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Effects of local concentrate and weaning age on the performance of crossbred calves*

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ABSTRACT

Thirty calves were allocated to three diets and two weaning ages (3 × 2 factorial) to study the effects of local concentrates (A (T1) and B (T2)) and weaning age (9 and 12 weeks) on dry matter intake, growth and costs of gain. All calves were fed whole milk and hay and either supplemented with the concentrates or unsupplemented (T3). Mean total dry matter intake (1.53 vs 0.93 kg/d) and growth rate (0.31 vs 0.23 kg/d) were higher ($P<0.05$), whereas the costs of gain (2123 vs 2696 shillings/kg gain) were lower for supplemented than unsupplemented calves. Early weaned calves had lower (0.26 vs 0.30 kg/d) gain than late weaned. It is concluded that weaning at 12 weeks and supplementing local concentrates improve performance of calves.

KEY WORDS: calf, concentrate, intake, growth, costs

INTRODUCTION

Commercially available calf concentrates in developing countries are expensive and erratic in supply. Little has been done in these countries to search for proper calf formulations for promoting growth and reducing cost of rearing calves. Feeds formulated from locally available feed resources would make cheap calf concentrate (Berhane et al., 1998). However, more information is needed on the utilization of local feed materials by calves. This study was conducted to test two concentrates formulated using locally available feed materials on total dry matter intake, growth performance and costs of gain by calves at 9 or 12 weeks of weaning.

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MATERIAL AND METHODS

Two concentrates were formulated according to NRC (2001) recommendations using different local feed resources (Table 1).

Table 1. Ingredient inclusion levels (g/kg DM) and estimated cost of the formulated concentrates

Ingredient	Concentrate	
	A	B
Hominy feed	610	690
Cassava root meal	0	50
Molasses	40	0
Sesame cake	0	50
Sunflower seed cake	140	140
Ipomoea meal	140	0
Fish meal	60	60
Mineral mixture	0	5
Bone meal	5	0
Common salt	5	5
Cost Tshs[1]/kg fresh feed	94	119

[1] Tanzania shillings

Thirty crossbred (Zebu × 50-87 Frisian/Ayrshire) male calves aged 4-5 days with initial weight ranging from 23 to 34 kg were randomly allocated to three dietary treatments and two weaning ages in a 3×2 factorial arrangement. The treatments were concentrate A (T1), B (T2) and no supplementation (T3). All calves were daily fed 4 kg of whole milk in the first 4 weeks followed by 3 kg from the 5th week to the end of the 8th week and 2 kg towards weaning at 9 or 12 weeks. All calves were given hay and water *ad libitum* from the second week of age. The concentrates were offered starting from the second week of age and increased gradually up to 1 kg. Calves were weighed weekly and feed consumption recorded daily for 28 weeks. The cost of gain was calculated as the cost of feed per kg body weight gain. Proximate components of feed samples were analysed according to AOAC (1990). Dry matter intake, growth rate and cost of gain were analysed using General Linear Model procedure of SAS (2000) with covariance analysis. Least square means were compared using the probability difference.

RESULTS

Concentrate A had lower crude protein, energy and higher crude fibre contents compared with concentrate B, which had higher ether extract than the former (Table 2). The body weight of calves at 28 weeks ranged from 60 to 106 kg. Calves supplemented with either of the two concentrates had higher dry matter

intake and growth rates than unsupplemented and the differences increased with advanced age (Table 3). Early-weaned calves consumed less dry matter and had lower (P<0.05) growth rate than late weaned calves. The cost of gain was higher (P<0.05) in calves on T3 and the magnitude increased with advanced age.

Table 2. Chemical composition of the experimental feeds

Component, g/kg DM	Concentrate		Hay	Milk[1]
	A	B		
Dry matter	932	935	919	109
crude protein	179	186	44	302
ether extract	589	949	112	354
crude fibre	109	86	453	NA
N-free extractives	558	510	399	NA
solid not fat	-	-	-	64.6
ash	95	103	93	65
Ca	6.8	10.1	1.9	NA
P	6.2	8.3	1.8	NA
Energy MJME/kg DM	12.3	13.1	8.7	25.25

[1] NA- not analysed

Table 3. Effects of treatment and weaning age on the performance of calves

Parameter	Age days	Treatment			SEM + sign.	Weaning age weeks		SEM + sign.
		T1	T2	T3		9	12	
Dry matter intake, kg/d								
	9	0.81^{a}	0.81^{a}	0.53^{b}	0.05***	0.74	0.69	0.03 NS
	12	1.29^{a}	1.19^{a}	0.85^{b}	0.07***	0.88	1.11	0.05*
	28	2.46^{a}	2.61^{a}	1.41^{b}	0.07***	2.46	2.16	0.05 NS
Gain, kg/d								
	9	0.28^{ab}	0.31^{a}	0.25^{b}	0.02*	0.26	0.29	0.01 NS
	12	0.33^{a}	0.33^{a}	0.27^{b}	0.01**	0.28	0.34	0.01*
	28	0.29^{a}	0.31^{a}	0.18^{b}	0.001***	0.25***	0.28	0.01*
Cost, TShs[1]/kg gain								
	9	3126^{b}	2442^{b}	3536^{a}	188.5*	3289	3046	153.9 NS
	12	2234^{b}	2335^{b}	2728^{a}	111.9**	2384	2414	91.5 NS
	28	1284^{b}	1317^{b}	1825^{a}	31.9***	1509	1442	26.0 NS

[1] Tanzania shillings; ^{a,b,c} means with the same superscript letters across the row are not significantly (P>0.05) different

Weaning time had no effect (P>0.05) on the cost of gain. The interaction effect between diet and weaning age was not significant (P>0.05) in all the parameters measured.

DISCUSSION

The hay used in the experiment had lower energy (8.7 MJ ME/kg DM) and crude protein (44 g/kg DM) than the reported critical lower levels for optimal microbial activity in the rumen (Canton et al., 1988). The slightly higher energy content in concentrate B than A could be due to the high fat content, which might have originated from the sesame cake. Nevertheless, the energy and protein contents of both concentrates were within the recommended values of 12-13 MJ ME and 160-200 g CP per kg dry matter of calf concentrate (NRC, 2001). The observed higher dry matter intake and growth rate by the supplemented than unsupplemented groups was expected and was in agreement with the findings by Stafford et al. (1996) and Valdes et al. (2000). These authors concluded that supplementation increases feed dry matter intake and hence faster growth rate. The observed lower dry matter intake and growth rates from 12th week of age by the early than late weaned calves could be due to weaning stress, as pointed out by Funaba et al. (1994). This could be explained by the fact that it takes time for the calf to adjust itself to the new post weaning diet and hence the temporary slowing down of growth rate. This implies that under rearing conditions used in the present study, better results are obtained when calves are weaned at 12 weeks of age. The increased cost of rearing of calves in T3 was due to the poor growth of the calves. Poor calf growth is known to increase cost of rearing and reduce future production performance of the animal (Pilau et al., 2003). The present results support the conclusion made by Preston (1989) that concentrate supplementation to growing animals fed tropical pastures is inevitable for optimal daily weight gain and reduced cost of rearing. The results have economic implications for poor farmers in the tropics that enter into small scale dairy production but often do not have financial resources to purchase commercial concentrates. Such farmers could depend on locally formulated concentrates and weaning strategy to increase performance and income from such enterprise.

CONCLUSIONS

It is concluded that balanced calf concentrates could be economically prepared under local situations to increase growth rates of calves and better results are obtained when weaning is done at 12 weeks of age.

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