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Substitutional Feeding Value of Ensiled Sugarcane Tops and its Effect in Crossbred Heifer's/cow's Reproductive Performance

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Abstract: Deciphering the myth and replacement value of sugarcane tops silage made with 1% urea, 0.5% salt and 2% molasses (SCTS) to mixed green grass (GG) having iso-nitrogenous (1.81) and iso-caloric value (48% TDN) was studied. Eight crossbred heifers (13-19 months age) were divided in two groups of four animals in each. Animals were offered either GG or SCTS *ad libitum* and concentrate as 1/3rd of total dry matter requirement in a 180 days trial. Though the dry matter intake of SCTS was ($p < 0.05$) lower than GG (96.99 vs 90.70 g kg⁻¹ W^{0.75}), the occurrence (75%), intensity, duration of oestrus (18.17 vs 19.83 h) and the number of heifers conceived (50%) were not affected. In yet another experiment, eight crossbred cows in advanced stage of pregnancy were placed in the same feeding regime and its effect on dry matter intake, incidence of abortion and birth weight of calves were assessed. The milk yield and quality were studied in the calved animals. It was observed that feeding of SCTS did not induce abortion in the advanced pregnant cows, the dry matter intake (136.64 Vs 119.72 g kg⁻¹W^{0.75}) and the birth weight of calves did not vary (17.00 vs 20.75 kg). The post partum milk yield (8.05 vs 7.80 kg) and its composition were not affected by feeding SCTS. There was no incidence of abortion in conceived heifers/ cows fed with SCTS. Hence, it is concluded that SCTS can be used as alternate fodder without affecting reproductive performances in crossbred heifers/cows.

Key words: Reproductive performance, heifers, cow, sugarcane tops, silage, myth

Introduction

Sugarcane tops (*Saccharum officinarum*) are the important crop residue yielding about 15% of the total sugarcane yield. Thus there is abundant availability of sugarcane tops at the time of harvest, which could be used a fodder to reduce pressure on the cultivable land. However, due to the low protein (Kutty and Prasad, 1980), low digestibility of nutrients (Patil *et al.*, 1999) and poor mineral contents (Joshi *et al.*, 1995) the sugarcane tops are being partially used as roughage. Andrade *et al.* (2001) reported that urea supplementation increased the digestibility of dry matter and total digestible nutrients intake of sugarcane forage.

In addition, there is also apprehension among the farmers that feeding of sugarcane tops would result in reduced conception rate, repeat breeding, abortion in early pregnancy, etc., in cattle. According to a survey report (Anonymous, 2003), out of 180 farmers interviewed in Tamil Nadu, India, about 39% reported the apprehension of early embryonic death in pregnant animals on feeding the sugarcane tops.

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However, information on the effect of feeding value added sugarcane tops silage with 1% urea, 0.5% salt and 2% molasses on the reproductive traits in dairy cattle is lacking. Hence the study was designed to examine the scope of replacing iso caloric and iso-nitrogenous mixed green grass (GG) by sugarcane tops silage (SCTS) as well as to decipher the myth of adverse reproductive performance on feeding SCTS to heifers/cows.

Materials and Methods

Method Adopted to Enrich and Ensilage Sugarcane Tops

About 72 tones of sugarcane tops were collected and allowed to wilt for 4-5 h in the harvesting field itself. The tops were then chopped to a length of 4-5 cm using chaff-cutter and ensiled in silo pits with one per cent urea, 0.5% common salt and two percent molasses on air-dry basis. The value addition was based on the earlier work conducted in this laboratory to assess the precise level of additives (Wilhelmina, 2001). The silo was opened after 60 days of ensiling.

The Bajara-Napiar hybrid (*Pennisetum glaucum* and *P. purpureum*) grass was mixed with Alfalfa (*Medicago sativa*) in the ratio of 1:1.09 in order to match the nitrogen and energy content of SCTS.

Replacement Value of SCTS to GG and its Effect on Reproductive Performance in Crossbred Heifers.

Experiment I

A study was carried out for 180 days in eight Jersey X Sindhi crossbred heifers (*Bos taurus* × *Bos indicus*) of 13-19 months age with a mean body weight of 158.75±13.27 kg. The animals were randomly distributed into two treatment groups of four animals each. The heifers were individually penned giving adequate floor space in a well-ventilated shed. The heifers in the one group received *ad libitum* of GG while the other group received *ad libitum* of SCTS. Both groups received one third of dry matter requirement as concentrate. The concentrate mixture was formulated with maize (14%), damaged wheat (16%), Wheat bran (21%), rice bran (20%), groundnut cake (13%), Sunflower oil cake (10%), molasses (2%), urea (2%) and mineral mixture (2%) so as to contain 22% of crude protein and 70% of total digestible nutrients. Records were maintained on feed offered, left over and reproductive performance traits like occurrence of oestrous cycle, duration of oestrus, intensity of oestrus and conception. The intensity of oestrus was measured using a scorecard outlined by Rao and Rao (1981) and Callesen *et al.* (1993). The conceived animals were continuously fed with respective rations up to third month of pregnancy to observe incidence of any early abortion.

Replacement Value of SCTS to GG in Advanced Stage of Pregnancy and its Effect on Post Partum Milk Yield and Composition in Cows- Experiment II

Eight Jersey x Sindhi crossbred cows (*Bos taurus* X *Bos indicus*) in advanced stage of pregnancy (last three months) were randomly allotted to two groups of four animals in each. The housing, feeding and management of the animals were the same as in experiment I. The concentrate mixture was formulated with maize (20%), wheat bran (22%), rice bran (17%), mung chuni (15%), groundnut cake (10%), Sunflower oil cake (12%), molasses (2%) and mineral mixture (2%) so as to contain 17% of crude protein and 65% of total digestible nutrients. The experimental animals were fed with respective rations for a total period of 120 days. Records were maintained on feed / fodder offered, left over, incidence of abortion, birth weight of calf, daily milk yield and milk quality. Milk parameters were studied by collecting the milk samples during the data collection period of 10 days after 8 days post calving. Milk samples were collected at morning and evening milking. These samples were analyzed for fat content by Gerber's method (BIS, 1977). Solids not fat (SNF) in the milk were calculated using

the BIS (1982) formula, $SNF = (CLR/4) + 0.25 + 0.6$, where CLR = corrected lactometer reading at 27°C, F = % of fat content of milk. The total solids in milk were calculated by addition of fat and SNF.

Statistical Analysis

The data collected in both the trials was analyzed using paired t-test as per the procedure of Snedecor and Cochhran (1967).

Results

Replacement Value of SCTS to GG and its Effect on Reproductive Performance in Crossbred Heifers.

Experiment I

The dry mater intake and reproductive parameters viz. Occurrence of oestrus, intensity of oestrus, duration of oestrus, number of heifers conceived and incidence of early abortion due to feeding of SCTS and GG are presented in Table 1. The dry matter intake kg^{-1} metabolic body weight of heifers fed with SCTS was significantly ($p < 0.05$) lower than the heifers fed with GG. Out of four animals in control group, 75% showed the occurrence of oestrus. In heifers fed with SCTS, the occurrence of oestrus was also 75%. In 66.66% of animals fed with either GG or SCTS, the intensity of oestrus was observed as intense (20-30 points) with remaining 33.33% of animals showing moderate (10-20 points) intensity of oestrus. Pregnancy was confirmed in 50% animals in both groups without any incidence of abortion in the pregnant animals during the first trimester of pregnancy.

Replacement Value of SCTS to GG in Advanced Stage of Pregnancy and its Effect on Post Partum Milk Yield and Composition in Cows-experiment II

The data on the dry matter intake, pregnancy and milk yield and composition are presented in Table 2. Similar to the results of experiment I, the daily dry matter intake kilogram- metabolic body size was significantly lower ($p < 0.05$) in cows fed with SCTS (119.72 ± 2.41 g) compared to GG (136.64 ± 4.46). The mean gestation period was 277 ± 5.98 days for cows fed in GG group and 265 ± 8.67 days for cows fed with SCTS. No incidence of abortion was observed in the experimental animals fed in the both groups. The birth weight for calves born to cows fed with SCTS was increased ($p > 0.05$) by 22%.

Table 1: Dry matter intake and the effect of feeding sugarcane tops silage for 180 days on reproductive traits in crossbred heifers (Mean±SE)

Parameters	Control	Sugarcane tops silage
Dry matter intake		
100 kg^{-1} body weight	2.75±0.04	2.48±0.06
$kg^{-1} W^{0.75}$	96.90±0.41 ^b	90.70±3.86 ^a
Reproductive traits		
Estrus response	3	3
Mean body weight of heifers at first oestrus (kg)	164±21.5	185±19.14
Intensity of estrus		
Intense (20-30 points)	2	2
Moderate (10-20 points)	1	1
Weak (0-20 points)	-	-
Duration of oestrus (h)	18.17±0.60	19.83±0.44
Number of heifers conceived	2	2
Incidence of abortion	Nil	Nil

Mean value in a row with different superscripts differ, significantly ($p < 0.05$); Mean of four observations; SE = Standard Error

Table 2: Effect of feeding sugarcane tops silage to crossbred cows in advanced stage of pregnancy on feed intake, reproductive traits and post partum milk yield and composition (Mean±SE)

Parameters	Control	Sugarcane tops silage
Dry matter intake $\text{kg}^{-1} \text{W}^{0.75}$ (g) (4)	136.64±4.46 ^b	119.72±2.41 ^a
Mean gestation period (days) (4)	277.00±5.98	265.00±8.67
Incidence of abortion (4)	0	0
Birth Wt. of calf (kg) (4)	17.00±1.47	20.75±2.03
Average milk yield/day (kg) (40)	7.44±0.88	7.21±0.39
Milk Fat (%) (40)	4.55±0.09	4.55±0.14
Milk total solids (%) (40)	13.18±0.16	12.74±0.09
Milk solid not fat (%) (40)	8.63±0.13	8.19±0.06
Specific gravity (40)	1.029±0.000	1.028±0.002
Daily FCM yield (kg) (40)	8.05±0.96	7.80±1.12

Mean value in a row with different superscripts differ significantly, ($p < 0.05$), Parenthesis indicate the total number of observation, SE = Standard Error

The average daily post partum milk yield was did not vary between cows fed with GG and SCTS. The corresponding daily fat corrected milk yield was marginally decreased in cows fed SCTS (Table 2).

Discussion

The significant ($p < 0.05$) reduction in the dry matter intake of SCTS could be attributed to the degree of proteolysis and the concentration of fermentation acids (Steen *et al.*, 1998). Keady and Mayne (2001) reported similar significant reduction in the feed intake with increased level of grass silage in the ration of the cattle.

In spite of significant ($p < 0.05$) lower level of dry matter intake, SCTS did not affect the parameters studied. It could be argued that enhanced absorption and there by the digestibility of fermented volatile fatty acids and microbial protein in ensiled material was responsible to off set the difference in intake.

The duration of oestrus observed in the present study was in agreement with observation of Sood and Nanda (2006) in normal crossbred cows. Similarity in reproductive traits in both the groups is suggestive of no ill effect on the reproductive performance due to feeding SCTS. Gestation period in the advanced pregnant cow experiment was closer to the findings of Rahman and Rahaman (2006). Non-significant variation in the birth weight between GG and SCTS indicates that GG could be replaced by SCTS as pre calving diets had no deleterious effect (Butler *et al.*, 2002; McNamara *et al.*, 2003). However, cows fed SCTS produced calves with relatively higher birth weight than those fed with GG. Indicating the efficacy of utilization of nutrients in SCTS. The birth weight of calves born to cows fed with the SCTS corroborated with the reports of Jesudasan (1979) and Govindarajan (1983) in Jersey crosses.

The milk yield and daily fat corrected milk yield was reduced only marginally in cows fed in cows fed with SCTS. On the other hand no appreciable variation could be observed in the composition of milk from those cows in both the groups. Huhtanen *et al.* (2003) reported similar results and found more profound decrease in milk fat yield than the milk yield, because milk fat and protein concentrations decreased with increasing lactic acid or total acid concentration in the silage.

It is observed in experiments I and II that on feeding SCTS in spite of reduced dry matter intake, had no adverse effect on the reproductive traits in early as well as late pregnancy in the experimental animals. Replacing the mixed green grass (GG) completely with sugarcane tops silage (SCTS) did not affect the occurrence, intensity and duration of oestrus in crossbred heifers. There was no incidence of early abortion in pregnant heifers on feeding the SCTS. Replacing the GG completely with SCTS

did not have any adverse effect on the late pregnancy, birth weight of calves, post partum milk yield and composition. Hence apart from concluding that SCTS can replace GG to serve as alternate fodder source, the myths among the farmers on the incidence of repeat breeding and early abortion on account of feeding the sugarcane tops could also be considered as false.

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