

Milk yield and composition in dairy cows fed sugar cane-based diets with different levels of sunflower oil

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Introduction Investigations into nutraceuticals have stimulated consumers' demands for healthier products and new scientific data relating to their effects on human health. Milk fat from ruminants contains several components that promote beneficial human health effects, and conjugated linoleic acids (CLA) are given special attention due to their known anticarcinogenic properties. Sugarcane is an important tropical gramineous species of plant because of its potential for high dry matter production per unit area, low-cost per dry matter unit produced and its period of maturity coincides with a period of pasture shortage. However, no studies in the literature have reported its potential as a forage in association with vegetable oils as most research on CLA has been performed in temperate areas, compared to the tropics. Therefore, the purpose of this study was to assess diets based on sugarcane with different concentrations of sunflower oil (SFO) with respect to the milk yield and composition of dairy cattle.

Material and methods Four multiparous Holstein x Gir cows with a 107±10 lactation days and average milk production of 15±5 kg/d with cannulas in the rumen received four dietary treatments (levels of SFO inclusion, % diet dry matter, DM) *ad libitum* in a 4 x 4 Latin Square design composed of 19-day experimental periods (10 days for adaptation and the last 9 days for data collection). The treatments were: 1) Control: diet without SFO; 2) SFO1: diet containing 1.5% of SO; 3) SFO2: diet containing 3.0% of SFO and 4) SFO3: diet containing 4.5% of SFO. The diets were isoproteic with 14.5% crude protein (CP) in accordance with the NRC, 2001 and fed once a day as total mixed rations (TMR) composed of whole sugarcane plant and a concentrate mixture (60:40, % of diet DM). Milk samples were collected from morning and afternoon milking (6:00 and 14:00 h, respectively) during the last 6 days of each experimental period and analyzed for total solids, fat, protein, lactose contents using the technique described by the IDF (1996). The chemical analyzes were analysed following the procedures described in AOAC (2000). The neutral detergent fiber content corrected for ash and protein (NDFap) was estimated following Mertens' (2002) recommendations. Humane animal care and handling procedures were followed in accordance with the Federal University of Viçosa guidelines (Viçosa, MG, Brazil). The results were analysed through variance and regression with the *Statistical Analysis System* software (SAS, 2002) at a 5% probability for type I error.

Results The different levels of SFO had no effect ($P>0.05$) on DM, CP, and NDFap intakes. However, there was linear increase ($P<0.05$) in EE intake (Table 1). The linear increase in EE intake ($P<0.05$) for the cows supplemented with SFO may be explained as a function of the increase in EE content from the experimental diets without a significant difference in DM intake. Dietary SFO affected neither ($P>0.05$) milk yield (corrected or not corrected for 3.5% fat) nor protein and lactose content. However, fat content ($P<0.05$) decreased linearly with SFO.

Table 1 Daily nutrient intake and milk composition of cows fed different levels of SFO

Items	SFO levels				MSE ¹	Effect (P value)	
	0	1.5	3	4.5		L	Q
DM (kg/day)	14.6	15.5	16.1	14.4	0.703	ns ²	ns
CP (kg/day)	1.9	2.0	2.0	1.8	0.091	ns	ns
EE (kg/day)	0.3	0.5	0.7	0.9	0.039	<0.001	ns
NDF ap(kg/day)	5.0	5.4	5.8	5.1	0.289	ns	ns
Milk yield (kg/day)	15.1	15.6	16.1	15.1	0.831	ns	ns
Corrected yield (kg/day)	15.5	14.9	13.8	13.0	1.070	ns	ns
Fat (%)	3.7	3.3	2.7	2.6	0.165	<0.01	ns
Protein (%)	3.3	3.2	3.3	3.4	0.053	ns	ns
Lactose (%)	4.3	4.4	4.3	4.3	0.032	ns	ns
Regression equations							r ²
EE intake (kg/cow/day)	$\hat{y} = 0.28 + 0.14xX$						0.96
Fat (%)	$\hat{y} = 3.62 - 0.25xX$						0.88

¹MSE = Mean standard error; ²ns = not significant ($P>0.05$); r² = coefficient of determination

Conclusions Inclusion of up to 4.5% SFO in sugarcane-based diets affects neither the dry matter intake nor milk yield in Holstein x Gir, but it reductions in levels of milk solids, as fat can pose financial implications in view of the producer subsidy schemes adopted by Brazilian dairy.

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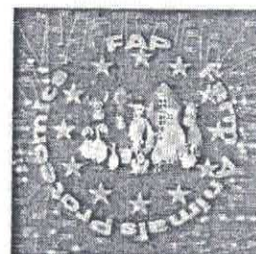
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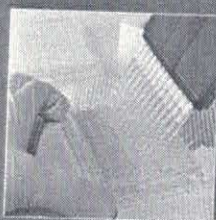
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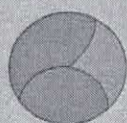
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