

## Feed Values of Sunflower Heads and Stovers Treated with Different Methods and Possibilities of Using as Roughage

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**Abstract:** This study was carried out to determine the effects of different urea treatments (4% urea; US, 4% urea+molasses; UMS, and 4% urea+soybean extract treated stovers and heads; USS) on the digestibilities of the sunflower stovers and heads and also to determine the possibilities of utilizing of these stovers and heads as an alternative roughage source. Four native Karayaka hoggets were used in digestion trial. Digestibility coefficients related to dry matter, organic matters, crude protein of the untreated stovers and heads (UTS), US, UMS, and USS were determined as; 35.771, 46.232, 6.037 %; 42.478, 47.742, 37.916%; 62.334, 51.085, 45.311%; 55.232, 59.340, 56.330%, respectively. Energy values (SV) were determined as; 5.468, 14.353, 15.550, 26.757 SV, respectively.

Fattening period was 70 days and animal materials were 40 hoggets. Total weight gains, daily weight gains, daily forage intakes, daily concentrate intakes and feed efficiency ratios (feed/gain) were found as; 7.02, 7.54, 7.70, 9.23 Kg; 100.00±12.95, 107.72±15.78, 109.57±11.56, 127.43±15.70 g; 553.86, 550.00, 574.36, 575.86 g; 599.21, 592.43, 598.21, 598.79 g; 11.53, 10.61, 10.71, 9.22 for UTS, US, UMS, and USS, respectively.

**Key Words:** Sunflower stovers and heads, urea treatment, digestion coefficients.

### Farklı Yöntemlerle Muamele Edilmiş Ayçiçeği Sap ve Tablalarının Yem Değerleri ve Kaba Yem Olarak Kullanılabilme Olanakları

**Özet:** Bu çalışma, farklı şekillerde uygulanan üre muamelelerinin (%4 üre; ÜA, %4 üre+melas: ÜMA, %4 üre+soya fasülyesi ekstraktı; ÜSA) ayçiçeği sap ve tablalarının (AST) sindirilme düzeyleri üzerindeki etkilerinin ve bu şekilde muamele edilmiş AST'nin kaba yem kaynağı olarak kullanılabilme olanaklarının belirlenmesi amacıyla yürütülmüştür. Sindirim denemesinde 4 Karayaka koçu kullanılmıştır. Muamelesiz AST ile ÜA, ÜMA ve ÜSA'nın kuru madde, organik maddeler, ham protein sindirilme dereceleri sırasıyla; %35.771, 46.232, 6.037; % 42.478, 47.742, 37.916; %62.334, 51.085, 45.311; %55.232, 59.340, 56.330, enerji değerleri ise 5.468, 14.353, 15.550, 26.757 Nişasta Değeri (ND) olarak saptanmıştır. Yemleme denemesi 40 tokluyla 70 gün sürdürülmüştür. Toplam ve günlük ağırlık kazancı sırasıyla, 7.02, 7.54, 7.70, 9.23 Kg; 100.00±12.95, 107.72±15.78, 109.57±11.56, 127.43±15.70; günlük kaba yem tüketimi ve kesif yem tüketimi 553.86, 550.00, 574.36, 575.86 g; 599.21, 592.43, 598.21, 598.79 g ve yemden yararlanma oranları sırasıyla; 11.53, 10.61, 10.71, 9.22 olarak saptanmıştır.

**Anahtar Kelimeler:** Ayçiçeği sap ve tablaları, üre muamelesi, sindirilme derecesi.

#### Introduction

In our country, roughage production level isn't enough to satisfy the demand of animal husbandry. This fact encouraged the researchers to find alternative roughage sources. Sunflower heads and stovers (SS) is one of these alternative sources that can be used to

achieve aim mentioned above. Due to excessive production of sunflower in Turkey, a large quantity of heads and stover is produced. It is obtained some 2.850.000 tons of SS annually from the production of sunflower (Tosun, 1993). It is well known that the crude

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protein (CP) content of the SS is very low; the crude fiber (CF) content and the lignification rate are high. Consequently, the digestibility of nutrients, particularly that of the protein fraction, is low. The consumption is also very low due to the fact that they are unpalatable and the passage through the digestive tract is slow (Akyıldız, 1986).

The digestibility and consumption of the straws can be elevated by means of several technical practices. One of these practices is urea treatment. In this practice, while lignocellulose linkages are loosened, the linkages between lignin and hemicellulose in the CF fraction of the feed are broken by the  $\text{NH}_3$  released from the urea hydrolyzation (Orskov, 1988; Ergül, 1993).

Drackley et al (1985) found dry matter (DM), CP contents and DM digestibilities of SS as 65.4, 6.1 and 40.6 %, respectively. These researchers indicated that increase in SS content caused decrease in DM digestibility and increase in acetat/propionat ratio.

Cafantaris et al (1983) reported that urea and soybean extract (SBE) raised the digestibilities of organic matters in barley straws from 42% to 56%. In some of the other researchs, similar results have been obtained ( Williams et al. 1984, Munoz et al. 1991, Du et al. 1992, Joy et al. 1992, Sarıçiçek and Ocak, 1994, Ocak, 1992, Dias da Silva et al. 1988).

Some of the researchers have conducted researchs in order to determine the effects of urea+molasses treatment. While some of these researchers indicated that urea+molasses treatment gave better results than urea treatment (Williams et al. 1984, Cheva-Isarakul et al. 1986, Stephenson et al. 1992, Sarıçiçek and Ocak, 1994), the other researchers reported that molasses addition had no positive effect on urea treatment ( Karabulut, 1986, Trung et al. 1989, Nakanishi et al. 1992, Hai et al. 1993).

Haoque et al., (1983), have suggested that rice straws treated with urea caused higher daily live weight gains according to the untreated rice straws at calves.

Du et al., (1992), have treated wheat straws and corn straws with urea+SBE(%5.4) and  $\text{NH}_3$ , respectively. These researchers couldn't find any significant differences between animal groups consumed these feed sources in respect of daily live weight gains.

Results obtained in some of the experiments (Cheva-Isarakul et al. 1986, Hai et al. 1993) showed that urea and

urea+molasses treatments have decreased feeding costs per Kg live weight gain.

In this study, it was aimed to investigate the effects of urea, urea+molasses and urea+SBE treatments on digestibilities of nutrients and starch value (SV) of SS. In addition, it was aimed to determine the feeding value of SS.

## Materials and Methods

### Material

In the digestion experiment, four Turkish native Karayaka rams, aging between 9 to 12 months, were used. In the second part of experiment (fattening trial) 40 Karayaka hoggets were used.

Sunflower heads and stovers used in this study were prepared by chopping with a thresher, and then treated with urea, urea+molasses and urea+SBE, respectively. The nutrient contents of the untreated and treated SS were given in Table 1.

### Methods

By means of a preliminary study, amount of SS needed for each experiment group along the experiment was found as 600 Kg.

During the urea treatment 24 Kg urea was used for 600 Kg straw. 4 Kg urea was dissolved in 50 lt water for each 100 Kg straw.

For urea+molasses treatment 4 Kg urea and 5 Kg molasses was dissolved in 50 lt water. 24 Kg urea and 30 Kg molasses were used for 600 Kg straw.

During the urea+SBE treatment 30 Kg soy bean meal was dissolved in 150 lt water, and was strained after 24 hours and afterwards 24 Kg urea was added into this extract. 24 Kg urea and 30 Kg soy bean meal were used for 600 Kg straw.

This study consists of two distinct part, namely digestion trial and fattening trial.

The digestibilities related to feeds used in the experiment were determined by means of classical digestion trial as explained by Akyildiz (1984). Each trial

Table 1. Nutrient contents of SS, %

Treatments		DM	OM	CP	EE	CF	NFE	CA
Untreated Group	1	86.280	84.081	5.030	1.330	41.500	36.220	2.200
	2		95.860	5.830	1.541	48.100	40.380	4.140
4%Urea Treated Group	1	82.350	79.031	7.280	1.270	45.370	25.110	3.320
	2		95.968	8.840	1.542	55.094	30.492	4.032
4%Urea+SBE Treated Group	1	85.630	80.211	7.001	1.330	43.220	28.660	5.419
	2		93.670	11.328	1.553	50.473	30.316	6.330
4%Urea+Molasses Treated Group	1	73.390	70.390	8.510	1.240	35.100	25.540	3.000
	2		96.592	9.967	1.452	55.264	25.910	4.408

DM: Dry matter, OM: Organic matter, CP: Crude protein, EE: Ether extract, CF: Crude fiber, NFE: N-Free extract, CA: Crude ash.  
1: As fed, 2: Moisture free basis.

consisted of a 7-day of transition, a 8-day of preliminary and a 10-day of main periods, being a total 25 days.

40 Karayaka hoggets used in the fattening trial were weighed for 3 successive days and then were allocated to four groups according to their initial weights. Fattening trial lasted for 70 days.

Untreated SS, 4% urea treated SS, 4% urea+molasses treated SS and 4%urea+SBE treated SS were given to the 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> groups, respectively. SS and concentrate feed amounts being given to the groups were calculated as mentioned below.

First, daily dry matter (DM) requirements were determined by using initial live weights of groups (daily DM requirements were accepted as 4.3 %of initial live weight) (Çakır et al. 1981). While 60% of the daily DM. requirements was met with roughage, the rest (40%) was met with concentrate feed.

Daily weight gains and feed consumptions were determined for every week. All of the data were evaluated by variance analyse (Düzgüneş et al. 1987).

## Results

Results of the digestion and feeding experiments were given in Table 2 and Table 3, respectively.

## Discussion

It can be understood that different treatments caused some changes in the crude nutrient contents of SS (Table 1). The most outstanding change was observed in CP content. Highest and lowest CP contents were observed at urea+SBE treated group and untreated group, respectively. The increase observed at CP contents of treated groups results from the supplements (urea and SBE).

Table 2. Results of digestion trial, %

Treatments		DM	OM	CP	EE	CF	NFE	SV
Untreated Group	DC	35.771	46.232	6.037	18.672	43.157	29.042	
	DNR	35.771	44.318	0.352	0.288	20.758	11.727	5.468
4%Urea Treated Group	DC	42.478	47.742	37.916	49.423	47.325	51.246	
	DNR	42.478	45.817	3.352	0.762	26.076	15.626	14.353
4%Urea+SBE Treated Group	DC	55.232	59.340	56.330	58.655	59.240	60.664	
	DNR	55.232	55.583	6.381	0.911	29.900	18.391	26.757
4%Urea+Molass Treated Group	DC	62.334	51.085	45.311	48.293	51.218	52.919	
	DNR	62.334	49.344	4.517	0.702	28.305	13.711	15.550

DC: Digestion coefficient, DNR: Digestible nutrient ratio, SV: Starch value

Table 3. Results of fattening trial

	GROUPS			
	Untreated	4%Urea	4%Urea+SBE	4%Urea+Molasses
Initial Weight(Kg)	29.480±4.48	29.460±3.92	29.440±2.82	29.470±2.67
Final Weight(Kg)	36.500±6.25	37.000±5.55	38.760±4.69	37.140±3.46
LWG (Kg)	7.02	7.54	9.23	7.70
Daily LWG (g)	100.000±12.96	107.720±15.78	127.430±15.70	109.570±11.16
DRC (g)	553.860	550.000	575.860	574.360
DCC (g)	599.210	592.430	598.790	598.210
FER	11.530	10.610	9.220	10.710

LWG: Live weight gain, DRC: Daily roughage consumption, DCC: Daily concentrate consumption, FER: Feed efficiency ratio (Feed/Gain)

It is a well-known fact that cell membranes are damaged by means of treatments and cell contents are released (Karabulut, 1986). Addition of SBE increases hydrolysis of urea (Munoz et al. 1991). The higher N content of urea+SBE treated group is raised from urea and soybean addition which have a higher N content.

Digestibility and digestible nutrient content of UTS increased due to the urea treatment. This result is consistent with the findings of other researchers (Joy et al. 1992, Hai et al. 1993, Dias da Silva et al. 1988, Sarıççek and Ocak, 1994). The increase observed at digestibilities are arisen from the damaging effect of  $NH_3$  released from urea hydrolysis

4% urea+molasses treatment caused higher increases in digestibilities of nutrients (except for crude fat) compared to 4%urea treatment. This finding is supported by some of the researchers' findings (Cheva-Isarakul et al. 1986, Sarıççek and Ocak, 1994). The increase in digestibilities of various nutrients in 4% urea+molasses treated SS compared to the urea treated SS can be attributed to the stimulating effect of energy supplied by molasses addition on efficiency of rumen microorganisms.

The highest increases in digestion coefficients of all nutrients were observed at 4%urea+SBE treatment. However, digestibility belonging to DM (55.232%) of 4%urea+SBE treatment was lower compared to that of 4%urea+molasses treatment (62.334%). This difference can be attributed to the differences in the initial DM contents of these feed groups. The reason why the 4%urea+SBE treatment caused higher digestibilities and digestible nutrient ratios compared to the other treatments was the increasing effect of urease activity of SBE on

hydrolysis rate of urea (Çerçi and Sarı, 1990, Ocak, 1992). The Starch Values of untreated group, 4%urea treated group, 4%urea+molasses group and 4%urea+SBE treated group were determined as 5.468, 14.353, 26.757 and 15.550, respectively.

According to the some of the researchers the increases in digestibilities of treatment groups are raised from stimulating effects of urea, molasses and soybean additions on activities and amounts of rumen microorganisms (Orskov, 1988).

From the Table 3., it can be seen that there were differences, albeit nonsignificant statistically, between the various performance traits. Results in fattening trial is consistent with some of the researchs (Cheva-Isarakul et al. 1986, Du et al. 1992) and is contrasted with the other researchs (Trung et al. 1989, Haoque et al. 1983).

These results indicate that the treatments mentioned above have no positive effects on feeding value of SS. But, it should be remembered that the inclusion of SS in the rations of ruminants cause the feeding costs to decrease (Cheva-Isarakul et al. 1986, Hai et al. 1993). Beside this, more detailed researchs should be carried out on some of the novel treatments (acid treatment etc.) which can be used to improve the feeding value of SS.

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