EFFECT OF DIETRAY ENERGY LEVEL ON: 1-DIGESTIBILITY AND PERFORMANCE OF GROWING BUFFALO HEIFERS.

G. F. Shahin

Animal Production Research Institute, Ministry of Agriculture, Dokki, Giza, Cairo

SUMMARY

Twenty four growing buffalo heifers (7 month and 153 ± 6 Kg body weight) were allocated randomly and equally to one of three treatments of 8 heads each on the basis of age and weight. Animals received their allowance from the experimental rations according to Kearl (1982). Rations were iso – nitrogenous and with levels of dietary energy (80, 100 and 120 % TDN).

Body weight of each heifer was recorded biweekly until the study was completed. Treatment period lasted 12.2 months. Feed and fecal samples were collected at the last 3 days of the treatment period to determine the apparent total tract nutrients digestibility using acid insoluble ash as the internal marker. DM intake was significantly increased ($P< 0.01$) with high energy level (120 and 100 % TDN) than low energy level (80 % TDN). Daily gain, age at the onset of the first heat and age at first fertilized service of heifers fed high energy level was significantly ($P < 0.05$) better than those fed low energy level. Also, the heifers fed low energy level (80 % TDN) showed the highest DM consumed ($P< 0.05$) kg DM / kg gain compared to heifers either fed on normal or high energy levels (100 and 120 % TDN). In addition, the heifers fed ration containing 120 or 100 % TDN showed the highest TDN consumed ($P < 0.01$) / kg gain compared to heifers fed on low energy level 80 % TDN. While, DCP conversion was not significantly affected ($P < 0.05$). Both the normal and high levels of energy (100 and 120 % TDN) groups were superior relative to the 80% TDN group. The animal group fed 120 % TDN level (R3) recorded the highest digestibility values for DM, OM, CP, EE and NFE as will as feeding values (TDN and DCP) compared to those fed either 100 or 80 % TDN level (R1and R2). While, CF digestibility was significantly improved ($P < 0.01$) for low energy level.

Key words: *energy level, buffalo heifers, digestibility, puberty and performance.*

INTRODUCTION

Buffaloes are popular with peasant farmers, who recognize the value of the animal's ability to thrive on coarse roughage in a tropical climate and produce good meat, milk and calf skin which are made into quality leathers for shoes, hand bags and suede garments (FAO Animal Production and Health Series-'The water Buffalo', (1977) FAO estimates for 1995 were 3, 25 million buffaloes in Egypt.

Nutritional components, especially energy level, is the most important factor affecting body weight, age of first fertilized service, age at first calving and growth rate at different ages . Mohan *et al.* (1984) reported that feed intake, feed efficiency and dressing percentage of growing lambs were improved when fed higher energy levels. Better performance and carcass traits were also reported for ewes and withers fed high energy level (Ahmed and Davies, 1986). Zedan (1995) reported that energy intake and poor body condition, after calving, delay the return of normal function of the ovaries . Conception rate tends to decrease when energy intake is

inadequate to the requirements.

It seems that scarce information exists on the utilization of diets with different energy levels on reproductive and productive performance of buffaloes in Egypt.

MATERIALS AND METHODS

This study was conducted at El-Gemiza Experimental Station Animal Production Research Institute, Agriculture Research Center, Ministry of Agriculture, and Egypt.

Twenty-four growing buffalo heifers (215 days old and 153 kg body weight) were allotted randomly into three similar groups of eight each. All experimental heifers were kept under semi-open sheds, and individual daily feeding was applied. The experimental rations were iso-nitrogenous with three levels of dietary energy {80, 100 and 120 % TDN according to Kearl , (1982) } Table (1) .

The composition of the experimental rations was the concentrate feed mixture (CFM) ; brseem hay (BH) ; crushed yellow corn (C) and rice straw (RS) . The CFM was individually weighed for each animal and offered twice daily before observed oestrous at 7 a.m and 4 p. m. While roughage was offered at 8 a.m and 5 p.m. Roughage: concentrate ratio was 60 to 40. Mineral blocks and fresh water were available freely throughout the experimental period. Individual feed intakes were recorded daily, while fasting body weight of each heifer was recorded at the start of the experiment and then biweekly until the study was completed. Feed allowance was adjusted biweekly according to the change in body weight. Nutrient composition of the ingredients is found in Table (1). Weights were collected in the morning after an overnight without feed and water. Heifers were observed twice daily (at 7 a.m and 4 p.m) for oestrous. Feed intake was adjusted to body weight to calculate feed efficiency. Feed and fecal samples were chemically analyzed according to A.O.A.C. methods (1984).

At the end (about 350 days from the start) of the experiment individual feed residues and fecal grab samples were collected for a 3- d period and composited for each animal to determine total tract apparent nutrients digestibilities using silica (McDonald *et al.*, 1995) as an internal marker.

Data were statistically analyzed according to SAS (1995). The least significant difference (contrasts) was used.

RESULTS AND DISCUSSION

The results of heifers performance are shown in Table (2). Weight at onset of puberty was similar for heifers fed different energy levels; difference was not significant. Regarding age at onset of puberty the values were 217.75, 243.13 and 210.63 days for groups R1, R2 and R3, respectively. Heifers on high energy level attained onset of earlier puberty than those either on normal or low level of energy. Such differences proved to be statistically highly significant ($P< 0.01$).

Weight gain and average daily gain (ADG) followed the same trend, heifers on high energy level resulted in a significant increase in weight gain ($P< 0.05$) and average daily gain ($P< 0.01$). It may coincide with the age of puberty and consequently a probable secretion of sex hormones. Many investigators reported similar results { Mudgal and Sivaiah (1982), Sharma and Sharma (1983), Ropke et.al., (1994) and Shahin (2000)}, on the contrary, Sengar et.al., (1984) ; and Ordoveza (2001) reported that no significant difference in growth rate working with buffalo calves fed different energy levels .The average daily feed DM intake for 120 % energy level (R3)

Table (1) : Chemical analysis of experimental feed stuff and tested rations .

Item	DM	Nutrient % of DM					
		OM	CP	CF	EE	NFE	Ash
Concentrate feed mixture (CFM)	87.22	94.62	17.56	9.17	1.19	66.70	5.38
Corn	89.17	98.44	9.05	2.39	2.88	84.12	1.57
Rice Straw	91.39	80.20	4.28	35.76	1.71	38.45	19.80
Berseem hay	92.96	87.44	13.93	27.32	0.48	45.71	12.56
Rations 1	87.89	89.12	12.55	18.87	2.11	55.59	10.88
Rations 2	86.25	87.25	12.49	20.17	1.86	51.73	13.75
Rations 2	86.25	87.25	12.49	20.17	1.86	51.73	13.75
Rations 3	88.65	90.56	12.64	16.71	2.31	58.9	9.44

Table (2) : Mean daily gain of different heifer groups during the experimental period .

Item	Experimental			Sig.
	R 1	R 2	R 3	
No.of animals	8	8	8	
Weigh changes :				
Initial weight , kg	153.50 ± 6.01	153.38 ± 8.32	153.38± 4.95	NS
Age , day	215.50 ± 2.04	214.88 ± 2.39	214.25± 1.65	NS
Weigh at puberty , kg	301.75 ± 7.21	292.75 ± 13.0	307.38± 5.55	NS
Period , day	217.8ab± 7.66	243.13a ± 11.8	210.6ab± .36	**
Total gain , kg	148.3ab± 7.36	139.38b± 6.74	154.0a ± .59	*
Daily gain, kg	0.687ab ± 0.04	0.582b ± 0.04	0.733a± 0.02	**
DM intake , kg , h , d	7.10b ± 0.24	6.92 b ± 0.53	7.95 a ± .26	**
Feed conversion :				
Kg DM / kg gain	10.24 b ± 0.21	11.90a ± 0.31	0.85ab±0.34	**
Kg TDN / kg gain	6.09ab ± 0.23	5.75b± 0.86	6.82 a ± 0.18	**
kgDCP/ kg gain	0.96 ± 0.02	0.99 ± 0.01	0.94 ± 0.03	NS

R 1 : 100 % TDN R 2 : 80 % TDN R 3 : 120 % TDN
**** : P < 0.01 * : P< 0.05 NS: Not significant**
a , b means of different letter in the same row are significantly different .

Table (3) : Intake of DM , nutrients digestibilities and feeding value of experimental ration offered to growing buffalo heifers .

Item	Experimental			Sig.
	R 1	R 2	R 3	
Body weight , kg	252.13± 11.99	258.63±11.27	247.13 ± 5.71	
, $W^{0.75}$	63.27	64.49	62.33	
Total DM intake Kg /h/d	9.79ab	8.04b	10.55 a	**
Total DMI Kg $W^{0.75}$	0.155ab	0.125b	0.169 a	**
Nutrients digestibility %				*
DM	66.42ab± 0.79	64.31b ± 0.98	67.51a ± 0.42	*
OM	68.97ab±0.66	66.45b ± 0.41	70.25a ± 0.81	*
CP	56.62 ab± 1.38	54.13b ± 1.44	59.95a ± 0.94	*
CF	49.26ab ± 0.80	59.28a ± 2.66	47.38b ± 1.17	**
EE	71.94 ab± 0.66	68.66b ± 0.41	73.04a ± 0.54	*
NFE	63.86ab ± 1.09	62.31b ± 1.23	66.30a ± 1.77	*
Feeding value %				
TDN	52.85ab ± 1.48	44.38b ± 1.98	61.56 a ± 1.83	**
DCP	8.69a± 0.35	7.34b± 0.70	8.91a ± 0.58	**

**** : P < 0.01 * : P< 0.05 NS: Not significant**
a , b means of different letter in the same row are significant different .

groups were higher than those for 100 % (R1) groups or 80 % energy level (R2) groups, difference was highly significant (P< 0.01). Feed conversion (kg DM / kg gain) was improved (P< 0.01) by 16.21 and 9.67 % , respectively due to the energy levels 100 and 120 % TDN as compared to 80 % TDN . Feeding low energy level resulted in a better (P< 0.01) conversion as 5.75 kg of TDN required to produce one kg live body weight compared with feeding the normal energy levels (6.09 and 6.82 kg TDN / LBW gain kg , respectively) .

Conversion of kg DCP / LBW gain kg was slightly improved with increasing the energy level . These findings agree well with those obtain by Kishan et. al., (1985); Merchen et. al., (1987) and Shahin (2000) who reported that animals fed low energy diets in the growing period consumed more feed and had higher DM intake / kg gain compared with those fed high energy diets. Merchen *et al.*, (1984) reported that the TDN and DCP required per kg gain in high energy level was significantly lower than low energy level. However, Kishan *et al.*, (1988) did not show any differences in nutrients utilization when buffalo were fed different energy levels.

Result in Table (3) show that the highest daily DM intake value (10.55 kg) was recorded for R3 (120 % TDN) followed by R1 (100 % TDN) which recorded a lower value (9.79 kg). Ranked third, R2 (80 % TDN) recorded a value of (8.04 kg), difference was highly significant .Supporting the present study , most researchers working with steers and sheep using low energy rations indicated higher feed : gain ratios compared with those fed high energy diets { Allan (1969) ; Allam (1970) and Soliman *et al* . (1975)}. Concerning, the digestion coefficients the high energy level resulted in significant (P < 0.05) increases in digestibility of DM, OM, CP, EE and NFE. On the contrary digestion coefficient of CF was highly significant (P< 0.01) for low energy diet.

The highest digestion coefficients obtained for the high energy diet may due to the highest content of concentrates and low fiber content.

Value of TDN was higher in experimental rations R1 and R3 than that of R2. This was expected because R1 and R3 contained more concentrates than R2.

Moreover, DCP of experimental rations R1 and R3 were higher (P< 0.01) than that of the R2. This was expected since the average of CP content and digestibility coefficient were significantly higher in R1 and R3 than that of R2.

The present findings were nearly similar to these obtained by Hayneys *et al.*,(1955) who reported that a linear increase in TDN with increase in concentrates in the diet up to 66 % . El-Komy *et al* ., (1979) found that as the concentrate level of the diet increased , digestible DM , CP , EE and NFE and TDN increased . Bartocci *et al.*, (1997) Shahin (2000) and Hussain *et al.*, (2001) reported that increasing the energy content of the diet was found to improve digestibility. Tiwari *et al.*, (1990) found that the higher levels of energy in the diets may have increased rumen microbial growth

Shahin (2000) reported that high level of energy resulted an increased nutritive value as TDN and DCP.

Performance of buffalo heifers as affected by feeding different energy levels is displayed in Table (4). Results showed a trend of almost similar to data in Table (2) which indicate that, live body weight at first fertilized service of heifers fed high energy level (120 % TDN) had heavier body weight than those fed 100% or 80% TDN. However, there was no significant difference between treatments.

Regarding age at first fertilized service of heifers fed low energy level (80 % TDN) was greater than heifers on higher energy levels (100 or 120 % TDN), difference due to energy level proved to be highly significant (P< 0.01).

Total gain was almost similar with all heifers on different energy levels, (Table 4). However, daily gain was higher (P < 0.01) for heifers fed high energy level 120 % TDN (0.700 kg) follow by 100 % TDN (0.657 kg) than 80 % TDN (0.515 kg). Most researchers were in agreement that increasing energy levels in the diet or energy supplementation resulted in greater daily gain of different foreign breeds of animals (Gomez and Hemandez , 1980 ; Mohan *et al.*,1984 ; Barros *et al.*, 1990 ; Gorgulu *et al* .,1994 and Shahin , 2000); while other (Craddock *et al* ., 1974) showed that energy level did not affect significantly average daily gain . More recently , Saikia and Baruah (1997) using diets of 65 , 70 and 75 % TDN fed to crossbred (Beetal - Assam) weaned goats , found that the daily gain in body weight differed significantly , being lowest in low energy group and highest in high energy group

Average daily DM intake for 120 % TDN (R3) group was higher (P < 0.01) than those fed100 or 80 % TDN (R1 and R2) groups .These results are inagreement with the findings reported by Pandit and Singh (1967) , Helmy (1988) , Bayoumi (1995) and El – Ashry *et al* ., (2003) . Concerning feed conversion, the (DM kg / kg gain) for heifers fed 100 % TDN (R 1) was better (14.85 kg DM / kg gain) than those of animals fed 80 or 120 % TDN (R2 and R3). Such differences proved to be statistically significant.

TDN kg / kg live body gain of heifer fed low (80 % TDN) energy level showed better value compared with heifers group fed normal or high (100 and 120 % TDN) energy levels . Regarding , DCP conversion value was better for heifers fed either normal or high (100 and 120 % TDN) energy level than heifer fed low level (80 % TDN) .but the difference was not significant . Sprott *et al* ., (1980) ; Woody *et al.*, (1983) and Horn *et al.*, (1995) , found that the average daily gain of different animals was improved with a high dietary energy level , Kanat *et al.*, (1997) fed Holstein bulls on three levels of energy (1.6 %, 2.0 % and 2.4 % concentrates of live weight with constant CP (12 %) and given the straw as roughage freely; the low energy group consumed significantly more feed per kg live body weight gain than high energy group which is in accordance with the present results (Table 4) .

Data of economic point of view (Table 5) include the relative economic efficiency (daily gain, age at first fertilized service and feed cost). Means of initial, final weight (weight at first fertilized service) and total gain of buffalo heifers over the whole experimental period for different experimental groups were almost similar .However, the highest value of average daily gain was recorded for heifers fed high energy level (120 % TDN) (0.720 g / h / d) followed by those fed (100 % TDN) (0.675 g /h /d) and finally heifers fed low energy level (80 % TDN) (0.554 g /h /d) . It was found that feeding heifers on 120 or 100 % of the allowance TDN resulted an increase in average daily gain by 130 % and 121.84 % compared to those on 80 % level of energy.

Concerning the age at first fertilized service, it was found that the heifers fed on high energy level (120 % TDN) attained onset of earlier puberty and first fertilized service than those either on low level of energy (100 or 80 % TDN). Such differences proved to be

Table (4): Productive and reproductive performance of buffalo heifers fed different energy treatments .

Item	Experimental			Sig.
	R 1	R 2	R 3	
No. of Animals	8	8	8	
Body weight, kg				
Weight at puberty , kg	301.75 ± 7.21	292.75±13.0	307.38 ± 5.55	NS
Age at puberty, day	433.3ab±9.43	458.0a±11.84	424.9ab±3.82	**
(age at onset of first heat)				
Weigh at first fertilized service ,kg	365.15± 4.84	356.26±10.74	371.14± 4.49	NS
From puberty to conception period, day	95.88ab± 7.86	123.25a±6.18	91.50ab± 3.59	**
Total gain , kg	63.15 ± 5.89	63.51 ± 4.43	63.76 ± 2.61	NS
Daily gain , kg	0.657ab± 0.02	0.515b± 0.02	0.700 a± 0.03	**
DM intake , kg / h / d	9.75ab±0.49	8.43b± 0.64	11.12a ± 0.8	**
Feed conversion :				
kgDM / kg gain	14.85b±0.47	16.35a±0.48	15.87ab±0.54	*
kgTDN / kg gain	7.67ab ± 0.33	7.33b± 0.27	8.64 a ±0.61	**
kgDCP/ kg gain	1.34 ± 0.03	1.39 ± 0.04	1.36 ± 0.05	NS

** : P < 0.01 *: P< 0.05 NS: Non significant

a , ab and b means of different letter in the same row are significantly different.

Table (5) : The economics of feeding different dietary energy levels fed to growing buffalo heifers .

Item	Experimental		
	R 1	R 2	R 3
No .of animal	8	8	8
Initial weight, kg	153.50± 6.01	153.38± 8.32	153.38± 4.95
Weight at first fertilized service,kg	365.15± 4.84	356.26± 0.74	371.14± 4.49
Total gain , kg	211.65± 6.47	202.88± 3.89	217.76± 3.01
Daily gain , kg	0.675± 0.043	0.554± 0.021	0.720 ± .011
Relative daily gain efficiency	+121.84 %	100 %	+130 %
Initial age , days	215.5 ± 2.04	214.88± 2.39	214.25± 1.65
Age at first fertilized service, days	529.1± 13.49	581.25±10.82	516.38± 4.80
Period between initial age and age at first fertilized service, days	313.6± 13.43	366.39 ± 9.75	302.14 ±4.65
Relative in all period efficiency	+116.82 %	100 %	+121.26 %
Total DMI ,kg / h	2955	3145	3120
DMI , kg / h / d	9.42	8.58	10.32
Total feed cost , LE	1360	1258	1560
Relative economic efficiency (feed cost)	-109 %	100 %	-124 %

R 1 : 100 % TDN R 2 : 80 % TDN R 3 : 120 % TDN

statistically highly significant.

Regarding the feed cost, it was indicated that heifers fed on high level of energy (120 % TDN) had the most expensive values followed by those on 100 % TDN. The feed cost of 125 & 100 % TDN treatment formed 124 and 109 % of those fed low energy level (80 % TDN).

Conclusion

It is concluded that the high energy diet might be fed to growing buffalo heifers in particular during the period of significant response apart from the period of early after weaning, age of puberty and age first mating fertilized. This suggestion might promote a rapid rate of growth and consequently decrease the number of days on feeding till first fertilized service would take place on body weight basis, Thus, it is not recommended to apply the high energy diets for feeding the growing buffalos heifers in all stages of reproduction and productive performance. In addition, extending the feeding period on high energy level can increase the production costs.

REFERENCES

Ahmed , N. A. and H . L . Davies 1986). Effect of sex and dietary energy concentration on feed conversion ration, growth and carcass characteristics in Merino X Border leice steer lambs . Proceeding of the Australian Society of animal production – 16 , 119.

A. O. A. C. (1984) .Association of Official Analytical Chemists Official Methodsof Analysis. 14th ed. Washington, D. C.

Allam , S . M . (1970) . The effect of energy and protein level on the efficiency of feed utilization with growing sheep . Ph . D . Thesis , Cairo Univ ., Fac. Agric.

Allan , D . M . (1969). The performance of lambs fed all concentrate diets varying energy density and crude protein content. Proc. of meat production from entire meat animal . PP . 103 , London .

Barros , N . N.; J. Kawas ; W . L . Johnson and J . M . Shelton (1990) . Energy utilization by Somali lambs fed napiergrass ' ad – libitum '' and an energy supplement at increment levels. P esquisa - Agropecuaria - Brasileira , 9 : 1283 .

Bartocci , S . ; S . Terramoccia ;A. Amici ; F. Martillotti ; A . Borghese ; S Failla and VL. Barile (1997). Digestibility in buffalo of diets with two levels of energy and protein degradability , Proceedings 5 th world buffalo congress,Royal palace, Caserta, Italy, 13 – 16 October , 302 .

Bayoumi , H . M . (1995) . Productive and reproductive performance of Egyptian buffaloes as affected by feeding level during mid – pregnancy and early stage of lactation . M. Sc. Thesis , Fac.of Agric ., Moshtohor , Zagazig Univ . Banha Branch , Egypt.

Craddock , B . F . ; R . A . Field and M . L . Riley (1974) . Effect of protein and energy levels on lamb carcass composition . J . Anim . Sci ., 39 : 325 – 330 .

Dimov , K . ; M . Tsankova and A . Tosev (1984) . Comparative intensive fattening of buffalo calves and calves different amount of dietary energy Zhivotnor dni – Nauki , 21 : 4 , 57

El – Ashry , M . A.; H. M. Khattab ; K . E. I. Etman and S. K. Sayed (2003 Effect of two different energy and protein levels on productive and reproductiveperformances of lactating buffaloes. Egyptian J . Nutrition and Feeds 6 (Special Issue) : 491.

El-Komy,A.; Hassan, A; Badawy, A. and El-Shazly, K.(1979).Studies on milk

yield and composition and blood composition of cross – bred and buffalo cows at different seasons of lactation and fed on different diets . Alex . J. Agric . Res ., 27 (4) : 9.

FAO, (1977). Animal Production and Health Series (The water buffalo). A project sponsored by the 'Australian Freedom From Hunger Campaing'. Ca MPIGN FAO of the united Nations Rome 1977.

Gomez . R and J . Hemandez (1980). Response of growing Pelibuey sheep to varying levels of dietary . Tropical Anim . Prod . , 5 : 3 , 292 .

Gorgulu , M . ; O. Ozturkcah ; E . S . E . Gala and O . Gursoy (1994) .Effects of dietary energy and protein levels on fattening performance of Awassi lambs Strategies for the development of fat – tail sheep in the Near – East , Proceedings , Adana , Turke , 5 – 9 October – 1992 ; 66 – 69 .

Hayneys , E . H .; Davis , R . E.; Warner , R . G . and Loosli , J . K . (1955) The digestibility coefficient of feeds containing various ratios of hay to grain by fistulated steers and milking cows . J . Anim . Sci ., 14 : 1206 .

Helmy, G. H.(1988). Studies on productive and reproductive traits of Egyptian buffalo as affected by steaming up and feeding in early stage of lactation. Ph D Thesis , Fac. of Agric ., Zagazig Univ ., Moshtohor , Banha Branch , Egypt .

Higazy , A . (1985) . The effect of some nutritional levels during different seasons on gestation and milk yield of buffalo heifers. Ph . D . Thesis , Fac Agric ., Al – Azhar Univ . , Cairo.

Horn , G . W .;M. D. Cravey ; F. T . Mc Collum ; C. A. Strasia ; E. G . Krenzer ; Jr . and P. L . Claypool (1995) . Influence of high starch vs high fiber energy supplements on performance of stocker Cattle grazing wheat pasture and subsequent feedlot performance.J. Anim. Sci., 73: 45 .

Hussain , A; J . I. Sultan and Zia . Ul. Hasan (2001) . Supplementation effect of protein and energy on nutrient digestion and N metabolism of buffalo calves fed wheat straw based diets . Pakistan J. Agricultural Sciences ,v . 38 (3-4) P . 22 .

Kanat , R . ; A . Kanat ; M . Avci and Y . Guneri (1997) . Effects of diets with low high energy level on fatting performance and some blood parameters of Holstein bulls. J . Anim . Sci ., 76 : suppl 2 .

Kearl, L . C . (1982) . Nutrient allowance of ruminants in developing countries . International Feedstuffs Institute Utah Agricultural Experiment Station Utah State University , Logan Utah December .

Kishan , J . ; N . Kewalramani ; BN . Gupta and SP . Arora (1985) . Influence of levels of energy on CO2 production rate , TVFA concentration in the rumen and nutrients digestibility in buffaloes . Indian J. Animal Sciences , 55: 7 , 620 .

Kishan , J .;MY . Khan and M. Lai (1988). Influence of level of energy on nutrient utilization by buffaloes under control condition in respiration chamber. Indian J. Anim. Nutr. ,5: 32.

Merchen , N . R .; D . E .Darden; L . Mallikarjunappa , S . and V. D . mudgal (1984) Prformance of buffalo heifers fed various proportions of concentrate and roughage . Indian J . Anim Sci . 54 (8) : 731.

Merchen , N . R .; D.E .Darden ; L.L. Berger ; G.C. Fahey; JR.; E . C Titgemeyer and R.L . Fernando (1987). Effects of dietary energy level and supplemental protein source on performance of growing steers and nutrient digestibility and nitrogen balance in lambs . J . Anim . Sci .,65: 658.

McDonald , P . ; R . A . Edwards and J . D . Greenhalgh (1995) . Special

methods for measuring digestibility . Animal Nutrition . 5 th Ed . England .

Mohan , D.V. G.K. ; K. S. Reddy ; C.M. Naidu ; Munirathnam and K.K. Reddy (1984).Effect of different levels of energy supplementation on the performance of weaner lambs fed a basal ration of legume hay . Indian J. Anim . Sci., 54 : 1170 .

Mudgal ,VD . and K . Sivaiah (1982). Effect of feeding different levels of protein and energy on feed utilization and growth buffalo calves .Indian journal of dairy Science ,35 : 2 , 138 .

Ordoveza , A . L. (2001) . Investigation on the establishment of the energy and protein requirement of dairy cattle and buffaloes for the growth , maintenance and milk production under Philippine conditions Castillo , L. S. National Academy of Science and Technology , Bicutan , Taguig , Metro Manila (Philippines). Annotated bibliography on Philippines biodiversity: Live-stock and Poultry (Agro biodiversity) 1949 – 1997 Dairy cattle . Bicutan ,Taguig , Metro Manila (Philippines) . 110 P. Received P . 22.

Pandit , M . N . and S . N. Singh (1967) . Factors affecting crude fiber utilization by ruminants . I – Effect of the levels of molasses at various DCP intakes on roughage utilization. Indian J. Dairy Sci ., 20 : 165

Ropke , R . ; D . Schams ; FJ . Schwarz and M . Kirchessner (1994). Growth related hormones in plasma of bulls , steers and heifers given food with tow different energy level . Animal Production , 59 : 3 , 367.

SAS Institute, Inc. (1995). SASI STAT Guide for personal computers, Vers I

Sengar , SS . ; DN . Verma ; KK . Baruah ; UB . Singh and SK . Ranjhan (1984). Body composition and water metabolism in buffalo calves maintained on different level of energy and protein . Journal of Nuclear A agriculture and Biology, 13 : 1, 29.

Saikia , G . and K . K . Baruah (1997) . Feed conversion efficiency and relative cost of growth production of crossbred (Beetal – Assam local) goats fed threelevels of energy . Indian Vet . J . , 74 : 388 .

Shahin , G . F . (2000) . Effect of dietary energy level and protein source on sheep performance . Ph . D. Thesis , Fac . Agric. Menoufiya Univ.

Sharma , SC . and DD. Sharma (1983) . Effect of levels of energy on growth rate and utilization in buffalo calves. Asian journal of Dairy Res. 2 : 2 , 106

Soliman , H . S . ; M . A . EL – Ashry and O. Shehata 1975). Different energyand protein levels in rations for fattening lambs . 1 – Effect of different energy and protein levels in rations on body weight gain and feed efficiency of Rahmani lambs . Egypt . J . Anim . Prod . , 15 : 19

Sprott , L . R . ; L . R . Corah ; J .G . Rilley and G . H . Kiracofe (1980) . Effect of dietary monensin , energy and protein on on puberty , conception and growth in beef heifers. J Anim . Sci. (Suppl. 1): 158.

Tiwari , S . P . ; Sanjeev Kumar and H . P. Narang (1990) . The effect of protein and energy levels during late pregnancy on nutrient utilization and kid birth weight in goats. Actaveterinaria – Beograd , 40 : 5 – 6 , 297 .

Woody ,H. D . ; D. G. Fox and J. R. Black (1983) Effect of diet grain content on performance of growing and finishing cattle . J . Anim . Sci.,57 : 717.

Zedan, K.I. (1995) .Effect of dietary energy on the performance of milking buffaloes.M.Sc.Thesis, Fac. Agric. Menoufiya Univ. Shebin El Kom. Egypt.

تأثير مستوى طاقة الغذاء على: ١- معاملات الهضم والأداء الأنتاجى لعجلات الجاموس النامية .

جمال فاروق شاهين

قسم تغذية الحيوان – معهد بحوث الإنتاج الحيواني - مركز البحوث الزراعية – الدقي الجيزة

تهدف هذه الدراسة معرفة تأثير استخدام ثلاث مستويات من الطاقة التي تحتاجها عجلات الجاموس النامية حسب مقررات كيرل ١٩٨٢ (٨٠ – ١٠٠ – ١٢٠ %) من المركبات الغذائية المهضومة (على معاملات الهضم والنمو ومعدل الأداء وبعض الدراسات الفسيولوجية والعمر عند البلوغ الجنسي والعمر عند أول تلقيحه مخصبة .

استخدم في هذه الدراسة عدد 24 من عجلات الجاموس النامية متوسط عمرها ٧ شهر عند أبتدأ التجربة ومتوسط وزنها ١٣٥,٥ كجم قسمت بالتساوي تبعا للعمر والوزن آلي ثلاث مجموعات متساوية .وزعت عشوائيا تبعا للمعاملات الآتية-:

المعاملة الأولى وفيها تناولت الحيوانات غذاء يحتوى على ١٠٠% من احتياجاتها من المركبات الغذائية المهضومة +١٠٠% من احتياجاتها من البروتين المهضوم والمعاملة الثانية تناولت الحيوانات غذاء يحتوى على ٨٠%من احتياجاتها من المركبات الغذائية المهضومة + ١٠٠% احتياجاتها من البروتين المهضوم والمعاملة الثالثة حيث تناولت الحيوانات غذاء يحتوى على ١٢٠% من احتياجاتها من المركبات الغذائية المهضومة + ١٠٠%من احتياجاتها من البروتين المهضوم .وقد استمرت التجربة حوالى١٢ شهر تم خلالها دراسة أداء العجلات حيث يتم وزن الحيوانات كل ١٥ يوم وتم اخذ عينات من الغذاء المأكول ومن روث كل حيوان لمدة ثلاثة أيام متتالية حيث استخدم لتقدير معاملات هضم المركبات الغذائية المختلفة باستخدام الرماد غير الذائب كمرقم داخلي.

وكانت أهم النتائج:

- زادت كمية الغذاء المأكول اليومي كمادة جافة زيادة معنوية جدا في المجموعة التي تتغذى على مستوى منخفض من الطاقة (٨٠ %) وذلك بالمقارنة بالحيوانات التي تتغذى على مستوى ١٠٠% آو مستوى ١٢٠% من الطاقة .
- تحسنت الكفاءة التحويلية للغذاء على أساس (كجم مأكول من المادة الجافة أو من البروتين المهضوم اللازم لانتاج كجم زيادة في الوزن) وذلك نتيجة لتغذية على مستويات الطاقة ١٠٠% أ و ١٢٠ % TDN وذلك بالمقارنة بمستويات الطاقة المنخفضة ٨٠ % TDN وكان معنويا بالنسبة للكفاءة التحويلية للغذاء علي أساس (كجم مأكول من المادة الجافة لانتاج كجم زيادة في الوزن) ، بينما تحسنت الكفاءة التحويلية للغذاء علي أساس (كجم مأكول من مجموع المواد الغذائية المهضومة اللازم لانتاج كجم زيادة في الوزن) وذلك في الحيوانات التي تتغذي علي مستوي منخفض من الطاقة (٨٠% TDN) بالمقارنة بالمجموعة التي غذيت علي المستوي (١٠٠% أو ١٢٠% TDN) طاقة.
- زاد الوزن النهائي للعجلات عند البلوغ الجنسي زيادة غير معنوية وذلك نتيجة التغذية علي مستويات الطاقة

١٠٠% أو ١٢٠% TDN وذلك بالمقارنة بمستويات الطاقة المنخفضة ٨٠% TDN.

- زاد معدل النمو اليومي زيادة معنوية عند مستوي معنوية ١% للعجلات عند البلوغ الجنسي وعند أول تلقيحة مخصبة وذلك بالنسبة للحيوانات التي تتغذي علي مستوي ١٠٠% أو ١٢٠% TDN بالمقارنة بمستوي ٨٠% TDN . وفي نفس الوقت أظهرت النتائج أن المجموعة المغذاة علي ١٢٠% TDN تحسنت بياناتها تحسنا غير معنوي في هذه التقديرات عن المجموعة المغذاة علي ١٠٠%TDN وكانت الفروق معنوية بالمقارنة بالمجموعة المغذاة علي مستوي ٨٠% TDN.
- لوحظ زيادة في الفترة حتى البلوغ الجنسي و حتى أول تلقيحه مخصبة في المجموعة التي تتغذى على عليقه تحتوى على مستوى اقل في الطاقة (% 80) وذلك بالمقارنة بالمجاميع المغذاة على 100 او % 120من الاحتياجات من الطاقة وكانت الاختلافات معنوية جدا.
- كما أظهرت النتائج أيضا أن معاملات هضم كل من المادة الجافة والمادة العضوية والبروتين الخام و المستخلص الخالي من الأزوت والمستخلص الأثيري وكذلك القيمة الغذائية قد تحسنت في المجاميع التي تتغذى على علائق ذات مستوى ١٢٠% طاقة بالمقارنة٨٠% أو ١٠٠% طاقة . وكانت الفروق معنوية ما عدا القيمة الغذائية كانت معنوي جدا لزيادة مستوى الطاقة . بينما زاد معامل هضم الألياف للمجموعة التي تتغذى على مستوى طاقة اقل ٨٠% وكان التحسن معنوي جدا.