al. 2019, Ozduven et al. 2021, Karahan 2023) and between 26.39 and 56.34% for other plant families (Basbag et al. 2018, 2020, Karahan 2023). The results of our study on the NDF value were consistent with the existing literature.

Digestible dry matter (DDM)

The mean two-year DDM values for legumes in the pastures under study ranged from 73.52% to 76.31% (mean 74.71%). Grasses achieved a lower range of 66.92% to 68.46% (mean 67.49%), while other families had a mean range of 68.50% to 69.94% (mean 69.26%). In accordance with the quality standards established by Lacefield (1988), legumes, grasses, and their mixtures are classified as "prime" or the highest quality group when the DDM value is above 65%. In this context, it can be observed that legumes, grasses and other families are included in the "prime" category. In the studied pastures, the best DDM values were given by pasture 4 in legumes and other families, while pasture 3 provied the best DDM values for grasses. Due to the low ADF value of pasture 4, the highest DDM value was obtained from this pasture.

In similar studies, DDM values ranged between 59.50-78.40% (Canbolat, Karaman 2009, Acikbas et al. 2017, Basbag et al. 2019, Tan et al. 2019, Karahan 2023) in legumes, 55.3-71.0% (Gursoy, Macit 2014, Can, Ayan 2017, Sayar et al. 2018, Tan et al. 2019, Ozduven et al. 2021, Karahan 2023) in grasses and 57.0-75.4% (Basbag et al. 2018, 2020, Karahan 2023) in plants belonging to other families. The findings obtained in our study were found to be compatible with the findings of the literature.

Dry matter intake (DMI)

In the pastures under investigation, legumes had an average DMI value of 3.58% (ranging from 3.26% to 3.92%), grasses had an average DMI value of 2.37% (ranging from 2.26% to 2.49%), and other families had an average DMI value of 3.47% (ranging from 3.15% to 3.77%) over a two-year period. In accordance with the quality standards established by Lacefield (1988), legume and grasses, as well as their mixtures, are classified as belonging to the "prime" group, which represents the highest quality category, when the DMI value is above 3%. In this regard, it can be observed that legumes and other related plants are classified as belonging to the "prime" group, while grasses are categorised as belonging to the "second quality" group. The most optimal DMI values were achieved in legumes and other families from pasture 4, and in grasses from pasture 3, based on our examination of the pastures. The low NDF value of pasture 4 resulted in the highest DMI value being obtained from this pasture.

In the past studies, legumes showed DMI values ranging from 2.31-4.65% (Canbolat, Karaman 2009, Acikbas et al. 2017, Basbag et al. 2019, Tan et al. 2019, Karahan 2023), wheatgrass ranged from 1.61-3.59% (Gursoy, Macit 2014, Can, Ayan 2017, Sayar et al. 2018, Tan et al. 2019, Ozduven et al. 2021, Karahan 2023), and other families ranged from 2.13-4.55% (Basbag et al. 2018, 2020, Karahan 2023). Our research findings align with previous literature regarding the DMI value.

Relative feed value (RFV)

In the observed grasslands, the mean two-year RFV values ranged from 188.9-232.3 in legumes, 117.3-132.6 in grasses (mean 124.3), and 167.1-205.5 in other families (mean 187.1). In accordance with the quality standards established by Lacefield (1988), when the relative feed value of legumes, wheatgrass and their mixtures exceeds 151, they are classified as belonging to the "prime" category, which represents the highest quality group. In this context, it can be observed that legumes and other related plants are classified as belonging to the "prime" group, while wheatgrass belongs to the "1st" and "2nd" quality groups. Pasture 4 for legumes and other families and pasture 3 for grasses achieved the highest RFV values out of all the observed pastures. The highest relative feed value was obtained from pasture 4, which exhibited high values of DDM and DMI.

In analogous research, RFV values in legumes ranged from 111.4-283.0 (Canbolat and Karaman 2009, Acikbas et al. 2017, Basbag et al. 2019, Tan et al. 2019, Karahan 2023), in grasses from 68.9-196.9 (Gursoy and Macit 2014, Can and Ayan 2017, Sayar et al. 2018, Tan et al. 2019, Ozduven et al. 2021, Karahan 2023) and in other families from 94.1-251.2 (Basbag et al. 2018, Basbag et al. 2020, Karahan 2023). Our observations regarding the RFV value were found to be consistent with the literature.

Potassium (K)

Two-year mean K percentages for legumes, grasses, and other families in the studied pastures ranged between 2.26-3.14% (mean 2.71%), 2.06-3.35% (mean 2.54%), and 2.45-3.10% (mean 2.66%), respectively. Muller (2009) posited that the K content of pastures under grazing should be approximately 3% for mixtures comprising legumes, grasses, and other plants. From this perspective, the K values obtained from legumes, grasses and other family plants are found to be in close proximity to these values. The best performing pastures for K were pasture 2 for legumes and grasses, and pasture 1 and pasture 2 for other families.

Other similar studies have shown K values from 0.67-3.82% (Gursoy, Macit 2017, Basbag et al. 2019, Karahan 2023) for legumes, 1.63-3.25% (Can, Ayan 2017, Gursoy, Macit 2017, Karahan 2023) for grasses and 1.20-3.78% (Basbag et al. 2018, 2020, Karahan 2023) for other families. The potassium content results from our study were consistent with the literature findings.

Calcium (Ca)

The pastures under study showed Ca values ranging from 1.54-1.83% (mean 1.66%) for legumes, 0.39-0.63% (mean 0.54%) for grasses and 1.37-1.56% (mean 1.46%) for other plant families. Muller (2009) reported that the Ca value in pastures under grazing should be 1.30% for legumes, 0.43% for grasses and between these values for mixtures with other plants. From this

perspective, it can be concluded that the Ca values obtained from legumes, grasses and other family plants are sufficient. Pasture 4 exhibited the highest Ca values for legumes, whereas pasture 3 displayed the best Ca values for grasses and other plant families.

In comparable studies, calcium values varied between 0.56-2.09% (Gursoy, Macit 2017, Basbag et al. 2019, Karahan 2023) among legumes, 0.09-1.15% (Can, Ayan, 2017, Gursoy, Macit 2017, Karahan 2023) among grasses and 0.94-2.01% (Basbag et al. 2018, 2020, Karahan 2023) in other plant families. Our study's results on the Ca content were consistent with the literature's findings.

Magnesium (Mg)

The average values were 0.26-0.36% (mean 0.32%) for legumes, 0.16-0.22% (mean 0.20%) for grasses, and 0.29-0.33% (mean 0.32%) for plants belonging to other families. Over the course of two years, the study analysed Mg values in various pastures. Muller (2009) reported that the magnesium (Mg) value in pastures under grazing should be 0.26% for legumes, 0.20% for grasses and between these values for mixtures with other plants. From this perspective, it can be concluded that the Mg values obtained from legumes, grasses and other family plants are sufficient. Pasture 3 and pasture 4 were found to have the highest Mg values in legumes and grasses, while pasture 2 and pasture 4 showed the best results for other families, although not statistically significant.

In similar studies, Mg values varied between 0.11-0.51% (Gursoy, Macit 2017, Basbag et al. 2019, Karahan 2023) in legumes, 0.07-0.35% (Can, Ayan 2017, Gursoy, Macit 2017, Karahan 2023) in grasses and 0.22-0.63% (Basbag et al. 2018, 2020, Karahan 2023) in other families. The results obtained from our study on the magnesium content are consistent with the literature.

Phosphorus (P)

Two-year average phosphorus values in the pastures under study ranged from 0.40% to 0.43% (average 0.42%) in legumes, 0.38% to 0.46% (average 0.40%) in grasses, and 0.29% to 0.35% (average 0.32%) in other plant families. Muller (2009) reported that the P value in pastures under grazing should be 0.31% for legumes, 0.25% for grasses and between these values for mixtures with other plants. From this perspective, it can be concluded that the P values obtained from legumes, grasses and other family plants are sufficient. The best P values in the studied pastures were given by pasture 1 and pasture 2, in legumes – by pasture 2, and pasture 4 ensured the bst P values in grasses and other families. As a matter of fact, the amount of available phosphorus was high in the soil analyses of pasture 2, pasture 4 and pasture 1 (Table 3).

In comparable studies, the phosphorous (P) values ranged from 0.20-1.28% in legumes (Gursoy, Macit 2017, Basbag et al. 2019, Karahan 2023), 0.30-1.19%

in wheatgrass (Can, Ayan 2017, Gursoy, Macit 2017, Karahan 2023) and 0.14-0.40% in plants belonging to other families (Basbag et al. 2018, 2020, Karahan 2023). Our results align with previous literature findings.

Table 3

Two-year average results of herbage and mineral analyses (%) from four pastures in the Elazig-Sivrice district and corresponding groupings

Family		Pasture				Mean	LSD	Cv
		1	2	3	4			
Legumes	CP	20.16*b*+	20.83*b*	20.86*b*	22.97*a*	21.21	1.432**	4.59
	ADF	18.09*b*	19.75*a*	18.86*ab*	16.16*c*	18.21	2.278**	8.51
	NDF	36.86*a*	34.73*b*	33.05*c*	30.92*d*	33.89	2.259**	4.53
	DDM	74.81*b*	73.52*c*	74.21*bc*	76.31*a*	74.71	1.775**	1.62
	DMI	3.26*d*	3.46*c*	3.69*b*	3.92*a*	3.58	0.271**	5.16
	RFV	188.89*c*	197.15*c*	212.79*b*	232.34*a*	207.79	20.723**	6.78
	K	2.86*b*	3.14*a*	2.60*c*	2.26*d*	2.71	0.157**	3.94
	Ca	1.58*c*	1.54*c*	1.69*b*	1.83*a*	1.66	0.071**	2.90
	Mg	0.26*c*	0.30*b*	0.35*a*	0.36*a*	0.32	0.030**	6.40
	P	0.43*a*	0.43*a*	0.41*b*	0.40*b*	0.42	0.016**	2.68
Grasses	CP	13.96*b*	16.42*a*	13.03*c*	11.60*d*	13.75	ns-	5.81
	ADF	27.49*ab*	28.21*a*	26.23*b*	28.02*a*	27.49	2.022**	5.00
	NDF	51.34*a*	53.32*a*	48.67*b*	51.86*a*	51.30	3.444*	4.57
	DDM	67.49*ab*	66.92*b*	68.46*a*	67.07*b*	67.49	1.575**	1.59
	DMI	2.37*ab*	2.26*b*	2.49*a*	2.35*b*	2.37	ns	5.05
	RFV	124.58*ab*	117.25*b*	132.58*a*	122.87*b*	124.32	ns	6.64
	K	2.51*b*	3.35*a*	2.25*c*	2.06*d*	2.54	ns	6.74
	Ca	0.54*b*	0.39*c*	0.63*a*	0.61*a*	0.54	ns	9.93
	Mg	0.20*b*	0.16*c*	0.22*a*	0.22*a*	0.20	0.019**	6.54
	P	0.39*b*	0.46*a*	0.38*bc*	0.38*c*	0.40	0.015*	2.53
Other families	CP	17.74	18.53	18.19	18.74	18.30	1.970**	7.32
	ADF	25.82	24.51	26.19	24.35	25.22	3.075**	8.29
	NDF	36.68*a*	33.03*b*	38.29*a*	32.85*b*	35.21	3.996*	7.72
	DDM	68.78	69.81	68.50	69.94	69.26	2.395**	2.35
	DMI	3.32*b*	3.66*a*	3.15*b*	3.77*a*	3.47	0.427**	8.37
	RFV	177.4*b*	198.5*a*	167.1*b*	205.5*a*	187.1	28.296**	10.28
	K	3.10*a*	2.96*a*	2.13*c*	2.45*b*	2.66	0.321**	8.21
	Ca	1.37*b*	1.45*b*	1.56*a*	1.46*ab*	1.46	ns	6.95
	Mg	0.31	0.33	0.29	0.33	0.32	0.048**	10.47
	P	0.30*b*	0.35*a*	0.29*b*	0.34*a*	0.32	ns	7.17

+Results in the same row marked with different letters indicate a significant year x pasture interaction at (*) $P \leq 0.05$ level and (**) $P \leq 0.01$ level based on the LSD test, CV – coefficient of variation, ns – not significant

CONCLUSIONS

The present two-year study aimed to evaluate the herbage quality and mineral composition of various pastures in the Sivrice District of Elazig Province. This research provides valuable insights into the general state of these ecosystems. The outcomes indicate positive herbage quality levels throughout all examined pastures, highlighting the resilient nature of the local grazing environments. Notably, pasture 4 in Surek village stood out by showing an exceptional performance, exhibiting significantly higher values across essential parameters, such as crude protein (CP), acid detergent fibre (ADF), neutral detergent fibre (NDF), Dry matter intake (DMI), digestible dry matter (DDM), relative feed value (RFV), calcium (Ca), and magnesium (Mg). This increased performance, particularly in legumes and plants from other families, positions pasture 4 as a noteworthy contributor to the forage resources of the region.

Additionally, pasture 3 (Guney village) exhibited heightened values compared to other pastures in CP, ADF, NDF, DDM, DMI, RFV, Ca, and Mg, particularly concerning grasses. This exceptional profile emphasises the diversity among the scrutinized pastures and stresses the significance of factoring in both legumes and grasses when conducting an all-inclusive assessment of forage quality. The varying performance observed across the diverse pastures highlights the necessity for specific management plans focusing on the strengths of each ecosystem, promoting the implementation of sustainable grazing practices and maximizing the nutritional value of the obtainable forage resources. Overall, the findings of this investigation substantially add to the comprehension of grazing patterns in the Sivrice District, supplying helpful recommendations for farming and environmental administration in the area.

Author contributions

Both authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by F.K.K. The data utilized was interpreted and reviewed by M.B. The first draft of the manuscript was written by F.K.K. and both of authors read and approved the final manuscript.

Conflicts of interest

The authors declare no conflicts of interest in relation to this article.

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