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EFFECT OF FEEDING DIFFERENT LEVELS OF GREEN FORAGES AND COMPLETE RATION ON PRODUCTIVE PERFORMANCE OF RUMINANT ANIMALS.

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ABSTRACT: **The present study was conducted to evaluate the nutritional values of two cuts of Kikuyu grass (K.G) as green forage through digestibility trails on sheep and estimated the fresh and DM yield of Kikuyu grass as ton/fed. The experimental rations were:**

Control ration (C): 60% concentrate feed mixture (CFM)+Berseem hay *ad lib*

1st tested ration (T_1): 60 % concentrate feed mixture (CFM) + Kikuyu grass *ad lib*.

2nd tested ration (T_2) : 40 % concentrate feed mixture (CFM)+ Kikuyu grass *ad lib*.

The main results as follow:

Chemical composition of the two cuts of Kikuyu grass showed that, CP, CF, EE, NFE, and Ash (on DM basis) were, 15.09, 26.70, 2.97, 41.56, 13.68 %., respectively in 1st cut and 14.43 ,30.24 , 2.74, 36.96, 15.63 % respectively in 2nd cut.

The dry matter intake were 70.51, 70.46 and 66.95 as g / kg $W^{0.75}$ for rations C (60%CFM +B.H *ad lib*), T_1 (60 % CFM + Kikuyu grass *ad lib*) and T_2 (40 % CFM + Kikuyu grass *ad lib)* by rams fed 1st cut and were 61.77, 6016 and 61.24 g / kg $W^{0.75}$ for all same rations by lambs fed 2nd cut.

The digestibility coefficient of DM, OM and CP of rations T_1 and T_2 were significantly ($p < 0.05$) higher than those of C ration. Also, CF, EE and NFE took the same trend without significantly differences through the 1st cut. Also with the 2nd and cut the digestibility coefficient of all nutrients of T_1 and most nutrients of T_2 were significantly ($P < 0.05$) higher than those of C ration.

The nutritive values as TDN, SE and DCP % were the best with the ration containing Kikuyu grass (T_1 and T_2) compared to (C).

The N- balance was positive by sheep feed rations containing Kikuyu grass (T_1 and T_2) for 1st and 2nd cut.

The total yield (ton / fed) of Kikuyu grass as fresh, DM and CP were 35.70, 7.78 and 1.15., respectively .

The results showed that, feeding on Kikuyu grass as summer green forage in the rations is more suitable for sheep when fed with apart of concentrate.

INTRODUCTION

In Egypt, one of the main important problems in field animal production is the shortage of feedstuffs especially during summer season and early autumn. Several attempts were done to increase and improve animal feeds as partial solution to compensate for the shortage during summer period Ghoneim (1964), Abou-Raya *et al.*, (1965), Ibrahim *et al.*, (1980), (1982), (1983) , (1985), Gabra et al.,(1985)and Abd El-Baki *et al.*,(1994). Also to introduce new summer forage such as Kikuyu grass which is highly nutrients, palatable and its yield is distinctly high Abd El-Hamid (1998).The objective of this work was to study the effects of feeding Kikuyu grass ad lib with different levels of concentrate (60 or 40%) on digestibility ,nutritive values and N-balance .Also to estimate the yield of kikuyu grass (2 cuts).

MATERIALS AND METHODS

This work was conducted in the Department of Animal Production, Faculty of Agriculture, Zagazig University and EL.Gemiza Experimental Station, Animal Production Research

.Institute , Agriculture Research Center, Ministry of Agriculture., Egypt. Kikuyu grass pasture (*pennisetum clandestinum)* was cultivated in half Feddans (one Feedan =4200 m^2)The land was prepared for cultivated by conventional procedure i.e. ploughing and twice harrowing with different sowing date to obtain the same high and age through the experimental periods. The seeding rate was 500-gm/Fed. Fertilization of the cultivated land was achieved by calcium superphosphate (15.5 P_2O_5) at the rate of 100 Kg / fed before sowing and nitrogen fertilization (Urea 46.5%) was added at rate of 30 Kg / fed after 21 days from germination and was repeated after each cut. Irrigation was carried out every 15-21 day according to plants need and climate conditions. Forages were clipped 2 times (2 cuts) when they reached 80 cm in high (50 days) in 1st cuts and 40 days for 2nd cut. Fresh and dry matter (DM) yields of forages as ton / fed were estimated. Three digestibility trials were carried out using 3 mature rams in each trial to evaluate 1st cut of Kikuyu grass.All rams were individually housed in metabolic cages. The animals were weighed at the start and the end of collection period. . Preliminary and collection periods were 15 and 7 day.,respectively. Three digestibility trials were carried out using 3 mature lambs in each trials to determine the effects of different ration (2nd cuts) of Kikuyu grass pasture and concentrate feed mixture (CFM) on nutrients digestibility and nutritive values. The experimental rations were offered as follow:

C: 60% (concentrate feed mixture) + (Berseem hay *ad lib)*

T_1:60 % (concentrate feed mixture) + (Kikuyu grass *ad lib)*

T_2: 40% (concentrate feed mixture) + (Kikuyu grass *ad lib)*

The rations were offered according to the allowance of the rams (NRC, 1986) in each experimental period. The ration was offered twice daily in equal parts. The animals were trained to consume all the offered feed without residues. Water was offered in free amounts. The chemical composition of ration, feces and urine were carried out according to A. O. A. C. (1990). Digestible energy (DE) of tested ration for sheep was calculated according to the equation of Abou Raya *et al.*, (1972) DE (kcal / 100 g DM) = 34.81 + 3.71 TDN %.Composite samples of daily urine containing 10% H_2SO_4 solution were collected for each

animal over enter collection period and stored for N-derimentation.

The chemical analysis of concentrate feed mixture (CFM), Kikuyu grass (KG) 1st cuts and 2nd cuts and Berseem hay (B.H) are shown in Table (1). Statistical analysis using general linear models procedure adapted by Spss (1997) for user's guide, with one-way ANOVA; mean were separated using Ducan's multiple range test (1955).

Table (1) Chemical composition of concentrate feed mixture Kikuyu grass and Berseem hay on D M basis.

Items	CFM*	Kikuyu grass (KG)		Berseem hay (B.H)
		1st cut	2nd cut	
Chemical composition (%)				
DM	89.05	20.81	22.75	89.74
OM	91.35	86.32	84.37	84.62
CP	16.23	15.09	14.43	13.25
CF	12.98	26.70	30.24	28.61
EE	02.73	02.97	02.74	01.74
NFE	59.41	41.56	36.96	41.02
Ash	08.65	13.68	15.63	15.38

* CFM concentrate feed mixture consisted of 35 % wheat bran, 15 % undecortiead cotton seed meal, 30% yellow corn, 15% sunflower meal, 3%molasses, 1.5% limestone and 0.5% salt.

RESULTS AND DISCUSSION

1- Nutritional evaluation of experimental rations containing Kikuyu grass (Frist cut) by rams:

Feed Intake

The daily DM intake per kg $w^{0.75}$ (Table 2) was significantly ($P< 0.05$) decreased in T_2 (40% CFM + Kikuyu grass *ad lib)* comparing with ration C (60% CFM + B.H *ad lib*) and T_1 (60% CFM + Kikuyu grass *ad lib*). While, no significant difference between control ration (C) and T_1 which indicated that Kikuyu grass is more palatable as green forage. The values of DM intake were similar to those reported by Gabra (1984), Abd El-Baki et al., (1994) by sheep fed different Sorghum varieties

Digestion coefficient of nutrients:

The (DM), (OM) and (CP) digestibility of T_1 were significantly ($P< 0.05$) higer than the control ration C this may be due to the associated effect between green forage and concentrate feed mixture.(Table 2). No significant differences of DM and OM digestibility between ration C and T_2. While CP digestibility of ration T_2 was significantly ($P<0.05$) higher than that of ration C. The values were nearly similar to those reported by Moawd (1998) for sheep fed Teosinte, and Sudan grass and Abd El- Baki et al., (1994) on sheep fed 50%CFM + Sweet sorghum *ad lib* (1^{st} and 2^{nd} cuts). No significant differences of CP, EE and NFE digestibility between various rations (C,T_1 and T_2) while T_1 and T_2 showed the best values compared to control ration. Generally, it could be seen that the digestibility coefficient of various nutrients (except for EE) of ration T_1(60%CFM+Kikuyu grass ad lib) were the highest values, while ration C showed the lowest ones.

Nutritive values:

The nutritive values as TDN, SE, DCP and DE of treatment T_1(60% CFM + KG *ad lib*) was significantly ($P<0.05$) higher than other rations C and T_2. This may be due to higher digestibility of most nutrients. On the other hand, control ration C showed the lowest values due to the low digestibility of most nutrients. These values were nearly similar to those reported by Ensminger et al., (1990) of Kikuyu

Table (2): Feed intake, digestibility and nutritive values of experimental rations containing Kikuyu grass by rams (1st cut).

Items \ Rations	Treatments		
	60%CFM+B.H *ad lib* (C)	60%CFM+KG *ad lib* (T_1)	40%CFM+KG *ad lib* (T_2)
No. of animal	3	3	3
Average body weight (kg)	68.67 ± 1.20	68.00 ± 3.51	69.33 ± 2.19
DM intake (g/h/d)			
CFM	1008.93 ± 17.65	999.88 ± 52.34	674.7 ± 25.83
B.H	673.03 ± 25.89	-	-
KG	-	668.63 ± 38.66	933.85 ± 10.63
Total DM intake (g/h/d)	1681.96 ± 43.13	166.51 ± 90.56	1608.55 ± 36.23
Total DM intake (g/kgw)$^{0.75}$	70.51^{a} ± 0.96	70.46^{a} ± 1.11	66.95^{b} ± 0.10
Digestion coefficient (%)			
DM	69.11^{b} ± 0.33	72.42^{a} ± 0.41	69.57^{b} ± 0.39
OM	72.47^{b} ± 0.18	76.00^{a} ± 0.54	74.29$^{a b}$ ± 0.53
CP	72.71^{b} ± 0.75	77.96^{a} ± 0.37	76.18^{a} ± 0.72
CF	64.29 ± 0.65	70.84 ± 1.16	68.78 ± 1.70
EE	72.23 ± 0.77	79.81 ± 3.88	81.99 ± 0.69
NFE	75.31 ± 0.58	76.60 ± 0.45	75.41 ± 0.24
Nutritive value % (On DM basis)			
TDN	67.76^{b} ± 0.34	70.69^{a} ± 0.15	68.51^{b} ± 0.41
SE	54.79^{b} ± 0.33	58.08^{a} ± 0.15	54.85^{b} ± 0.39
DCP	10.93^{b} ± 0.17	12.29^{a} ± 0.07	11.85^{a} ± 0.15
DE (kcal/100 g DM)	286.19^{b} ± 2.08	297.06^{a} ± 0.89	288.99^{b} ± 2.46

a , b, c Means in the same row with different superscripts differ ($P < 0.05$)

grass. Also These values agree with those of Abd El-Baki et al., (1994) who reported that the TDN, SE and DCP were increased with increasing concentrate levels in the ration containing forages. (Table 2).

Feed units intake:

The feed units intake as TDN, SE and DCP (g/h/d) for all treatments did not significantly differ for treatments, while T1 (60%CFM+Kikuyu grass *ad lib*) showed the best values.The SE and DCP intake as g/kg $W^{0.75}$ of T_1 (60% CFM +Kikuyu grass *ad lib*) were significantly ($p<0.05$) higher than control ration and T_2, but no significant differences of TDN among the different treatments.

N- balance:

No significant difference of N-intake, N- excreted, N- absorbed and N-balance between different treatments (C,T_1 and T_2). The N-balance was positive for sheep fed control ration (C) and the tested ration (T_1 and T_2) which containing CFM and Kikuyu grass with different levels (Table 3). The N- balance as percent of absorbed for T_2 was significantly ($p<0.0.5$) higher than for T_1, but insignificantly higher than control ration (C).

2- Nutritional evaluation of experimental rations containing Kikuyu grass by mature lambs 2nd cut :

Feed intake:

The daily DM intake by sheep as g / head/ day or per kg $W^{0.75}$ was not significantly affected by inclusion of different levels of Kikuyu grass. This phenomenon indicate that, Kikuyu grass is more palatable. The values of DM intake were lower than that of 1st cut which may be due two high CF content (Table 1).

Digestion coefficients:

The DM and EE digestibility of T_1(60% CFM + Kikuyu grass *ad lib*) Table 4. were significantly ($p<0.05$) higher than for control ration C and T_2. Also, the OM, CP and CF digestibilities for ration T_1 and T_2 (which are containing Kikuyu grass) are significantly ($p<o.o5$) higher than for control ration (without Kikuyu grass) which may be due to associative effect between green farage and

Table (3): Daily feed units intake and N- balance of experimental ration containing Kikuyu grass (1st cut) by rams.

Rations / Items	Treatments		
	60%CFM+B.H *ad lib* (C)	60%CFM+KG *ad lib* (T_1)	40%CFM+KG *ad lib* (T_2)
Feed units intake (g/d)	1139.81 ± 33.00	1179.88±67.96	1102.27±31.84
TDN	920.26 ± 16.77	968.72± 49.21	882.60± 27.93
SE	183.88 ± 4.86	105.04± 9.66	190.75± 4.45
DCP			
Feed units intake ($g/W^{0.75}$)			
TDN	47.77^{a} ± 0.75	49.78^{ab}± 0.95	45.87^{abc} ±0.37
SE	38.58^{b} ± 0.21	40.99^{a} ± 0.55	36.72^{c} ± 0.40
DCP	7.71^{b} ± 0.12	8.65^{a} ± 0.08	7.94^{b} ± 0.10
N- balance			
N- intake (g/h/d)	40.46± 0.99	42.10± 2.28	40.07± 0.92
N-excreted			
Fecal -N	11.04± 0.58	9.30± 0.74	9.54 ± 0.54
Urine -N	23.03± 041	26.22± 1.80	22.60 ± 0.43
Total	34.07± 0.77	35.52± 2.52	32.14 ± -.87
N- Absorbed	29.42± 0.77	32.80± 1.54	30.52 ± 0.71
N- balance	6.39± 0.37	6.57± 0.52	7.92 ± 0.41
% of intake	15.78±0.55	15.75±1.34	19.65 ± 0.62
% of absorbed	21.69^{ab} ±0.50	20.19^{b} ± 1.48	25.94^{a} ± 0.59

a, b, c, Means in the same row with different superscripts differ ($P< 0.05$)

Table (4): Feed intake, digestibility, and nutritive values of experimental rations containing Kikuyu grass (2nd cut) by sheep

Rations / Items	Treatments		
	60%CFM+B.H *ad lib* (C)	60%CFM+KG *ad lib* (T1)	40%CFM+KG *ad lib* (T2)
No. of animals	3	3	3
Average body weight (kg)	40.00± 1.155	40.33± 2.60	39.66± 2.18
DM intake (g/h/d)			
CFM	587.73± 16.96	592.62± 38.25	391.83± 20.40
B.H	394.84± 113.72	-	-
KG	-	371.57±30.46	577.23±37.92
Total DM intake (g/h/d)	982.57± 30.26	964.19± 67.24	969.06± 58.32
Total D M intake g/kW $^{0.75}$	61.77±0.62	60.16± 1.49	61.24±1.16
Digestion Coefficient %			
DM	69.11^{b}±0.28	70.78^{a} ± 0.08	69.51^{b} ±0.24
OM	72.61^{b} ±0.24	74.71^{a} ± 0.22	74.00^{a} ±0.08
CP	71.61^{b} ±0.98	76.25^{a} ±0.68	74.60^{ab} ± 0.29
CF	64.78^{b} ±0.28	70.93^{a} ± 0.92	71.86^{a} ±1.30
EE	74.33^{c} ±0.29	83.61^{a} ± 0.32	80.74^{b} ±0.12
NEE	75.60 ±0.70	75.43± 0.45	74.46± 0.44
Nutritive value %			
TDN	66.30^{c} ± 0.23	69.53^{a} ± 0.16	67.48^{b} ± 0.19
SE	53.43^{b} ± 0.42	56.15^{a} ±0.21	53.23^{b} ± 0.22
DCP	10.79^{c} ± 0.23	11.85^{a} ±0.16	11.52^{ab} ± 0.15
DE(kcal/100 g DM)	279.11^{b} ± 2.62	292.76^{a} ±0.98	285.17^{b} ± 1.16

.a, b, c Mean in the same raw with different superscripts differ (P< 0.05)

concentrate. Also may due to decreasing DM intake (60.16 and 61.24 g/kgw$^{0.75}$) . These results are in agreement with Anderson et al., (1959). Moe et al., (1965) and EL-Gendy (1990).

Nutritive values:

The TDN and SE for T_1 (Table 4) were significantly ($p<0.05$) higher than for control ration C and T_2 while, DCP for treatments T_1 and T_2 was significantly ($p<0.05$) higher than for control ration. It was showen that, the nutritive values as TDN, SE, DCP and DE of T_1 were higher than others due to increasing digestibility of most nutrients, while control ration (C) showed the lowest one, due to decreasing digestibility of most nutrients. These values were nearly similar to those reported by Ensminger et al., (1990) and Abd EL-Baki et al., (1994).

Feed units intake:

The feed units intake of TDN, SE and DCP intake (Table 5) as g/kgW$^{0.75}$ for all rations were not significant while T_1showed the best values.

N- balance:

The DCP intake (Table 5) was highest for T_1 and lowest for C treatment, with no significance differences between treatment . The N- absorbed g , for T_1 was the highest value (18.28) compared to others treatments, This may due to higher N- intake and digestibility The N – balance for sheep fed T_2 was significantly ($p< 0.05$) higher than for control ration (C) but insignificantly higher than T_1. Generally, the N-balance was positive for sheep fed control ration (C) and the experimental rations (T_1 and T_2) which containing Kikuyu grass with different levels. The N–balance as percent of intake or absorbed for T_2 were significantly ($p<0.05$) higher than for control (C) but insignificantly higher than for T_1

Yield of Kikuyu grass:

From the data in (Table 6) It is clear that, the yield of Kikuyu grass as 1st cut were 16.80 ton ,3.49 ton for green yield, DM and 0.53 Ton CP yield. While the corresponding values were 18.90 ton, 4.29 ton and 0.62 Ton for 2 nd cut. The total yield were 35.07 ton ,7.78 ton and 1.15 Ton for green yield, DM and CP yield.

The total yeild of Kikuyu grass as fresh, DM and CP are

Table (5): Daily feed units intake and N- balance of experi - mental rations containing Kikuyu grass (2^{nd} cut) by sheep

Rations / Items	Treatments		
	60%CFM+B.H *ad lib* (C)	60%CFM+KG *ad lib* (T_1)	40%CFM+KG *ad lib* (T_2)
Feed units intake (g/h/d)			
TDN	651.65± 23.51	670.13± 44.80	653.67± 36.96
SE	525.17±20.07	548.34± 41.49	509.09±2810
DCP	106.31±4.38	114.22± 8.40	109.86± 5.76
Feed units intake (g/W $^{0.75}$)			
TDN	40.95± 0.35	41.83± 0.31	41.32± 0.13
SE	33.00±0.57	34.21± 1.32	32.19±0.44
DCP	6.67± 0.20	7.12± 0.17	6.95±0.07
N- balance			
N – intake	23.68± 0.73	23.96± 01.65	23.50± 1.40
N- excreted			
Fecal -N	6.71± 0.35	5.68± 0.41	5.96±0.46
Urine –N	12.09± 0.41	11.78± 0.81	11.08± 0.80
Total	18.80± 0.66	17.46± 1.19	17.04± 1.13
N – absorbed	16.97± 0.74	18.28±1.34	17.54± 0.94
N – balance	4.88^{b}± 0.54	6.50^{ab} ± 0.68	7.46^{a} ± 0.29
% of intake	20.54^{b} ± 1.44	27.09^{ab} ± 1.12	32.04^{a} ±1.82
% of absorbed	28.58^{b} ± 1.40	$35.48^{a\,b}$ ±1.08	42.87^{a} ±2.15

a, b, c Mean in the same row with different superscripts differ (P< 0.05)

35.07, 7.78 and 1.15 Tons par fedden respectively through the two cuts . These results are in agreement with Abd El-Hamid (1998).

In conclusion, feeding kikuyu grass as a new Summer green forage Egypt (1st and 2nd cut) in the rations is more suitable for sheep and when fed with a part of concentrate feed mixture (60 or 40%)which improved feed intake, digestibility and nutritive values. Also the kikuyu grass give a high yield of green forage.

Table (6) Green forage, dry matter and crude protein (ton per feddan) for Kikuyu grass.

Items	Green yield (Ton/fed)	DM yield (Ton/fed)	CP (Ton/fed)
1 st cut	16.80	3.49	0.53
2 nd cut	18.90	4.29	0.62
Total	35.07	7.78	1.15

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تأثير التغذية على مستويات مختلفة من الأعلاف الخضراء والعلائق المتكاملة على الأداء الإنتاجي للحيوانات المجترة

جمال الدين على عبد الرحمن* ، شريف يوسف شريف*

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تم أجراء هذه الدراسة فى كل من قسم الإنتاج الحيوانى كلية الزراعة جامعة الزقازيق ومحطة بحوث الإنتاج الحيوانى التابعة لمعهد بحوث الإنتاج الحيوانى – مركز البحوث الزراعية بغرض دراسة إمكانية زراعة حشيشة الكوكيا تحت الظروف المصرية كعلف أخضر صيفى جديد وتأثير التغذية عليه بواسطة الأغنام مع مستويات مختلفة من العلف المخلوط المركز، وأهم النتائج المتحصل عليها هذا البحث :

١- ظهر التحليل الكيماوى أن المادة الجافة – الألياف الخام – الرماد – فى الحشة الثانية تتفوق على مثيلتها فى الحشة الأولى ، بينما المادة العضوية – البروتين الخام – الدهن الخام والكربوهيدرات الذائبة أخذت الاتجاه المعاكس .

٣- تفوقت معنويا معاملات هضم المادة الجافة – المادة العضوية والبروتين الخام للمعاملة الأولى(٦٠% علف مخلوط مركز + حشيشة كوكيا للشبع) عن مجموعة المقارنة (٦٠% علف مخلوط مركز + دريس برسيم للشبع) ولم تتفوق معنوياً عن المعاملة الثانية (٤٠% علف مخلوط مركز + حشيشة كوكيا للشبع)

٤- تفوقت المعاملة الأولى عن معاملة المقارنة والمعاملة الثانية فى قيم المواد المهضومة الكلية وقيمة معادل النشا والبروتين الخام المهضوم .

٥- كان ميزان الآزوت موجب فى المعاملات الثلاثة وتراوحت قيمته بين ٦,٣٩ – ٧,٩٢ (جرام / رأس / يوم) خلال الحشة الأولى ، بينما تراوحت قيمته بين ٤,٨٨ – ٧,٤٦ (جرام / رأس / يوم) خلال الحشة الثانية .

٦- إنتاجية الفدان خلال الحشة الأولى والثانية ٣٥,٧٠ طن / فدان علف أخضر ، ٧,٧٨ مادة جافة طن / فدان وبروتين خام ١,١٥ طن / فدان .

نستخلص من هذه الدراسة أن تغذية حشيشة الكوكيا للشبع مع مستويين مختلفين من مخلوط العلف المركز (٦٠ ، ٤٠%) للأغنام خلال حشتين متتاليتين أدى إلى تحسين معظم معاملات الهضم والقيم الغذائية وميزان النيتروجين للأغنام .