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UTILIZATION OF THE ENERGY AND PROTEIN BY GROWING COW AND BUFFALO CALVES

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SUMMARY

Limited informations on the dietary energy and protein utilization in growing buffalo calves as compared with that of cow calves. A great understanding of dietary energy and protein utilization in that of buffalo calves is, therefore, needed. Three balanced rations were formulated and offered to growing buffalo and cow calves throughout a feeding experiment in order to investigate the possible differences between growing cow and buffalo calves in regard to the efficiency of dietary energy and protein utilization. Twenty four calves, four from each species at three weeks of age, 100 and 200 kg body weight, were slaughtered and the carcass analysis was under taken.

Metabolizable energy of the feed was determined from the chemical analysis using Van Es (1978) equation. The energy retention was calculated by multiplying retained fat (kg) in the carcass by the factor (39.8 kj/g) to get the calorofic equivalent (Blaxter *et al.*, 1966). The corresponding factor for carcass protein was (23.9 kj/g).

It was found that the efficiency of utilization of metabolizable energy for maintenance for buffalo calves was similar to that of cow calves. Results also indicated that the utilization of metabolizable energy for growth of buffalo calves was better than that of cow calves. The difference between the buffalo calves and cow calves in regard to the growth rate could be explained in the light of the present findings.

Keywords: Energy, protein, growth, cows, buffaloes

MATERIALS AND METHODS

Animals: Twelve males of each of the cow and buffalo calves born on the farm of the faculty of Agriculture. University of Alexandria were used throughout this study.

Feeding system: The milk was introduced to the calves daily in two equal portions according to the early weaning system described by El-Naggar (1974). Three concentrate mixtures were introduced to calves (Table 1). The feeding system for cow and buffalo calves during the experimental period was presented in (Table 2). Energy and protein requirements were predicted using the equations of (Menke, 1980) assuming that both species have the same nutritional needs at the indicated rate of body weight gain.

Slaughter experiments: The 24 male calves were slaughtered at three intervales, 3 weeks age to act zero time slaughter weight, 100 kg body weight and 200 kg body weight. Eight calves 4 from each species on each interval were used throughout the slaughter experiments.

The chemical analysis of the carcass was conducted according to (A.O.A.C., 1975).

Methods: Metabolizable energy of the consumed feed was determined according to it's chemical analysis using the equation of Van Es, 1978. The amount of energy retained was calculated by multiplying retained fat (kg) by the factor (39.8 kj/g) to get it's calorofic equivalent (Blaxter *et al.*, 1966). The corresponding factor for carcass protein was (23.9 kj/g). Statistical analysis were made according to Snedecor and Cochran (1967).

Table 1. Composition (%) and the nutritive value of the three experimental concentrate mixtures

Components	Concentrate mixture 1	2	3
-Chemical composition:			
Maize grain	34.40	34.45	30.40
Linseed oil meal	20.00		
Barley grain	10.00		
Horse bean	25.00		
Decorticated cotton seed cake		30.00	
Undecorticated cotton seed cake			40.00
Rice bran		10.00	11.00
Wheat bran		15.00	12.00
Cotton seed oil		3.00	1.00
Molasses	8.00	5.00	3.00
Mono calcium phosphate	0.75	0.20	0.40
Calcium carbonate	1.25	1.75	1.60
Mireral Mixture	0.50	0.50	0.50
Vitamin AD_3E.	0.10	0.10	0.10
-Nutritive value:			
Crude protein (g/Kg DM)	185.3	218.9	162.4
Digested crude protein (g/kg DM)	145.0	182.0	126.0
ME. (Mj/Kj. DM)	11.7	11.7	10.6
TDN (g/Kg DM)	790	790	688
SE (g/Kg DM)	750	731	590
Ca %	0.8	0.8	0.8
P %	0.6	0.6	0.6

Table 2. The feeding system for the cow and buffalo calves from birth weight to 200 kg body weight

Age, Season, Live weight	Live body weight (kg)	Concentrate Mixture (kg/head/day)	Feedstuffs
Birth-2 months			-Whole milk restricted.
Winter	40	*ad lib.*	-Concentrate mixture I.
30-60 kg.	50	*ad lib.*	-Permanent water supply.
	60	*ad lib.*	-No fresh green fooder.
3-5 months.			
Spring	80	1.6	-Concentrate mixture II.
60-100 kg.	100	2.0	-Fresh berseen ad Lib.
			-200 g straw/day.
5-10 months.	120	2.1	-Concentrate mixture III
Summer	140	2.3	-Fresh berseem or sorghum
100-200 kg	160	2.6	*ad lib.*
	180	2.8	-200 g straw/day or good
	200	3.1	quality berseem hay

RESULTS AND DISCUSSION

Equations relating energy retention (Mcal/day) to nitrogen retention (g/day) and energy retention (Kcal/day) to nitrogen retention expressed in terms of energy for growing cow and buffalo calves are presented in (Table 3). The presence of a positive intercept indicating that N-retention can occur when energy retention is zero. (that is, that body fat can be oxidized and protein synthesized simultaneously is in agreement with the results of (Blaxter *et al.*, 1966 and Waters, 1908). It may be of interest to draw the attention that the present equations (Table 3) could be used to measure the composition of gain for the two local animal species. Efficiency with which the metabolizable energy of a diet of constant composition was used to meet energy needs for maintenance and for body gain are presented in (Table 4). The efficiency of utilization of metabolizable energy for maintenance were slightly lower (8%) than those expected (calculated according to the equations given by ARC, 1965) for the two species. The

present results concerning maintenance for growing cattle were higher than those reported by (Rohr and Danenicke, 1978) for Friesian (56%) and simmental bulls (58%) and those of (Geay *et al*, 1974; Robelin and Geay, 1976) for salers (53%) and limousin bulls (56%). Efficiency of utilization of metabolizable energy for the maintenance of buffalo calves was similar to this of the cow calves.

Table 3. Equations relating energy retention (Mcal/day) to nitrogen retention (g/day) and energy retention (kcal/day) to nitrogen retention expressed in termes of energy* (Kcal/day), for growing cattle and buffaloes

Species	Equation.	r
Cattle	$NR= 4.83+7.18\ E_R$	0.958
	$NR= 4.85+1.71\ E_R$ (1)	0.918
Buffaloes	$NR= 5.15+7.90E_R$	0.988
	$NR= 5.16+1.88E_R$(2)	0.976
Cattle	$NR= 164.0+24.4\ E_R$	0.959
	$NR= 0.67+0.24\ E_R$ (3)	0.920
Buffaloes	$NR= 175.11+26.9E_R$	0.988
	$NR= 0.73+0.27E_R$(4)	0.976

* N is expressed in terms of energy using a value of 34 kcal/g N for calorofic value of body protein (Franke & Weniger, 1958).
(1), (2) E_R= Mj/day.
(3), (4) N_R and E_R in termes of Mj/day.

Table 4. Efficiency* with which the metabolizable energy of a diet of constant composition was used to meet energy needs for maintenance and for body gain together with those expected from the results of previous work for growing cattle and buffaloes

Species	No. of Animals	Equation relating energy retention (R1 Mj/day) to ME (ME, Mj/day)	Efficiency utilization of ME%			
			For Maintenance		For body gain	
			Found	Expected**	Found	Expected***
Cattle	12	R=0.68 ME-0.78 (r=0.99)	0.68	0.74	0.43	0.56
		R=0.43 ME-0.06 (r=0.68)				
Buffaloes	12	R=0.69 ME-3.41 (r=0.99)	0.69	0.75	0.40	0.57
		R=0.40 ME-1.38 (r=0.83)				

*Efficiency calculations not included (Head-Blood-Skin-Hoofs).
**From the equation of (A.R.C., 1965)
***From the equation of (A.R.C., 1965)

Efficiency utilization of metabolizable energy for growth was found to be better in buffalo calves (40%) as compared to those of cow calves (43%). On the other hand, great differences were found between the present results and those calculated according to the equations given by (ARC, 1965).

ME utilization for growth in monogastrics is known to depend on the composition of gain (Kielanowski, 1976 and Thorbek, 1977). There is reason to believe that this is also true for ruminants. However, some schools of thought still maintain tat growth only depends on the nature of feed.

It is concluded that a real difference between growing cow and buffalo calves in regard to the growth rate could be explained in the light of the present findings.

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