

Evaluation of Two Different Artificial Pastures as Alternative Source For Livestock Production

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Introduction

The stage of growth seems to be the most important factor affecting the chemical composition and digestibility of range forage. In general, all forages are highly succulent and palatable in early growth. The objectives of this study were to examine the pastures artificially established in the Mediterranean region in terms of stage of maturity, quality, yield and botanical composition.

Material and methods

This study was conducted at Isparta (37°45'N, 30°33'E, elevation 1035 m) located in the Mediterranean region of Turkey during the 2010 and 2011. For this purpose, 3ha pasture land was chosen adjacent to the university farm located in Isparta province and divided into two pasture lands (AP1 and AP2 each 1.5ha), and cultivated in March 2010 with two different botanical compositions, AP1, mixtures of *Medicago sativa* L.(20%) + *Bromus inermis* L. (40%) + *Agropyron cristatum* L. (30%) + *Poterium sanguisorba*(10%); and AP2, mixtures of *Medicago sativa* L. (15%) + *Onobrychis sativa*Lam. (15%) + *Agropyron cristatum* L. (35%) + *Bromus inermis* L. (35%), respectively. Seven harvesting times starting from the 1st May to the 1st August 2011 were applied and grass samples were collected by using 1m² quadrates fortnightly. The green yield, dry matter (DM) yield, crude protein (CP), acid detergent fibre (ADF) and neutral detergent fibre (NDF) contents were determined in this research. Besides, the changes in dry weight ratios of botanical compositions were also determined at each sample collection.

Results and Discussion

The results showed that both the effects of mixtures of artificial pastures were significant for green yield and DM yield and the effects of harvesting times were also significant at all components. The green (31.16 t ha⁻¹) and DM (13.81 t ha⁻¹) yields of AP2 were significantly higher than those of AP1. The significant changes were observed in green and DM yield, CP, ADF and NDF contents of the pastures according to harvesting times (Table 1). The green yields increased from 1 May to 15 May, but it linearly decreased at later harvest times. The DM yield of AP1 increased until the third harvesting time, reached the highest value (12.10 t ha⁻¹) while DM yield of AP2 increased until the fourth harvesting time, reached the highest value (16.73 t ha⁻¹). This could be explained by plant maturation and cell wall lignification (Sankhyan et al., 1999).

The highest CP contents were obtained from first harvest time in AP1 (17.91%) and AP2 (17.96%). Crude protein contents decreased with advancing stages in the present study (Table 1). Other reports also support that the concentration of CP decreases by advancing stage of maturity (Balde et al., 1993), suggesting that animals should be supplemented with protein sources, especially towards the end of the grazing season. The highest ADF and NDF contents were obtained from final harvesting time (30 July) in AP1 (49.59, 67.24%, respectively) and AP2 (52.42, 68.57%, respectively) (Table 1). The trends in ADF and NDF contents with increasing maturity are normally lead in the reverse of protein (Rebole et al. 2004; Turk et al. 2009).



Table 1. Effect of harvesting times on green yield, dry matter yield, crude protein, ADF and NDF contents of artificial pastures.

Harvesting Times	Green Yield (t/ha)		DM yield (t/ha)		CP (%)		ADF (%)		NDF (%)	
	AP1	AP2	AP1	AP2	AP1	AP2	AP1	AP2	AP1	AP2
1 May	33.72 b	44.03 b	8.92 d	11.86 e	17.91 a	17.96 a	37.33 g	39.57 f	51.07 g	52.43 g
15 May	37.81 a	46.13 a	11.46 b	14.16 c	14.15 b	13.97 b	40.15 f	42.47 e	55.13 f	55.84 f
30 May	32.13 c	40.73 c	12.10 a	15.82 b	12.64 c	12.28 c	42.86 e	45.74 d	58.80 e	60.34 e
15 June	22.72 d	34.52 d	10.76 c	16.73 a	11.31 d	11.17 d	45.52 d	48.08 c	62.07 d	62.72 d
30 June	18.52 e	25.34 e	11.24 b	16.16 b	10.22 e	9.97 e	47.21 c	50.55 b	64.40 c	65.96 c
15 July	14.21 f	16.35 f	10.84 c	12.79 d	9.42 f	9.19 f	48.64 b	51.97 ab	66.15 b	68.01 b
30 July	10.81 g	11.04 g	8.76 d	9.18 f	9.08 g	9.03 f	49.59 a	52.42 a	67.24 a	68.57 a
Mean	24.27 B	31.16 A	10.58 B	13.81 A	12.10	11.94	44.47	47.26	60.69	61.98

The botanical composition of the pastures changed significantly at advanced harvesting times. While dry weight ratios of *Bromus inermis* L. was increased gradually, those of the rest of mixtures were decreased (Table 2).

Table 2. Effects of harvesting times on dry weight ratios (Botanical Composition) of artificial pastures.

Harvesting Times	AP1				AP2			
	<i>Medicago sativa</i> L.	<i>Poterium sanguisorba</i>	<i>Agropyron cristatum</i> L.	<i>Bromus inermis</i> L.	<i>Medicago sativa</i> L.	<i>Onobrychis sativa</i> Lam.	<i>Agropyron cristatum</i> L.	<i>Bromus inermis</i> L.
1 May	33.12 b	12.06 ab	28.08 a	26.74 d	17.43 b	20.52 a	32.21 c	29.84 e
15 May	34.55 a	12.24 a	27.12 bc	26.11 d	18.57 a	20.49 a	34.23 a	26.71 f
30 May	34.61 a	11.22 c	27.54 ab	26.63 d	17.22 b	18.73 b	33.28 b	30.77 d
15 June	31.42 c	11.52 bc	26.58 cd	30.49 c	16.54 c	18.62 b	33.24 b	31.61 d
30 June	30.59 c	12.40 a	26.15 d	30.87 bc	15.54 d	16.18 c	32.52 bc	35.77 c
15 July	28.66 d	12.14 ab	27.35 a-c	31.85 b	14.29 e	15.56 d	30.62 d	39.53 b
30 July	25.91 e	11.26 c	26.49 cd	36.36 a	13.74 f	14.62 e	30.71 d	40.94 a

Means on each column followed by the same letter were not significantly different at 0.05 level using LSD test

Conclusion

The results indicated that there was a reduction in forage quality at the late stages of vegetation period. Contents of CP ratios decreased with advancing growth while DM yield, ADF and NDF increased in both pastures. It may be concluded that the establishment of AP2 is recommended for the region.

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