IMPACT OF USING BAKERY WASTES OR DISCARDED DATE IN CORN STOVER SILAGE ON THE PERFORMANCE OF DAMASCUS LACTATING GOATS

By

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SUPERVISION SHEET

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LIST OF ABBREVIATIONS

AOAC	**Association of Official Agriculture Chemists**
AIA	**Acid insoluble ash**
BW	**Bakery waste**
BWS	**Bakery waste silage**
C	**Control**
C^o	**Centigrade**
C.A	**Cited after**
CF	**Crude fiber**
CFD	**Crude fiber digestibility**
CFM	**Concentrate feed mixtures**
CP	**Crude protein**
CGS	**Corn grains silage**
CG	**Corn grains**
CS	**Corn stover**
d	**Day**
DCP	**Digestible crude protein**
DCPI	**Digestible crude protein Intake**
DD	**Discarded date**
DDS	**Discarded date silage**
DE	**Digestible energy**
DM	**Dry matter**
DMD	**Dry matter digestibility**
DMI	**Dry matter intake**
EE	**Ether extract**
FCM	**Fat corrected milk**
g	**Gram**
hrs.	**Hours**
Kg	**Kilogram**
LAB	**Lactic acid bacteria**
LE	**1 pound Egyptian currency = 100 piasters**

mg	**Milligram**
ml	**Milliliter**
NDF	**Neutral detergent fiber**
NFE	**Nitrogen free extract**
NFED	**Nitrogen free extract digestibility**
NH_3-N	**Ammonia nitrogen**
NRC	**National Research Council**
OM	**Organic matter**
OMD	**Organic matter digestibility**
pH	**Minus log of hydrogen ion potential**
R1	**CFM+ CGS**
R2	**CFM+ BWS**
R3	**CFM+ DDS**
TDN	**Total digestible nutrients**
TDNI	**Total digestible nutrients Intake**
TS	**Total solid**
TVFA's	**Total volatile fatty acids**
SNF	**Solid non fat**

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ABSTRACT

This study aimed to investigate the effect of replacing corn grains with some of agricultural and agro- industrial by-products (bakery waste or discarded date) in silage making, on characteristics quality of silage, nutrient digestibility, milk production and composition. Corn stover was collected, chopped into 3-5 cm and ensiled with either corn grains, bakery wastes or discarded dates at ratio 90%: 10% (on DM basis), respectively. Each type of silage was packed in 30 plastic bags (1 kg in each) for 10 weeks to evaluate the quality of different silages via laboratory analysis. In the same time, 100 kg from each type of silage was prepared and packed in double layer bags and incubated for the suitable time of each silage type to evaluate nutritive value via digestion trials using twelve adult Rahmany male sheep (average weight 55 kg). Also, at the same time, each type of silage was kept inside over ground silo to study the effect of incorporating different silages inlactating Damascus goats (average weighed 30 kg) ration on milk production and composition. Hence, there were 3 experimental rations included CFM plus either corn stover with corn grains silage (R1), corn stover with bakery wastes silage (R2) or corn stover with discarded date silage (R3). Results indicated that pH values, NH_3-N concentration and lactic acid concentration of CGS and DDS were reached the optimal point at 6^{th} week, while, the optimal of point for BWS was 7^{th} week of ensiling. The significant highest ($P<0.05$) digestion coefficients of CP and CF were observed with goats fed R2 compared with those fed R1 or R3. While, there was insignificant ($P>0.05$) difference in the digestibility of OM and EE among different groups being, (88.81 and 89.21%), (87.65 and 86.38%) and (88.63 and 88.42%), respectively for R1, R2 and R3. Also, nutritive value as DCP had the same trend of nutrients digestibility. However, the significant highest ($P<0.05$) digestion coefficient of NFE and nutritive value as TDN were observed with goats fed R1 compared with those fed R2 or R3. There was an increase in the DM intake (DMI) for R1 ration than that of R2 or R3 rations, being 1.034, 1.032 and 1.024 kg/h/d, respectively. Results indicate that there were insignificant ($P>0.05$) differences in daily milk yield, 4% FCM (fat corrected milk), SNF, protein and lactose contents among groups. While, feeding goats R2 or R3 significantly ($P<0.05$) increased milk fat content by 28 and 29%, respectively compared with those fed R1. A decrease in feeding cost per 1Kg FCM was observed with goats fed R2 or R3 rations (1.69 and 1.70 L.E.) compared with those fed R1 ration (2.03 L.E.).

Therefore, feeding dairy goat rations containing either BWS or DDS instead of CGS can economically improve milk production efficiency.

Keywords: Corn silage, bakery wastes, discarded dates, corn stover, digestibility, lactating goat.

DEDICATION

I dedicate this work to my dear father and mother,my husband Mohamed, my children Mariam, Nooh and Kenzy,my sisters Walaa, Hala and Nada, my brother Ahmed, my friends Marwa and Dooa and my uncle Hassan El-Deeb for their patience and encouragement throughout the progress of this work.

INTRODUCTION

Cereal grains used in animal feeding have high content of starch. For example, corn and sorghum have in average 72% of starch whereas barley and oat have 57 and 58 %, respectively (Huntington, 1997). Corn grains were used as the main source of energy in the livestock nutrition, especially the high production animals, which require high levels of energy. At the same time, it is consider a major source of food for millions of poor Africans, according to (Efrem *et al*., 2010)**.** In recent years, using grains especially corn, for biofuel production as energy source for human lead to an increase in the price of the grains and so decrease the amount available for animals feeding. And at the same time, silage making is one of the most ways to use corn grains in animals feeding. Meanwhile, new carbohydrate sources must be found to replace corn grains for making good silage.

Many agricultural and agro-industrial by-products have potential as animal feeds. Many of these by-products currently are completely unused or are largely wasted due to the inability of farmers to use them before they spoil, as a result of seasonal production peaks and troughs. Consequently these by-products often become pollutants. Industry is a continued process all over the year and can supply a regular stream of by-products that can contribute to the animal feed prevalent over the year. This would help in minimizing the competition between crops for the irrigated in the cultivated land as source of human food and animal feed. A great attention is directed towards the utilization of available agricultural by-products, as new sources of nontraditional rations for feeding farm animals (Efrem *et al*., 2010).

Incorporation of unconventional feedstuffs, such as agro-industrial by-products in animal diets may participate in solving the problem of feed shortage. Many economic advantages could be obtained through processing and recovering such agricultural by-products in different methods, including ensiling, biological, chemical and mechanical treatments. Dealing with such residues and agro-industrial by-products could lead to decrease the feeding cost and alleviate the pollution problems Almira *et al.* (2012).

Therefore, some of industrial by-products such as discarded dates and bakery wastes can be used as a source of carbohydrate in silage making. Egypt is one of the important countries in date palm world production which represented about 17% of the total world production, FAO (1999)**,** and about 1.37 million tons of date crop, (Ministry of Agriculture, 2012)**.** Meantime, the quantity of discarded dates is estimated to be about 20% of dates produced, (Belal *et al*., 1999**),** which contained high amounts of carbohydrates (65-75%).

On the other hand, bakery wastes can be composed of cake leftovers, pieces of bread, biscuits, or non-marketed products that have exceeded the expiration date, besides the wastes due to breaking, excess or lack of cooking during processing**,** (Wing, 1965). Meanwhile, using bakery wastes as a low-cost alternative feed or as a source of energy in silage making may be an appropriate strategy for increasing the sustainability of the animal production system. Bakery wastes contains high concentration of non-fibrous carbohydrates, which are characterized as energetic food, (Arosemena *et al*., 1995**),** so, it is a potential substitute of corn in animal diets and in silage making.