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A SHORT COMMUNICATION ON COMPLETE MAIZE SILAGE DIETS FOR DAIRY COWS

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In the Eastern Cape, milk is being produced off natural grazing and/or cultivated pastures, which are often supplemented with hay or silage. An overestimation of the natural grazing, coupled with low concentrate feeding, frequently results in large seasonal fluctuation in milk production. Fluctuations of this nature could be eliminated by a more constant supply of high quality feed. Complete diets based on maize silage as the major feed source offer several advantages.

Although complete diets for dairy cattle, based on mixtures of maize silage and concentrates, have received considerable attention abroad (Muller, Harshbarger & Oliver, 1967; Marshall & Browning, 1968; McCoullough, 1970; Spahr & Harshbarger, 1971; Waldern, 1972) no research has been done on this subject in South Africa. For this reason, preliminary trials on complete maize silage diets for dairy cattle were conducted at the Bathurst Research Station.

Jersey cows varying in age and stage of lactation, were used in two separate trials. During the first trial 15 cows were blocked for stage of lactation, lactation number and estimated production potential. These animals were randomly assigned to treatments A, B and C comprising the following concentrate to silage ratios: 50:50; 40:60 and 30:70 (on a dry matter basis). These diets were fed *ad lib.* for 16 weeks. Concentrates and silage were hand-mixed prior to feeding. Sixteen cows were similarly assigned to treatments D and E in the second trial and fed ratios of concentrate to silage of 45:55 and 35:65 *ad. lib.* for 8 weeks. In Trial II the concentrate was incorporated at time of ensiling. Cows were fed individually in both trials.

Treatments and composition of diets are shown in Table 1 and the results are summarised in Table 2.

Neither dry matter (DM) nor estimated digestible energy (EDE) intake differed significantly between treatments in either trial ($P>0,05$). During the first trial the cows consumed a daily average of 12,42 kg of DM, equal to 3,39% of live body mass. Mean daily intake of EDE was 158,8 MJ. During the second trial cows consumed an average of 11,25 kg of DM per day, equal to 3,25% of body mass and 149,6 MJ EDE.

Table 1

Composition and minimum requirements of complete rations on a moisture-free basis

		Treatments					Minimum requirements (N.R.C., 1971)
		Trial I			Trial II		
		A	B	C	D	E	
Concentrate	(%)	50	40	30	45	35	–
Maize Silage	(%)	50	60	70	55	65	–
EDE (MJ/kg)		13,2	13,0	12,9	13,4	13,2	11,3
Crude Protein	(%)	15,9	14,4	12,9	13,4	12,6	14,0
Crude Fibre	(%)	14,5	16,2	17,9	14,9	15,0	13,0
Calcium	(%)	0,55	0,51	0,47	0,75	0,59	0,43
Phosporus	(%)	0,45	0,40	0,34	0,52	0,38	0,33

Table 2

Mean values of parameters in Trials I and II

Parameters		Treatments							LSD	
		Trial I				Trial II				
		A	B	C	Mean	D	E	Mean	0,05	0,01
Daily Feed Intake:										
DM: Total/cow	(kg)	12,75	13,09	11,43	12,42	11,10	11,40	11,25	NS	
DM: as %of body mass		3,52	3,53	3,12	3,39	3,22	3,27	3,25	NS	
Estimated DE	(MJ)	168,4	170,6	146,9	158,8	149,0	150,1	149,6	NS	
Crude Protein	(kg)	2,03	1,89	1,47	1,80	1,48	1,42	1,45	0,25	0,36
Calcium	(g)	70,5	66,8	53,7	63,7	83,2	67,0	75,1	8,2	11,9
Phosphorus	(g)	57,4	52,4	38,9	49,5	57,6	43,3	55,5	6,8	10,0
Daily Production/cow*:										
Milk	(kg)	10,92	12,14	9,67	10,91	11,10	10,70	10,90	1,78	NS
Butterfat	(kg)	0,60	0,64	0,54	0,59	0,64	0,63	0,64	NS	
Fat corrected milk (FCM)	(kg)	13,36	14,37	11,90	13,21	13,82	13,62	13,16	NS	
Mass change	(kg/cow/day)	0,55	0,58	0,46	0,53	0,33	0,31	0,32	NS	

*Adjusted for pre-experimental production

Mean daily protein intake in Trial I decreased with decreasing levels of concentrate in the diets, being 2,03, 1,89 and 1,47 kg for treatments A B and C respectively; the last value was significantly ($P<0,01$) lower than the first two. In Trial II mean daily protein intake was 1,45 kg and did not differ significantly ($P>0,05$) between treatments.

The mean daily adjusted milk production in Trial I was 10,92; 12,14 and 9,67 kg per cow for treatments A, B and C respectively, with the difference between treatments B and C being statistically significant ($P< 0,05$). The mean daily butterfat and FCM-production followed exactly the same pattern but failed to reach significance at the 5% level. In Trial II production of milk, butterfat and FCM did not differ significantly ($P>0,05$) between treatments and equalled 10,90; 0,64 and 13,16 kg per day respectively.

The decreasing concentrate content of the diets within or between trials did not result in a corresponding decrease in production; the only exception being the diet with 30% concentrate. In the latter case the intakes of crude protein, calcium and phosphorus were slightly below the estimated minimum requirements. It is noteworthy that even on the widest ratio of concentrate to silage, cows gained considerably in body mass.

The trends observed in these trials indicate that maize silage could be used as a major feed source in complete diets for dairy cattle, but more elaborate investigations are needed before any valid conclusions can be made. Present evidence is also insufficient to demonstrate any additional advantage which may stem from energy-enrichment of maize silage at the time of ensiling.

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