

Replacing dietary corn with sugar beet pulp on ruminal functions and performance of Egyptian buffalo

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ABSTRACT

Replacing of SBP for corn had no effects ($P>0.05$) on DMI during the experiment. Increasing pelleted sugar beet pulp (SBP) by 33% and 66% resulted in a significant ($P<0.05$) increase in ADG when compared with control (0%SBP) and 100%SBP. Replacing of SBP for corn significantly ($P<0.05$) increased total VFA concentration and NDF, and ADF digestibility coefficients (%). Ruminal pH was significantly higher for 100%SBP compared with the 0%SBP diet. Ruminal $\text{NH}_3\text{-N}$ concentrations were not affected ($P>0.05$) when SBP replaced either partially or totally cracked corn in the diet.

INTRODUCTION

In the Mediterranean countries, animal feeds shortage is a major challenge facing the traditional livestock development sustainability. Moreover, the use of cereal grains in ruminant diets inspires a direct competitive conflict between livestock and human nutritional system.

Increasing worldwide demand of ethanol production, availability of corn grains for animal production system is declining and has led to inflation in corn prices. Recent instability of livestock feed prices has forced beef producers seeking an alternative feed resource to replace corn grain without sacrificing feed quality or animal performance. In Egypt, scarce information is available regarding the impacts of substituting increasing levels of dried SBP for corn in buffalo diets.

Accordingly, the objectives of this study were to evaluate the effects of replacing corn with SBP on nutrients utilization and performance of buffalo growing calves.

MATERIALS AND METHODS

This study was conducted at the United Animal Production Farm, El-Amreya, located in Alexandria and Laboratory of Animal Nutrition, Department of Animal and Fish Production, Faculty of Agriculture, Alexandria University, Egypt.

- Forty male Egyptian buffalo calves (averaging 237.2 ± 24.46 kg of BW) were allotted randomly to 1 of 4 semi-opened pens (6×10) m² with separate feeders and watering bucket were always accessible (10 animals/pen).
- The experiment lasted for 143 days, from which 21 days as adaptation period and the rest were for sampling and data collection.
- Animals were allocated into a completely randomized design (CRD) and stratified according to initial BW to one of four experimental diet as follow: Control (0%SBP) = basal diet containing 60% cracked corn, (33%SBP) = basal diet replacing 33 % of cracked corn with SBP, (66%SBP) = basal diet replacing 66 % of cracked corn with SBP and (100%SBP) = basal diet replacing 100 % of cracked corn with SBP.
- Individual dry matter intake (DMI) intake and average daily gain (ADG) were determined, apparent NDF and ADF digestibility coefficients were determined using lignin contents as an internal marker.
- Rumen liquor samples (20 ml) were withdrawn before the morning feeding every 30 days using a stomach tube from each animal and ruminal pH was measured, $\text{NH}_3\text{-N}$ concentration was measured calorimetrically and total volatile fatty acids (total VFA) concentration was determined using gas chromatography (GC) .
- Collected data were analyzed using the MIXED procedure of SAS.

RESULTS

Table (1): Replacement of SBP for corn on performance, ruminal pH and total VFA concentration, NDF and ADF digestibilities of buffalo calves.

Item	Experimental diets				SEM	Trt	P-value	
	CTL	33%SBP	66%SBP	100%SBP			Day	T × D
No. of animals	10	10	10	10	—	—	—	—
Initial BW, kg	237.3	238.7	237.4	237.4	—	—	—	—
Final BW, kg	369.5	387.8	381.7	373.9	8.14	0.23	—	—
DMI, kg/d	8.44	8.54	8.58	8.61	1.09	0.19	<0.01	0.99
ADG, kg/d	1.08 ^c	1.21 ^a	1.18 ^{ab}	1.11 ^{bc}	0.17	<0.01	0.32	0.99
Ruminal pH	6.67 ^b	6.70 ^b	6.79 ^{ab}	6.90 ^a	0.53	0.04	<0.01	0.63
Ruminal $\text{NH}_3\text{-N}$, mg/dL	19.06	21.35	20.13	19.04	4.60	0.35	<0.01	0.47
Ruminal Total VFA, mM	108.32 ^b	117.29 ^{ab}	122.92 ^a	122.50 ^a	3.01	0.02	0.63	0.61
NDF digestibility, %	57.20 ^c	58.40 ^c	62.10 ^b	65.60 ^a	2.63	<0.01	—	—
ADF digestibility, %	50.30 ^c	52.30 ^{bc}	54.70 ^b	62.60 ^a	2.78	<0.01	—	—

^{a,b,c} means with different superscripts within row are different ($P < 0.05$).

CONCLUSION

Sugar beet pulp is a good candidate for partially replacement of corn grains in fattening diets for growing Egyptian buffalo calves, with no adverse effects on animal performance. Replacing dietary corn with SBP may be beneficially altering ruminal environment and increased the apparent NDF and ADF digestibility.