

COMPARISON AND FEED EVALUATION OF HYBRID NAPIER GRASS X PEARL MILLET AS A NEW GREEN FORAGE VERSUS NAPIER GRASS (*PENNISETUM PURPUREUM*) AND PEARL MILLET (*PENNISETUM GLAUCUM*) IN NEWLY RECLAIMED SANDY SOIL

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SUMMARY

Chemical composition and *In Situ* dry matter disappearance % (ISDMD %) and *In Situ* organic matter disappearance % (ISOMD %) for three heights of plants (50, 100 and 150 cm) of hybrid Napier grass x Pearl millet, Napier grass and Pearl millet grass were determined. Also, digestibility and some rumen parameters were studied by sheep.

Results showed that the content of hybrid Napier grass x Pearl millet of DM was lower compared with Napier grass or Pearl millet at 50, 100 and 150 cm heights. However, the CP content of the hybrid was higher than Napier grass or Pearl millet at 100 and 150 cm heights. Also, DM %, CF% and ADL% were increased and CP % were decreased with increasing plant height, while NDF % and ADF % of Pearl millet, Napier grass and its hybrid were nearly similar.

The ISDMD % and ISOMD % of Hybrid Napier grass x Pearl millet were significantly ($P < 0.05$) higher than those in Napier grass and Pearl millet grass. Also, increasing the heights up to 150 cm were significantly ($P < 0.05$) decreased the ISDMD % and ISOMD % than those at 50 and 100 cm heights. The average daily fresh intake or DM intakes as (g/h/d) among three forages were not significant. In the 1st cut, the digestion coefficients % of DM, OM, CF and NFE among three forages did not show any significant. Whereas, in the 2nd cut, the digestion coefficients % of DM, OM, CF and EE of hybrid were significantly ($P < 0.05$) higher than Pearl millet and insignificantly higher than Napier grass. The CP digestibility and feeding value as DCP % in hybrid were significantly ($P < 0.05$) higher compared with those in Napier grass and Pearl millet. No significant differences were detected in ruminal pH values, NH₃-N and TVFA's concentrations among three forages. The fresh yield (ton / feddan)

(Feddan= 4200 m²) of hybrid Napier grass x Pearl millet was significantly (P<0.05) higher than those in Napier grass and Pearl millet. On the other hand ,the DM and TDN yields (ton / feddan) of Pearl millet were significantly (P<0.05) lower compared with those of Napier grass and its hybrid, while the differences between Napier grass and its hybrid were not significant. The DCP yield (ton / feddan) of hybrid was significantly (P<0.05) higher than those of Napier grass and Pearl millet, whereas, Napier grass was significantly (P<0.05) higher than Pearl millet.

Keywords: *hybrid of Napier grass x Pearl millet, Napier grass, Pearl millet, digestibility, rumen, forage yield.*

INTRODUCTION

In Egypt, animals suffer from shortage of feed especially during summer season. Most of animal feeding in this period depends on grains, concentrate mixture and agricultural residues. The expensive price of grains and conventional supplements tend to increase animals feed cost. The green forage is a cheapest fodder for animals. Expansion in cultivation of marginal soils is a considered one of the most effective solutions to overcome feed shortages. Attempts were carried out to improve local species of green forage or to introduce a new green forage species in marginal soils especially in summer season as Napier grass (Makky, 1976). On the other side, the pearl millet is one of important grass in summer season in Egypt, especially in sandy soils (Mousa *et al.*, 1995; Geweifel, 1997 and Khinizy *et al.*, 1997). Napier grass and Pearl millet are both *Pennisetum* spp. and can be crossed to produce hybrids. New hybrid of Napier grass x Pearl millet have been developed in Florida (USA), and tested as a new forage crop in reclaimed sandy soil

in Egypt under Sharkia Governorate condition (Zeidan and Geweifel, 1997 and Mohamed, 2000). The same author found that the hybrid gave a five cuts and had a higher tiller, more leaves and consequently higher forage yield than Napier grass. Hybrid of Napier grass x Pearl millet called PMN hybrid in USA (Cuomo *et al.*, 1996). Quantity and quality are important criteria when evaluating forage species i.e. productivity, palatability and its feeding values, those are much favored by the introduction of new green forage.

The aim of this work is to evaluate Productivity, palatability, digestibility and nutritive values of hybrid of Napier grass x Pearl millet as new green forage compared with Napier grass or Pearl millet in newly reclaimed sandy soil.

MATERIALS AND METHODS

This work was carried out at Ismailia Research Station. (Ismailia Governorate) and Animal Production Research Institute, Agricultural Research Center, Egypt.

Hybrid of Napier grass x Pearl millet and Napier grass were planted by offshoots on spaces 50 x 50 cm and Pearl millet were planted with seeding rate 20 kg/fed. in newly reclaimed sandy soil of Ismailia Governorate. The fertilization was 200 kg calcium super phosphate (15.5 % P₂O₅) and 100 kg potassium sulphate (48% K₂O) was added before planting. Nitrogen fertilizer was 60 kg N as ammonium sulphate after 21 days from planting and after each cut. Irrigation was practiced every 3 days under sprinkler irrigation system. Two experiments were conducted for evaluated green forages.

Experiment 1

The experiment was carried out to evaluate the chemical composition and *In situ* dry matter disappearance % (ISDMD %) and *In situ* organic matter disappearance % (ISOMD %) for three heights of plants (50, 100 and 150 cm) of hybrid Napier grass x Pearl millet , Napier grass and Pearl millet grass. Synthetic fiber technique was carried out using the method of Mehrez and Ørskov (1977) to determine *In situ* disappearance in the rumen of buffalo (two bulls were fitted with permanent rumen cannula) at 48 hours incubation period . Four bags of each treatment were used (three bags incubated in each bull).

Experiment 2

The second experiment was carried out to study the nutrients digestibility of the previous plants at different heights (50 ,100 and 150 cm) .Digestibility trials were conducted by using 9 mature farafra rams on an avg. 63 kg body weight in a

complete randomized design to evaluate the three green forages (3 animals in each). Fresh green forages were chopped to about 5 cm in length, then mixed and offered *ad lib*. Animals were individually kept in metabolic cages. Each trial lasted 29 days as 21 days preliminary period and five days collection period and three days for rumen parameters. The 1st cut was cutting after 60 days from planting and the 2nd cut was cutting after 40 days from 1st cut. The intake of green forages was measured. Daily diets (80% of *ad lib*.) were offered in two equal portions at 8 am and 4 pm. Green forage samples and feces were daily collected during collection period. The samples of forages and feces were dried in an oven at 60°C for 48 hours, then thoroughly mixed and kept after grinding in stopper bottles for chemical analysis. Drinking water was available all times. The chemical analysis was determined according to the methods of A.O.A.C. (1996). Determination of neutral detergent fiber (NDF), acid detergent fiber (ADF) and acid detergent lignin (ADL) was carried out according to the methods of Goering and Van Soest (1970). Rumen fluid samples were obtained using a rubber stomach tube at before morning feeding and 2 hours post feeding. The samples were filtered through three layers of cheese cloth without squeezing. The ruminal pH values were immediately estimated by pH-meter. The ruminal NH₃-N concentration was determined according to Conway (1957). Total volatile fatty acids concentration (TVFA's) were determined by the steam distillation method as described by Warner (1964).

Data were statistically analyzed by using CoStat, 3.03 (CoHort,1986) as the following model: $Y_{ij} = \mu + T_i + E_j$

Where Y_{ij} is observation of parameter measured; μ , overall mean; T_i , effect of treatments and E_j , random error. Significant differences ($P < 0.05$) among means were tested by Duncan's multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

Chemical composition:

The chemical composition % (on DM basis) in Tables (1, 2 and 3) showed that the dry matter (DM) contents of hybrid Napier grass x Pearl millet had the lowest values compared with Napier grass or Pearl millet. The highest value of ash was observed with Napier grass and the lowest value was recorded with Pearl millet while, the hybrid showed intermediate values between Napier grass and Pearl millet. The crude protein (CP) content in Pearl millet was lower than Napier grass and its hybrid, but CP content of hybrid was higher than Napier grass at 100 and 150 cm height. The same trend was observed with Zeidan and Geweifel (1997), Mohamed (2000) and Zeidan *et al.* (2000) who noticed that the CP% was higher in hybrid of Napier grass x Pearl millet than Napier grass, while, Cuomo *et al.* (1996) found that a slightly higher in CP content (13.6 %) for Napier grass than Pearl millet x Napier grass hybrid (12.3 %) or pearl millet (12.7%). The crude

fiber (CF) values were nearly similar among three forages. On the other hand, the DM and CF percentages were increased but CP percentage was decreased by increasing plant heights. The same trend was showed by Gomide *et al.* (1969) and Ibrahim *et al.* (1980). The chemical composition values in this study was nearly similar with the results obtained by Mousa *et al.* (1995), Khinizy *et al.* (1997), Eid, (1999) and Soliman *et al.* (2005) in Pearl millet, and by Soliman (1984) and Etman *et al.* (1992) in Napier grass with some different. Generally, Patel and Shukla (1973) showed that the DM ranged from 15 to 20%, CP ranged from 11 to 19.5% ,EE ranged from 3.8 to 6.7% and CF ranged from 18.4 to 26.1% in Napier grass.

In this connection, the NDF and ADF percentages of Pearl millet, Napier grass and its hybrid (Table 2) were nearly similar. These results were in agreement with Cuomo *et al.* (1996). The ADL % in Pearl millet had the lowest values than those in Napier grass and its hybrid. On the other hand, the NDF, ADF and ADL percentages were increased by increasing plant heights. However, many factors such as temperature, light intensity, water availability, soil fertility and maturity affect on forage composition, particularly lignin content (Van Soest, 1996).

In situ DM and OM disappearance :

The values of *in situ* DM and OM disappearance % (ISDMD % and ISOMD % ,respectively) of Hybrid Napier grass x Pearl millet were significantly ($P < 0.05$) higher than those of Napier grass or Pearl

Table (1): Chemical composition (%) of Hybrid Napier grass x Pearl millet, Napier grass and Pearl millet at different heights.

Item	Plant height (cm)	On Fresh basis %						
		DM	OM	CP	CF	EE	NFE	Ash
Hybrid Napier grass x Pearl millet	50	13.39	11.85	2.02	2.70	0.48	6.65	1.54
	100	14.62	12.77	2.35	3.26	0.56	6.60	1.85
	150	17.84	16.30	1.76	4.56	0.69	9.29	1.54
Napier grass	50	15.51	13.28	2.50	3.31	0.59	6.88	2.23
	100	16.15	14.04	2.36	3.59	0.64	7.45	2.11
	150	19.12	16.42	1.80	4.86	0.60	9.16	2.70
Pearl millet	50	16.24	14.90	1.76	3.84	0.37	8.93	1.34
	100	16.26	14.88	1.56	4.08	0.47	8.77	1.38
	150	18.75	17.30	1.26	4.79	0.50	10.75	1.45
		On DM basis %						
Hybrid Napier grass x Pearl millet	50	100	88.47	15.09	20.15	3.62	49.61	11.53
	100	100	87.37	16.07	22.28	3.80	45.22	12.63
	150	100	91.35	9.86	25.57	3.88	52.04	8.65
Napier grass	50	100	85.59	15.10	21.32	3.79	45.38	14.41
	100	100	86.91	14.60	22.21	3.98	46.12	13.09
	150	100	85.88	9.40	25.42	3.12	47.94	14.12
Pearl millet	50	100	91.72	10.81	23.62	2.29	54.99	8.28
	100	100	91.53	9.57	25.12	2.91	53.93	8.47
	150	100	92.29	6.74	25.57	2.68	57.30	7.71

Table (2): Fiber fractions (%) of Hybrid Napier grass x Pearl millet, Napier grass and Pearl millet at different heights.

Items	Plant height	NDF	ADF	ADL	Hemi-cellulose	Cellulose
Hybrid Napier grass x Pearl millet	50 cm	57.71	45.21	6.33	12.50	38.88
	100cm	66.02	50.83	8.53	15.19	42.30
	150cm	69.60	53.63	9.46	15.97	44.17
Napier grass	50 cm	63.83	46.20	6.03	17.63	40.17
	100cm	64.05	47.80	9.98	16.25	37.82
	150cm	65.99	49.68	11.72	16.31	37.96
Pearl millet	50 cm	64.98	49.68	3.93	15.30	45.75
	100cm	65.39	50.46	4.44	14.93	46.02
	150cm	67.02	50.76	5.06	16.26	45.70

Table (3): Chemical composition (%) of Hybrid Napier grass x Pearl millet, Napier grass and Pearl millet during the digestibility trials

Items	On fresh basis						
	DM	OM	CP	CF	EE	NFE	Ash
1st cut							
HNG*PM	12.5	10.95	2.16	2.97	0.39	5.43	1.55
NG	16.17	14.34	2.41	3.66	0.51	7.76	1.83
PM	13.46	12.07	1.41	3.23	0.51	6.92	1.39
2nd cut							
HNG*PM	14.2	12.50	2.38	3.68	0.42	6.02	1.70
NG	18.85	16.94	2.68	5.30	0.62	8.35	1.91
PM	18.04	16.31	2.47	4.75	0.41	8.69	1.73
On DM basis							
1st cut							
HNG*PM	100	87.58	17.29	23.74	3.11	43.44	12.42
NG	100	88.71	14.88	22.64	3.18	48.01	11.29
PM	100	89.66	10.50	23.96	3.80	51.40	10.34
2nd cut							
HNG*PM	100	88.02	16.80	25.90	2.93	42.39	11.98
NG	100	89.85	14.20	28.11	3.26	44.28	10.15
PM	100	90.42	13.70	26.32	2.25	48.15	9.58

HNG*PM = Hybrid Napier grass x Pearl millet, NG = Napier grass, PM = Pearl millet

millet. However, there were no significant differences between Napier grass and Pearl millet Tables (4 and 5). On the other hand, ISDMD % and ISOMD % at 150 cm height in all plants were significantly ($P<0.05$) decreased than 50 and 100cm height, while, the differences between 50 and 100 cm height were not significant. The decreasing in ISDMD % and ISOMD % with advancing age may be due to the lignifications of plants. These results agreed with Soliman (1990), who found that the ISDMD % and ISOMD % were decreasing with progress of cutting time of green forage.

Forage intakes, digestion coefficients and nutritive values:

As shown in Table (6), the differences in daily feed consumption (kg/h/d) as fresh intake or daily DM intake at the 1st cut were not significant change among Hybrid Napier grass x Pearl millet, Napier grass and Pearl millet. Whereas, the DM intake expressed as % of body weight or $g/kgW^{0.75}$ of Pearl millet were significantly ($P<0.05$) lower than that in Napier grass and insignificantly lower than hybrid while, the difference between Napier grass and hybrid was not significant. At the 2nd cut, DM intake as percent of body weight or $g/kgW^{0.75}$ of Napier grass was significantly ($P<0.05$) higher than those in Pearl millet and hybrid. These finding agreed with the results of K/hinizy *et al.* (1997).

At the 1st cut, nutrients digestibility in Table (6) showed that hybrid Napier grass x Pearl millet was significantly ($P<0.05$)

higher in CP digestibility than those in Napier grass and Pearl millet grass and it was significantly ($P<0.05$) lower in EE digestibility than Napier grass. While, the differences in digestion coefficients percentages of DM, OM, CF and NFE among three forages were not significant. At the 2nd cut, digestion coefficients of DM, OM, CF and EE for hybrid were significantly ($P<0.05$) higher than that in Pearl millet and insignificantly higher than that in Napier grass. The differences in NFE digestibility among three forages were not significant. The CP digestibility in hybrid was significantly ($P<0.05$) higher than Napier grass and Pearl millet. The data obtained here supported the finding of Khinizy *et al.* (1997) and Soliman *et al.* (2005) with Pearl millet and Shalaby *et al.* (1980) and Etman *et al.* (1992) with Napier grass with some little differences. However, the digestibility in this study was higher than those obtained by Soliman (1984) and Gabra *et al.* (1994) with Napier grass.

The nutritive value expressed as total digestible nutrients (TDN%) among three forages at the 1st or 2nd cuts was not significant. The DCP values of hybrid were significantly ($P<0.05$) higher than those in Napier grass and Pearl millet grass at the 1st and 2nd cuts.

Rumen parameters:

The rumen parameters as shown in Table (7) explained that the differences of ruminal values of pH, NH_3 -N and Total VFA's among three forages in 1st cut and 2nd cut were not significant at 0 time or 2 hrs. post feeding. On the other hand,

Table (4): The values of ISDMD (%) of Hybrid Napier grass x Pearl millet, Napier grass and Pearl millet at different plant heights.

Item	Plant height (cm)			Average
	50 cm	100cm	150cm	
HNG*PM	65.32	63.29	59.91	62.84 ^a
NG	66.35	63.41	43.28	54.29 ^b
PM	63.63	62.18	36.88	57.68 ^b
Average	65.16 ^a	62.96 ^a	46.69 ^b	

a and b : means in the same row with different superscripts differ significantly (P< 0.05)
HNG*PM = Hybrid Napier grass x Pearl millet, NG = Napier grass, PM = Pearl millet

Table (5): The values of ISOMD (%) of Hybrid Napier grass x Pearl millet, Napier grass and Pearl millet at different plant heights.

Item	Plant height (cm)			Average
	50 cm	100cm	150cm	
HNG*PM	67.20	66.87	60.10	64.72 ^a
NG	68.12	63.67	43.49	56.89 ^b
PM	65.20	62.71	42.77	58.43 ^b
Average	66.84 ^a	64.42 ^a	48.79 ^b	

a and b: means in the same row with different superscripts differ significantly (P< 0.05)
HNG*PM = Hybrid Napier grass x Pearl millet, NG = Napier grass, PM = Pearl millet

Table (6): Average daily feed intake, digestion coefficients and nutritive values of Hybrid Napier grass x Pearl millet, Napier grass and Pearl millet by sheep.

Item	1 st cut			2 nd cut		
	HNG*PM	NG	PM	HNG*PM	NG	PM
Fresh intake, kg/h/d	6.70	5.77	5.87	6.33 ^a	5.83 ^{ab}	5.4 ^b
DM intake, g/h/d	838	932	790	900	1100	908
% of LBW	1.33 ^{ab}	1.45 ^a	1.25 ^b	1.47 ^b	1.74 ^a	1.46 ^b
g/kg W ^{0.75}	37.43 ^{ab}	40.98 ^a	35.12 ^b	40.97 ^b	49.01 ^a	40.87 ^b
Digestion coefficients, %						
DM	71.41	70.28	64.43	74.07 ^a	71.59 ^{ab}	68.77 ^b
OM	73.23	71.74	66.49	76.33 ^a	74.47 ^{ab}	71.69 ^b
CP	73.30 ^a	64.43 ^b	48.14 ^c	76.10 ^a	71.91 ^b	67.82 ^c
CF	77.72	73.01	69.49	79.32 ^a	77.71 ^a	74.62 ^b
EE	57.86 ^b	69.85 ^a	67.79 ^{ab}	68.99 ^a	68.50 ^a	62.06 ^b
NFE	71.84	73.55	68.76	75.11	73.67	71.80
Nutritive values, %						
TDN	66.38	66.42	62.84	69.72	69.67	66.65
DCP	12.67 ^a	9.59 ^b	5.05 ^c	12.79 ^a	10.18 ^b	9.29 ^c

a, b and c : means in the same row with different superscripts differ significantly (P< 0.05)

HNG*PM = Hybrid Napier grass x Pearl millet, NG = Napier grass, PM = Pearl millet

Table (7): The pH, NH₃-N and total VFA's of rumen fluid of rams fed the experimental forage crops.

Item	Time (hrs)	1 st cut			2 nd cut		
		HNG*PM	NG	PM	HNG*PM	NG	PM
pH	0	7.81	7.61	7.74	6.72	6.69	6.66
	2	6.58	6.36	6.34	6.18	6.44	6.32
NH ₃ -N (mg/100ml)	0	19.09	13.72	13.25	12.55	12.79	12.55
	2	23.75	18.85	19.55	17.92	15.35	15.35
Total VFA's (meq/100ml)	0	10.33	10.46	11.16	9.78	11.33	10.38
	2	12.29	12.62	13.64	12.21	14.17	12.76

HNG*PM = Hybrid Napier grass x Pearl millet, NG = Napier grass, PM = Pearl millet

NH₃-N and total VFA's values were lower at 0 time than 2hrs. post feeding, while, pH values were higher at 0 time than 2hrs. post feeding. Similar results were noticed by Soliman (1984) with Napier grass and Soliman *et al.* (2005) with Pearl millet. Also, the obtained pH values in Table (7) are within the normal ranges for normally functioning rumen as recorded by Hungate (1966).

Forage yield:

The results of forage yield (tons/ feddan) (Feddan= 4200 m²) as shown in Table (8), explained that the total fresh yield of hybrid Napier grass x Pearl millet was significantly (P<0.05) higher than those in Napier grass and Pearl millet whereas, Pearl millet was recorded the least yield .Also, the average yield of hybrid surpassed that of the Napier grass and Pearl millet by 6.3 and 6.3 tons /feddan in the first cut and by 4.0 and 14.5 tons /feddan in the second cut ,respectively . The fresh yield (tons /feddan) of Napier grass and its hybrid in the second cut was increased than that in the first cut . Meanwhile, the fresh yield (tons /feddan) of Pearl millet was decreased in the second cut.

The DM and TDN yields (tons / feddan) of Pearl millet were significantly (P<0.05) lower than those obtained with Napier grass and its hybrid, while, the differences between Napier grass and its hybrid were not significant. These results agreed with those obtained by Cuomo *et al.* (1996). The total DCP yield (tons / feddan) of hybrid was significantly (P<0.05) higher than that in Napier grass

or Pearl millet and DCP yield (tons / feddan) of Napier grass was significantly (P<0.05) higher than Pearl millet. Zeidan and Geweifel (1997), Mohamed (2000) and Zeidan *et al.* (2000) noticed that the total yields (tons / feddan) as fresh, DM and CP were higher in hybrid of Napier grass x Pearl millet than Napier grass.

CONCLUSION

It could be concluded that:

- 1- Hybrid of Napier grass x Pearl millet achieved the highest yield (tons / fedden) for DCP than those of Napier grass and Pearl millet.
- 2- Relatively small differences existed between Napier grass and its hybrid in DM and TDN yields, DM intake, nutrients digestibility and nutritive value as TDN.
- 3- More studies are needed to clarify the effect of feeding hybrid Napier Napier grass x Pearl millet alone or in mixture on meat and milk production of ruminants.

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Table (8): The average yield (ton/feddan^a) of Hybrid Napier grass x Pearl millet, Napier grass and Pearl millet in the first and the second cuts

Item	HNG*PM	NG	PM
Fresh yield, (tons/ feddan ¹) :			
1 st cut	18.9	12.6	12.6
2 nd cut	25.0	21.0	10.5
Total DM yield, (tons/ fedden) :	43.9 ^a	33.6 ^b	23.1 ^c
1 st cut	2.363	2.037	1.656
2 nd cut	3.550	3.959	1.890
Total TDN yield, (tons/ fedden) :	5.913 ^a	5.996 ^a	3.546 ^b
1 st cut	1.569	1.353	1.041
2 nd cut	2.475	2.758	1.260
Total DCP yield, (tons/ fedden) :	4.044 ^a	4.111 ^a	2.301 ^b
1 st cut	0.299	0.195	0.084
2 nd cut	0.454	0.403	0.176
Total	0.753 ^a	0.598 ^b	0.260 ^c

a ,band c: means in the same row with different superscripts differ significantly (P< 0.05)

¹feddan = 4200m², HNG*PM = Hybrid Napier grass x Pearl millet, NG = Napier grass, PM = Pearl millet

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مقارنة وتقييم غذائي لنباتات هجين علف الفيل والدخن (الدخنابير) كعلف أخضر جديد مقارنة بعلف الفيل والدخن فى الأراضى الرملية

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اجريت هذه الدراسة لتقييم نباتات هجين علف الفيل والدخن كعلف أخضر جديد ومقارنته بعلف الفيل والدخن وقد تمت زراعة المحاصيل الثلاثة فى مزرعة محطة البحوث الزراعية بالاسماعيلية فى الأرض الرملية. وقد أجرى التحليل الكيماوى وقدرت النسبة المئوية لكل من معامل اختفاء المادة الجافة % *In situ dry matter disappearance* (ISDMD) ومعامل اختفاء المادة العضوية (% *In situ organic matter disappearance* (ISOMD) على الارتفاعات المختلفة للنباتات. المحضنة بالكرش

كما اجريت تجارب الهضم على الأغنام لتقدير معاملات الهضم والقيم الغذائية للمحاصيل الثلاثة. وقد تم تقدير المحصول الكلى للأعلاف الثلاثة (طن/ فدان). وقد أظهرت نتائج الدراسة الآتى:

كانت نسبة المادة الجافة فى الدخنابير (الهجين) أقل من علف الفيل والدخن على الارتفاعات المختلفة (50 و100 و150 سم) بينما كانت نسبة البروتين الخام فى الدخنابير أعلى من علف الفيل والدخن عند ارتفاع 100 و150 سم. كانت النسبة المئوية للمادة الجافة والألياف الخام واللجنين تتزايد مع الزيادة فى ارتفاع الحش بينما انخفضت نسبة البروتين الخام ولم تكن هناك اختلافات معنوية فى نسبة الألياف الغير ذائبة فى المحلول المتعادل أو الحامضى بين المحاصيل الثلاثة. كان معامل هضم اختفاء المادة الجافة والمادة العضوية المحضنة فى الكرش فى الدخنابير أعلى من علف الفيل والدخن كما كان يتناقص مع ارتفاع الحش.

أظهرت التجارب على الأغنام أنه لا توجد فروق معنوية فى المأكول من العلف الأخضر الطازج أو الجاف للرأس فى اليوم بالنسبة للمحاصيل الثلاثة. كانت الفروق فى معاملات الهضم لكل من المادة الجافة والمادة العضوية والألياف الخام والمستخلص الخالى من الأزوت غير معنوية بين المحاصيل الثلاثة فى الحشة الأولى بينما كانت معاملات الهضم لكل من المادة الجافة والمادة العضوية والألياف الخام ومستخلص الأثير للدخنابير مرتفعة ارتفاعا معنويا عن الدخن وغير معنويا عن علف الفيل فى الحشة الثانية، وعموما كان معامل هضم البروتين فى الدخنابير أعلى من علف الفيل والدخن. كانت المركبات الكلية المهضومة للمحاصيل الثلاثة متقاربة وليس بينها فروق معنوية بينما كان البروتين المهضوم فى الدخنابير أعلى من علف الفيل والدخن. كما وجد ان تركيز ايون الهيدروجين الكرش وتركيز الأمونيا والأحماض الدهنية الطيارة لم يختلف معنوية بين المحاصيل الثلاثة المختبرة.

وكان محصول العلف الأخضر الطازج (طن/فدان) للدخنابير مرتفع معنويا عند مستوى 5% عن كل من علف الفيل والدخن. بينما كان محصول المادة الجافة والمركبات الكلية المهضومة (طن/فدان) للدخن منخفض معنويا عند مستوى 5% عن علف الفيل وهجينة (الدخنابير) بينما الختلافات لم تكن معنوية بين علف الفيل وهجينة (الدخنابير). ومن جهة أخرى كان محصول البروتين المهضوم (طن/فدان) فى الدخنابير مرتفعا معنويا عند 5% عن كل من علف الفيل والدخن، كما كان محصول علف الفيل مرتفع معنويا عند 5% عن الدخن.