Some nutritional studies on Elephant Grass in Egypt
Untersuchungen über Fütterung mit Elefantengras in Ägypten

by
A. A. Fahmy*, M. S. Saleh Youssef*, A. Gh. Galal**, H. M. El-Nouby*

1. Introduction

The main problems of animal production in Egypt are the inferior genetic make-up of the local breeds of animals and the acute shortage of available feedstuffs during summer and falls seasons when animals are furnished with only 39 and 37 % of their energy and protein requirements, respectively (Kotb et al., 1974).
Youssef et. al., (1973) reported that the recognition of animal in the Egyptian Agriculture, by the introduction of green fodder rotation throughout the year will effectively help in solving the problem. In this connection, the high productive perennial grasses will be a keen policy towards solving this problem.
Makky (1976) found that elephant grass was the most promising under the Egyptian conditions. It is characterized by its high photosynthesis, giving during spring, summer and autumn months from 6- 9 cuts according to climatic conditions totalling some 100 tons from green fodder.
Makky et al. (1978) suggested the devotion of 25 % of the existing maize and sorghum area to the growing of elephant grass and the prohibition of the present practice of plant defoliation which reduces one-third of the grain yield.
The objective of the present study was to investigate the productivity, chemical compostion, nutritive value and palatability of elephant grass, in the different cuts.

2. Materials and Methods

The Study was untertaken at Mallawy Station of the Animal Production Research Institute, Agricultural Research Centre during summer and automn 1976.
Elephant grass was cultivated on May 8th 1976 in one and a half faddan (o.42 ha), divided into blocks and further into plots (each 1/200 of a faddan). When plantations reached about 40 - 50 cm high at one month of age, they were cut for the first time, to promote tillering. At the time of the first cut, the different plots were cut successively, in order to obtain a green fodder of the same height (100 cm) for avoiding difference in the chemical composition and nutritive value. The daily fresh yield was weighed and a representative sample was taken for dry matter determination.
Four digestibility trials were carried out with two mature Ossimi rams for each using metabolic cages similar to those described by Maynard and Lossli (1965). The preliminary and collection periods in every trial lasted 10 days each. During the collection period representative samples of feeds, residues and faeces were taken for proximate analysis, which was carried out according to the A.O.A.C. methods (1965). In

* A.A. Fahmy, M.S. Saleh Youssef, H.M. El-Nouby
Adress: Animal Production Research Institute, Ministry of Agriculture, Cairo, Egypt
**Prof. Dr. A. Gh. Galal
Address: Department of Animal Production, Faculty of Agriculture, Minia University, Minia, Egypt

addition, the mineral analysis for the different cuts of elephant grass concerning calcium, sodium, potassium, magnesium, and manganese was carried out, according to the methods described by Salem (1976), using Unicam Atomic Absorption spectrophotometer phosphorous was also determined by using the colorimetric method of Troug and Mayer (1939).
Gross energy values (GE) were determined for both elephant grass and faeces samples of the four digestibility trials, using a standard non-adiabatic bomb calorimeter. The procedure used was that suggested by Fuel Research Division of the Department of Scientific and Industrial Research (1954), slightly modified by Khafagi (1967). In addition the calorific values of elephant grass and its digestible nutrients were calculated from the results of the chemical composition and the digestibility trials, after Abou-Raya (1967).
The palatability of elephant grass was tested with three mature male Ossimi rams. The animals were fed entirely on chopped elephant grass ad-libitum during the test period which lasted for 15 days. Representative samples of the grass fed and refused were taken for dry matter determination. Statistical analysis was carried out according to Snedecor (1961) and Duncan (1955).

3. Results and Discussion

3.1 Proximate Composition of Elephant Grass

Analytical results of representative samples of elephant grass in the successive cuts are shown in Table (1). The data indicated that dry matter content varied in a narrow rang from 12.86 to 14.43 with an average of 13.43 %. The values were lower than those reported by Soliman (1976). This might be due to the ample amount of manure applied and to the high fertility of the soil which accelerated the growth of the plants.
It was observed that a gradual decrease with slight fluctuations occured in both crude protein and ether extract contents in the successive cuts with advancing maturity. On the contrary, the crude fibre content which represented a major fraction of DM increased to some extent in the successive cuts. The comparatively lower temperature prevailing during the later cuts did not give the chance for considerable cell lignification. Fresh elephant grass contained on the average, dry matter (DM) 13.43 %; crude protein (CP) 1.75 %; ether extract (EE) 0.45 %; crude fibre (DF) 3.74 %; nitrogen-free extract (NFE) 5.26 %; ash 2.23 %. The corresponding averages on DM basis were 100, 12.98, 3.38, 27.83, 39.22 and 16.59 %. These results were in agreement with the findings of Butterworth (1965), Prospero (1972) and Soliman (1976).

3.2 Mineral Compostion of Elephant Grass

Data of Table (2) show that the ash, calcium (Ca), potassium (K), manganese (Mn) and silica contents of elephant grass increased in the successive cuts with advancing maturity. However, a drop occurred in the ash, manganese and silica contents of the 4th cut and in the potassium content of the 5th cut.
On the other hand the phosphorus (P), sodium (Na) and magnesium (Mg) contents decreased with slight fluctuations, in the successive cuts.
The potassium content was extremely high as it ranged from 5.52 to 6.37 %. However, toxicity of high intakes of this electrolyte in elephant grass was unlikely as pointed out by Church and Pond (1975).
Elephant grass contained, on the average of feed, Ca, 0.07 %; P, 0.05 %; Na, 0.03 %;

K, 0.85 %; Mg, 0.03 %; Mn, 0.0011 % and silica, 0.78 %. The corresponding averages on DM basis were 0.50, 0.33, 0.25, 6.35, 0.24, 0.008 and 5.77 %.

3.3 Energy Content of Elephant Grass

The data of Table (3) indicate that the calorific value of elephant grass decreased with advancing maturity from 4027 to 3927 Kcal./Kg., in the 5th cut. The calculated calorific values of the different cuts were near to the same trend as those of the estimated ones.
The average estimated calorific was higher than that calculated by 1.86 %. This would be in favour of the results of the proximate analysis and estimated calorific values.

3.4 Digestibility and Nutritive Value

Data of Table (4) show that the average digestibility coefficients for DM, OM, CP, EE, CF, NFE and energy (E) were 67.21, 71.73, 76.55, 69.80, 71.89, 69.97 and 69.25 %, respectively. Digestibility decreased sharply for DM, OM, CF, NFE and E after 2nd cut, while there were small differences among the values abtained in the last three cuts.
It was noticed that EE digestibility was considerably depressed from 74.45 % in the 2nd cut to 62.28 % in the 5th cut with 16 % decrease, while the decreases in the other constistuents were within 10 %.
Generally, the digestibility coefficients obtained were within those recorded by Marshall and Bredon (1963), Butterworth (1965) and Melotti and Lucci (1969).

3.5 Digestible Nutrients

The data of Table (5) show that on fresh basis 3rd cut contained the highest values for DCP and DCF of all the cuts, while the 2nd cut contained the highest values for DCP, DEE and DNFE, on DM basis. Generally, there was a tendency for the digestible nutrients except the DCF and DNFE to decrease in the successive cuts with advancing maturity. On the average, fresh elephant grass contained 1.34, 0.32, 2.68 and 3.68 % of digestible CP, EE, CF and NFE, respectively. The corresponding averages on DM basis were 9.96, 2.38, 20.00 and 27.45 %.
The DCP values in the various cuts were within the ranges reported by Marshall and Bredon (1963) and Soliman (1976). However they were lower than those found by Bose et al. (1970) and Nooruddin et al., (1975).

3.6 Estimated Versus Calculated Digestible Energy of Elephant Grass

The data of Table (6) show that the estimated digestible energy values agreed to a great extent with those calulated. The results confirmed the accuracy of the chemical analysis as well as the digestibility trial technique.

3.7 The Nutritive Value

It ist obvious from Table (7) that the 2nd cut contained on DM basis the highest and the 5th cut the lowest nutritive values of all the cuts, while the 3rd and 4th cuts were intermediate. On DM basis the total digestible nutrients (TDN) and starch equivalence (DE) values in the 2nd cut were significantly higher than those in each of 3rd, 4th and 5th cuts (P 0.05) while no significant differences were found among the latter three cuts, in this respect, concerning digestible energy (DE) the differences among the means of the different cuts were not statistically significant ($P < 0.005$).

Fresh elephant grass contained on the average TDN, 8.43 %; SE, 7.16 %; and DE, 0.372 Mcal./Kg. The corresponding averages, on dry matter basis, were 62.79, 53.32 % and 2.768 Mcal./Kg.

The comparatively narrow nutritive ratios (NR) of elephant grass averaging 1:5.34 indicated its suitability for feeding animals as pointed out by Mostert (1948), Waro-Austin (1963), Panda et al., (1967) and Odhiambo (1974).

3.8 Palatibility of Elephant Grass

The data of Table (8) show that the daily DM intake increased with the successive cuts. This might be attributed to the decrease occured in temperature which stimulated the appetite of the rams. The daily mean average for all the cuts was 2.068 Kg DM / 100 Kg body weight. It was interesting to notice that the rams tended to refuse the lower hard parts of the plant which were high in fibre and low in protein; such practice was reported, by Butterworth (1965), under similar conditions of ad-libitum feeding. The average values obtained for dry matter intake were in harmony with those reported by Panda et al. (1967) and Ranjhan and Talapatra (1967). However, they were lower than those found by Soliman (1976) averaging 2.39/100 kg. B.W, for Friesian bull calves.
Differences in DM intake might be due to differences in plant veriety, stage of maturity, its contents of DM and TDN and also to animal species.

3.9 Productivity of Elephant Grass

Data in Table (9) show the fresh and dry yields of elephant grass with the successive five cuts. The total yields of the five cuts per faddan were 87.98 and 12.15 tons for fresh and dry matter, respectively.
The lowest yield was obtained in the first cut due to the fact that the clumps were not completely formed and thus contained little number of tillers. On the contrary, the highest yield was obtained in the 2nd cut due to new tillering, the forage was in its best stage of vegetative growth.
Similar results were found by Prospero (1972).
It was noticed that the yield decreased sharply in the 3rd cut and then gradually in the 4th and 5th cuts, this might be attributed to the death of some tillers and the slow growth of the others due to unfavourable weather conditions.
These results were generally in harmony with those of Singh and Malik (1950), Grof (1958) and Makky (1976).

3.10 Elephant grass Versus Barseem

The present results of productivity (Table 9), composition (Table 1) and nutritive value (Table 7) of elephant grass were compared with those obtained by Galal (1976) for barseem (Meskawi) cultivated in Minia, (Egypt), i.e. in the same Governorate where elephant grass in the present study was cultivated. The mean averages are presented in Table (10).
Elephant grass contained on the average lower crude protein and NFE but higher crude fibre, EE and ash percentages than Meskawi barseem. The nutritive value of elephant grass was lower than that of Meskawi barseem by 15.36, 5.04 and 18.64, 9.43 % for TDN and SE, as fed fresh and on DM basis, respectively.

However the productivity of elephant grass was nearly double that of barseem. The five cuts of the former produced, during 164 days, aproximately 88 and 12 tons / faddan of fresh and dry matter, respectively. The corresponding total production of similar number of cuts of Meskawi barseem, produced during 210 days, were approximately 44 and 6 tons / faddan.

The average daily yield per faddan of elephant grass was containing 47, 38 and 7.38 kg of TDN, SE and DP., respectively. The corresponding daily figures per faddan of Meskawi barseem were 20, 18 and 3.67 kg. Accordingly, the nutritive value of the daily yield of elephant grass was 2.4, 2.1 and 2.0 times as those of Meskawi barseem for TDN, SE and DP, respectively.
It might be concluded from the results obtained that elephant grass is a quite palatable forage of high productivity and nutritive value provided that it is cut at a suitable stage of maturity (at 1 meter high). This would encourage its spread all over the country and facilitates its introduction in crop rotation as a good fodder for feeding animals in Egypt during summer period.

4. Summary

An experiment was carried out at Mallawy Station of the Animal Production Research Institute in Egypt, to study the productivity, chemical composition, nutritive value and palatability of elephant grass, in the different cuts.
Representative samples were taken from four successive cuts of the fodder during its growing season and analyzed for proximate and mineral compostion. Four digestibility trials were conducted to determine the nutritive value of the different cuts. The results could be summarized als follows:

(1) Elephant grass contained on the average as fed Dm, 13.44 %; CP, 1.75 %; EE, 0.45 %; CF, 3.74 %; NFE, 5.26 %; ash, 2.23 %; and 0.35 % Kcal./g. The corresponding averages, on DM basis were 100, 12.98, 3.38, 27.83, 39.22, 16.59 % and 3.996 Kcal./g.
(2) Elephant grass contained, on the average, as fed, Ca, 0.07 %; P, 0.05 %;, Na, 0.03 %; K, 0.85 %; Mg, 0.03 %; Mn, 0.0011 % and silica, 0.78 %. The corresponding averages on DM basis, were 0.50, 0.33, 0.25, 6.35, 0.24, 0.008 and 5.77 %.
(3) The average digestion coefficients were DM, 67.21 %; OM, 71.73 %; CP, 76.55 %;, EE, 69.80 %; CF, 71.89 %; NFE, 69.97 % and E, 69.25 %.
(4) The average nutritive values of elephant grass, as fed were TDN, 8.43 %, SE, 7.16 % and DCP, 1.34 %; on DM basis the corresponding averages were 62.79, 53.31 and 9.96 %.
(5) The average nutritive ratio of elephant grass was 1:5.34. The average estimated and calculated DE of all cuts were 2768 and 2752 Kcal/kg, respectively.
(6) The average daily DM intake of mature male Ossimi rams fed only chopped elephant grass ad-libitum was 2.07 Kg/100 kg. body-weight.
It was concluded that the palatability of this fodder was quite satisfactory.
(7) The total yield per faddan of five cuts taken at 1 meter high was 87.98 and 12.15 tons, for fresh and dry matter, respectively.

Zusammenfassung

Die Untersuchung wurde in der Versuchsstation in Mallawy des Instituts für Tierproduktion in Ägypten mit dem Ziel durchgeführt, die Produktivität, chemische Zusam-

mensetzung, Ernährungswert und Geschmack von Elefantengras zu bestimmen. Folgende Ergebnisse wurden ermittelt:

1. Das Elefantengras enthielt als frisch 13,43 % Trockensubstanz, 1,75 % Rohprotein; 0,45 % Äther-Extrakt; 3,74 % Rohfaser; 5,26 % stickstoffreier Extrakt; Asche 2,23 % und 0,53 Kcal/g. Die entsprechenden Werte bei Trockensubstanz waren 100 %; 12,98 %; 3,38 %; 27,83 %; 39,22 %; 16,59 % und 3,996 Kcal/g.
2. Die Zusammensetzung der Mineralstoffe war 0,07 % Kalzium; 0,05 % Phosphor; 0,03 % Natrium; 0,85 % Kalium; 0,03 % Magnesium; 0,0011 % Mangan und 0,78 % Siliziumdioxyd im frischen Zustand und 0,50 %; 0,33 %; 0,25 %; 6,35 %; 0,24 %; 0,008 % und 5,77 % im Trockensubstanz.
3. Die Verdauungskoeffizienten waren 67,21 % Trockenstubstanz; 71,73 % Organische Substanz; 76,55 % Rohprotein; 69,80 % Äther-Extrakt; 71,89 % Rohfaser; 69,97 % stickstofffreier Extrakt und 69,25 % Energie.
4. Die Ernährungswerte vom frischen Elefantengras waren 8,43 % gesamtverdauliche Naturstoffe; 7,16 % Stärkewert und 1,34 % verdauliches Rohprotein und für die Trockensubstanz 62,79 %; 53,31 % und 9,96 %.
5. Das Nährstoffverhältnis von Elefantengras war 1:5,34. Die geschätzte und gerechnete verdauliche Energie waren 2768 und 2752 Kcal/Kg.
6. Die durchschnittliche tägliche Aufnahme vom Elefantengras bei den Böcken war 2.07 Kg Trockensubstanz / 100 Kg Körpergewicht. Es ist anzunehmen, daß die Tiere es gern gefressen haben.
7. Der jährliche Ertrag von 5 Schnitten bei 1 m Höhe war 87,98 Tonnen frisches Gras und 12.15 Tonnen Trockensubstanz je Feddan (0,42 Ha).

5. References

Abou Raya, A.K., 1967 „Animal and Poultry Nutrition". 1st Edition Dar - El Maarif, Cairo (Arabic Textbook).
A.O.A.C. „Association of Official Agricultural Chemists", 1965: „Official Methods of Analysis". 10th Ed. Washington, D.C.
Bose, P.K., Paul, A.A. and Sengupta, S., 1970: Studies on hybrid Napier grass as cattle fodder. Indian Vet., J., 47(7), 580-587.
Butterworth, M.H., 1965: Some Aspects of the Utilization of Tropical Forages. 1 Green Elephant Grass at Various Stages of Growth. J. Agric. Sci. 65, 233-239.
Church, D.C. and Pond, W.G., 1975: „Basic Animal Nutrition and Feeding", published by D.C. Church. Distribution O & B. Books, 1215 NW Kline Place, Corvallis, Oregon 97330, USA.
Duncan, D.B., 1955: Multiple Ranges and Multiple F. test. Biometrics, 11,10.
Fuel Research Division, Department of Scientific and Industrial Research, 1954: Physical and Chemical Survey of the National Coal resources (Methods of Analysis of Coal and Coke), No. 44 Her Majesty's Stationary Office, London.
Galal, A.Gh., 1976: Number of cutting of Egyptian Clover for Forage, J. Animal Sci. 43(1), 263. (Abstract). (Unpublished detailed data).
Grof, B., 1958: Elephant Grass shows Promise for Grazing. Queensland Agric. J., 84,70 - 3. (Cited from Nutr. Abst. and Rev., 28:1045).
Khafagi, E.A., 1967: Some Comparative Studies on the Chemical Constituents of Feedstuffs and their Nutritive Value. M.Sc. Thesis, Fac. Agric. Cairo University.
Kotb, A.R., Saleh Youssef, M.S., Makky A.M. and Afifi, Y.A., 1974: Nutritional Status of Livestock in Egypt. Afric. Res.Rov., Cairo, 52(6), 21 - 36.
Makky, A.M., 1976: Introducing Elephant Grass in Agriculture of Egypt to solve Problems of Animal Production. El-Megala El Zeraiya, March - April (In Arabic).

Makky, A.M., Saleh Youssef, M.S., Hathout, M.K. and El-Nouby, H.M., 1978: Economics of Introducing Elephant Grass to the Egyptian Agriculture by Cultivation in One-fourth of the Maize and Sorghum area (Personal communication).
Marshall, B. and Bredon, R.M., 1963: The Chemical Composition and Nutritive Value of Elephant Grass (Pennisetuem Purpureum). Trop.-Agriculture, Trin., 40(1), 63-66 (H. Abstracts, 33(3) 173-4, 1963).
Maynard, L.A. and Loosli, J.K., 1965: „Animal Nutrition". 4th Ed. Mcgraw-Hill Co., Inc., N.Y.
Melotti, L. and Lucci, C. Des, 1969: Estimation of the Feeding Value of Napier Grass and Para Grass from Digestibility Trials with Sheep. Boletim de Indistrian Anim. 26, 275-284. (Cited from Nutr.Abst. and Rev. 42,698. 1972).
Mostert, J.W., 1948: Napier Fodder as a Feed. Farming in S. Africa 23:167-8. (Cited from Nutr. Abst. und Rev., 18,437/2557) 1948/49).
Nooruddin, G.D. Hha and Roy, L.N., 1975: Nutritive Value of Pusa Giant Napier Grass. Indian Vet. J. 52,564-567.
Odhiambo, J.F., 1974: The Nutritive Value of Various Growth Stages of Pennisetum purpureum. East African Agricultural and Forestry J. 325-329.
Panda, P.B., Singh G.S. and Singh, S.N., 1967: Nutritive Value of Pusa Giant Napier (Pennisetum purpureum) Grass when fed to Young Hariana Bull Calves. Indian J. Dairy Sci., 20(3), 153 - 156.
Prospero, A.O., 1972: Seasonal Variation in the Chemical Compostion, Major Mineral Nutrients and in vitro Digestibility of Napier Grass (Pennisetum purpureum schum). Anais da E.S.A. „Luiz de Queiroz" XXIX, 81 - 93.j
Ranjhan, S.K. and Talapatra, S.K., 1967: Yield, Chemical Compostion and Nitritive Value of Giant Napier Grass. Indian J. Dairy Sci. 20(3), 134 - 8.
Salem, O.A., 1976: The Effect of the Mechanical Treatments of the Hay on Digestibility, Nutritional Balances and Rumen Functions with Sheep. M.Sc. Thesis, Fac. Agric., Cairo Univ.
Singh, R. and Malik, H.C., 1950: Nutrious Forage from Napier and Guinea Grass. Indian Farming, 11: 521 - 524. (Cited from Abst. and Rev. 22, 27, 1952).
Snedecor, G.W., 1961: „Statistical Methods". 5th Ed., Iowa State Univ. Press. Ames, U.S.A.
Soliman, A.S., 1976: Some Studies on the Use of Elephant Grass for Feeding Dairy Cattle. M.Sc., Thesis, Fac. Agric., Zagazig Univ.
Troug, E. and Mayer, A.H., 1939: Improvement in deiness colorimetric method for Phosphorus and Arsemic. 1nd. Eng. Chem. Anal. Ed. 1, 136 - 139.
Waro - Austin, W.D., 1963: Napier Grass for Milk Production in the Trans Nazoia. E.Afr. Agric. Far. J., 248(4), 223 - 227. (Cited from H. Abstracts, 34(1), 31, 1964).
Youssef, M.S. Seleh, Makky, A.M., Kotb, A.R. and Labib, A.T., 1973: Annual Production of Animal Feeds from a Faddan of Land. Agric. Res. Rev. Cairo, 51(4), 9 - 29.

Acknowledgement

The authors wish to express their gratitude to Dr. A.M. Makky, Director of Animal Prod. Res. Insitute for his keen interest and for providing facilities, their appreciation and thanks are also due to the staff members of Mallawy Anim. Prod. Res. Station for their help and cooperation. Thanks are also due to staff members of Sheep Research Section of the Institute for providing facilities.

Table (1): Proximate composition of elephant grass

Item	DM	CP	EE	CF	NFE	Ash	OM
				%			
			Fresh fodder				
2nd cut	13.20	1.84	0.50	3.53	5.20	2.13	11.07
3rd cut	14.43	1.93	0.53	4.04	5.50	2.44	11.99
4th cut	12.86	1.60	0.46	3.55	5.25	2.01	10.85
5th cut	13.24	1.62	0.34	3.82	5.11	2.34	10.90
Average	13.43	1.75	0.45	3.74	5.26	2.23	11.20
			DM basis				
2nd cut	100	13.96	3.75	26.77	39.39	16.13	83.87
3rd cut	100	13.35	3.64	28.03	38.08	16.90	83.10
4th cut	100	12.40	3.54	27.64	40.80	15.62	84.38
5th cut	100	12.22	2.60	28.87	38.61	17.70	82.30
Average	100	12.98	3.38	27.83	39.22	16.59	83.41

Table (2): Mineral Composition of Elephant Grass

Item	DM	Ash	Ca	P	Na	K	Mg	Mn	Silica
						%			
					Fresh fodder				
2nd cut	13.20	2.13	0.06	0.05	0.04	0.85	0.03	0.0007	0.64
3rd cut	14.43	2.44	0.07	0.05	0.04	0.95	0.04	0.0014	0.87
4th cut	12.86	2.01	0.06	0.04	0.02	0.88	0.03	0.0008	0.74
5th cut	13.24	2.34	0.08	0.04	0.03	0.73	0.03	0.0015	0.86
Average	13.43	2.23	0.07	0.05	0.03	0.85	0.03	0.0011	0.78
					DM basis				
2nd cut	100	16.13	0.45	0.38	0.29	6.41	0.25	0.005	4.88
3rd cut	100	16.90	0.46	0.35	0.30	6.61	0.26	0.010	6.01
4th cut	100	15.62	0.50	0.30	0.19	6.87	0.22	0.006	5.72
5th cut	100	17.70	0.58	0.27	0.21	5.52	0.23	0.011	6.47
Average	100	16.59	0.50	0.33	0.25	6.35	0.24	0.008	5.77

Table (3): Estimated versus calculated calorific valus of elephant grass (DM basis)

Item	Estimated Kcal./Kg	Calculated Kcal./Kg	Recovery $\frac{\text{estd.}}{\text{caltd.}} \times 100$
2nd cut	4027	3975	101.31
3rd cut	4025	3931	102.39
4th cut	4006	3956	101.26
5th cut	3927	3830	102.53
Average	3996	3923	101.86

Table 4: Digestibility coefficients of elephant grass with Ossimi rams

Item	Coefficients of digestibility (%)						
	DM	OM	CP	EE	CF	NFE	E
2nd cut	72.15 a	76.16 a	80.17 a	74.45 a	76.64 a	74.53 a	74.00 a
3rd cut	65.75 a	70.95 b	78.61 a	72.97 a	70.09 b	68.63 b	69.00 a
4th cut	65.50 a	70.28 b	73.20 a	69.50 ab	69.35 b	69.59 b	67.00 a
5th cut	65.44 a	69.53 b	74.21 a	62.28 b	71.48 b	67.11 b	67.00 a
Average	67.21	71.73	76.55	69.80	71.89	69.97	69.25

In this table, means in the same column bearing different letters differ significantly ($P < 0.05$) according to Duncan's test (1955)

Table 5: Digestible nutrients of Elephant grass

Item	DCP%		DEE%		DCF%		DNFE %	
	As fed	DM basis	As fed	DM Basis	As fed	DM Basis	As fed	DM basis
2nd cut	1.48^{a}	11.19^{a}	0.37^{a}	2.79^{a}	2.71^{a}	20.52^{b}	3.88^{a}	29.36^{a}
3rd cut	1.52^{b}	10.49^{a}	0.39^{b}	2.66^{a}	2.83^{a}	19.65^{a}	3.77^{a}	26.13^{a}
4th cut	1.17^{c}	9.08^{b}	0.32^{a}	2.46^{a}	2.46^{a}	19.17^{a}	3.65^{a}	28.39^{a}
5th cut	1.20^{a}	9.07^{b}	0.21^{c}	1.62^{b}	2.73^{a}	20.64^{b}	3.45^{a}	25.91^{a}
Average	1.34	9.96	0.32	2.38	2.68	20.00	3.68	27.45

In this table means in the same column bearing different letters differ significantly ($P < 0.05$), according to Duncans test (1955)

Table 6: Estimated versus calculated digestible energy of Elephant Grass (on DM basis)

Item	Estimated Kcal./Kg	Calculated Kcal./Kg	Recovery $\frac{\text{ested.}}{\text{caltd.}}$ X100
2nd cut	2980	2958	100.74
3rd cut	2777	2736	101.50
4th cut	2684	2713	98.93
5th cut	2631	2600	101.19
Average	2768	2752	100.58

Table 7: Nutritive Value of Elephant Grass

Item	TDN %		SE		DE Mcal/Kg		NR
	Fresh	DM	Fresh	DM	Fresh	DM	1:
2nd cut	8.90^{a}	67.42^{a}	7.66^{a}	58.03^{a}	0.393^{a}	2.980^{a}	5.03
3rd cut	9.00^{a}	62.37^{b}	7.61^{a}	52.74^{b}	0.401^{a}	2.777^{a}	4.95
4th cut	8.00^{b}	62.21^{b}	6.79^{b}	52.80^{b}	0.345^{a}	2.684^{a}	5.85
5th cut	7.83^{b}	59.14^{b}	6.58^{b}	49.70^{b}	0.348^{a}	2.631^{a}	5.52
Average	8.43	62.79	7.16	53.32	0.372	2.768	5.34

In this table means in the same column bearing different letters differ significantly (P 0.05) according to Duncan's test (1955)

Table 8: Daily dry matter intake of elephant grass inn different cuts

Item	Body weight Kg	Fresh intake Kg	Dry matter intake		
			DM Kg	DM/100 Kg	DM/W 0.75 (g)
2nd cut Av.	62.0	9.118	1.199	1.934	54.3
3rd cut Av.	61.83	8.875	1.278	2.067	58.0
4th cut Av.	62.0	10.087	1.288	2.077	58.3
5th cut Av.	62.0	10.323	1.360	2.193	61.6
Average	61.96	9.601	1.281	2.068	58.1

Table 9: Yield per Faddan of Elephant Grass in different Cuts

Item	Date of cutting	Height Cm	Age of cut days	Fresh Yield tons/ Fad.	DM %	DM yield tons/ Fad.
1st cut	July 5th, 1976	100	27	9.31	17.0	1.58
2nd cut	July 25th, 1976	100	20	26.29	13.2	3.74
3rd cut	Aug, 16th 1976	100	22	19.20	14.4	2.77
4th cut	Sept. 11th, 1976	100	26	17.50	12.9	2.26
5th cut	Oct. 19th, 1976	100	38	15.68	13.2	2.07
Total	-------	---	133	87.98	--	12.15
Average	-------	---	26.6	17.60	14.14	2.43

Table 10: Elephant Grass Versus Barseem

Item	Chemical composition % DM					Nutritive Value % As fed		DM basis	
	CP	EE	CF	NFE	Ash	TDN	SE	TDN	SE
Elephant Grass	12.98	3.38	27.83	39.22	16.59	8.43	7.16	62.79	53.31
Barseem	16.89	2.15	21.66	49.05	10.25	9.96	8.80	66.12	58.86

Item	Productivity Faddan (5 cuts)				
	Fresh yield tons	DM yield tons	TDN Kg	SE Kg	DCP Kg
Elephant grass	87.98	12.15	7629	6299	1210
Barseem	44.35	6.34	4188	3736	771