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Effects of different levels of sunflower residue silage replacing with alfalfa hay and corn silage on nutrient digestibility of Mohabadi dairy goats

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Abstract: There is a shortage of feedstuffs in many countries. The use of agricultural by-products is often a useful way of overcoming this problem. Sunflower residuals are one of these by-products. Using such by-products for animal feeding is a means of recycling which otherwise, if accumulated, might cause environmental pollution. In vivo digestibility data on sunflower silage (SRS) that can be used in the formulation of diets for animals are limited. Four treatments (1, 2, 3 and 4) included 0% (control), 30%, 60% and 90% replacement of alfalfa hay and corn silage with SRS, respectively. The results showed that dry matter intake (DMI) of experimental goats was significantly different between the treatments (P<0.05). The highest and the lowest DMI were shown in the treatments 2 and 4, (1.45 and1.062 Kg), respectively. DM, OM, CP and NDF digestibility was significantly different between the treatments (P<0.05).

Introduction: Garcia (2006) stated that a dry matter rate of 300 g/kg is suitable for ensiling sunflower, and sunflower silage contains more crude protein, calcium and lipid than corn silage with the same dry matter content. Valdez et al. (1988) found that sunflower silage with a dry matter content of 22.8% has pH value of 4.4, crude protein rate of 10.6%, ADF of 30%, NDF of 43.5%. Stan (2001) determined that sunflower silage containing a dry matter of 30% had CP of 12.5% and ADF of 39%. Fassio et al. (2007) stated that pH value of sunflower silage with 220 g/kgDM rate was 5.3, while CP, ash, ADF and NDF content were 120, 130, 390 and 560 g/kgDM, respectively. Demirel et al.(2008) found that pH, ADF, and NDF content of sunflower silage with dry matter content of 212 g/kg DM to be 4.35, 375.6 and 409.7 g/kgDM, respectively. Denek et al. (2004) in their study, investigated the effects of various additives on the quality of sunflower silage, that additives of urea, urea plus molasses and urea plus ground wheat grain increase the pH values of silages.
Sunflower Stalks are lower in digestibility when compared to the sunflower head. The upper 1/4 of the stalk is about twice as digestible as the lower 1/4 of the stalk. There is little information available in Iran on the nutritive value of SR for ruminants. In vivo digestibility data on sunflower silage that can be used in the formulation of diets for cattle are limited. The objective of present study was to determine the effects of replacing alfalfa hay and corn silage with different levels of sunflower residual silage (SRS) on feed digestibility of Mohabadi goats.

Materials and methods: A total of 8 dairy goat, initial age and weight of secondary lactation and 60 kg, were divided into four groups of similar live weight in two Latin square design 4×4, which lactation period (include 14 days adaptation and 7 days recording) as row block and goat as column block to design identified. Sunflower residues (heads and stalk) were chopped in small particle size separately, and ensiled (60:40 ratio of heads and stalks) with adding of 0.5% urea and 0.5 % dried whey. Experimental diets were based on the substitution of alfalfa hay and corn silage with sunflower residues silage (SRS) at 4 rates including 0 (control, include Corn silage, alfalfa hay, barely, soybean meal and mineral and vitamin premix), 30, 60 and 90%.

Results and discussion: Dry matter intake decreased with increasing level of SRS among the diets(p<0.05). It may partly be due to increasing the NDF content of rations which is the more effective DMI limiting factor of the animal and large particle size of the sunflower stalks in our silage which had unpalatable lignocellulosic structures. No difference in milk production between treatment groups was found. Cows fed sunflower silage had less fat (3.2 versus 3.6%) but equal amounts of protein in milk. DM and OM digestibility decreased with increasing level of SRS among the diets. CP and NDF digestibility had significantly different between the treatments (p<0.05).
Demirel et al, (2006) found that starch and cell wall contents of feedstuffs have a great impact on digestibility. Increases in starch content and decreases in cell wall content of feedstuffs increase feed value and level of digestibility reported to be an important criteria for feed quality. It has been reported that reduction in digestibility of sunflower residues due to high fiber content may partly compensated with its high oil content. Feed efficiency of animals fed sunflower residue was greater than animals fed sorghum silage.
This experiment may indicate that sunflower residue silage is an acceptable forage for dairy goat. Based on the results of this study it may conclude that SRS can be replaced with forages ingredients up to 60% at feed shortage conditions as an uncommon feedstuff. More investigation should be done by different chemical and physical processing of sunflower residues and evaluate their nutritive values.

DMI and Nutrient Digestibility of Treatments

Traits	Groups				
	0 %	30 %	60 %	90 %	SEM
DMI (Kg/day)	1.43 ^{a}	1.45^{a}	1.37^{a}	1.06^{b}	.06
DM digestibility%	75.51^{a}	75.48^{a}	72.83^{a}	57.49^{b}	1.86
Cp digestibility%	76.97^{a}	76.57^{a}	78.55^{a}	65.95^{b}	1.62
OM digestibility%	77.17^{a}	75.55^{a}	74.96^{a}	57.32^{b}	1.89
NDF digestibility%	69.59^{a}	70.87^{a}	73.39^{a}	46.18^{b}	2.34

Means within each row with different superscripts are significantly different (P< 0.05).