EVALUATION OF TREATED CORN STOVER SILAGE AS A FEED FOR LACTATING CATTLE

Gamal M. El-Garhy
Animal Production Department, Faculty of Agriculture, Fayoum University, Egypt.

ABSTRACT:

This study was to determine the quality of different silages made from fresh corn stover. Such silages were made from corn stover alone (CSS), or with 3% molasses (CSSM) or with 5% granulated corn grain (CSSG) forming three silage treatments. Parameter studies were silage chemical composition, its color, smell, pH value, lactic acid, volatile fatty acids (VFA's) and NH_3-N as well as *in vitro* dry matter (DM) and organic matter (OM) digestibility. Rams were used to determine their nutritive values and rumen activity.

The lactation performance of dairy cattle that fed the silages mentioned above plus concentrate mixture (1:1) was also determined. Eighteen Friesian crossbred cows at 2nd to 4th lactation seasons with mean live body weight (LBW) of 460 kg were distributed into three similar groups. Parameters studied were rations digestibility and feeding values, milk yield and composition, feed intake, feed efficiency as well as a simple economic evaluation.

Results indicated that, the corn stover silages with additives contained more crude protein percentage (CP%), lactic acid and total VFA's and less NH_3-N compared with silage without additive. The additives of corn stover silage significantly ($P<0.05$) improved the digestibility of OM, CP and nitrogen free extract (NFE) compared to CSS. Feeding values followed the same pattern. Milk yield, fat corrected milk (FCM) and all milk components significantly increased with rations containing silage with additives (R2 and R3) compared to control ration CSS (R1). No significant differences were detected between the dietary rations regarding feed intake or feed efficiency. The economic efficiency was significantly higher for the ration containing silage with additives (R2 and R3) compared to control ration CSS (R1).

Keyword: Corn stover silage, silage quality, dairy cattle, milk yield, milk composition, feed intake and economic efficiency.

INTRODUCTION:

In Egypt, about 2 million feddans are cultivated annually with corn crop producing more than 5.15 million tons of dried cron stover **(Agricultural Economics, 2006)**. Few quantities of this residue are used for feeding animals in fresh form. While, the major part used mainly as fuel or being left in the field causing pollution problem. About 40-50% corn plants remains in the field after grain harvest offers a large potential energy source for ruminants.

Ensiling corn stover reduces field losses and may produce a more palatable feed than if it is being utilized by grazing **(Colenbrander *et al.*, 1971).** The success in making good quality silage from fresh corn Stover without or with additives is of practical importance in animal feeding in summer season **(Gad-Alla, 1991; Etman *et al.*, 1994; Bendary and Younis, 1997; Mohamed *et al.*, 1997; Mostafa *et al*., 2000 and Ahmed *et al*., 2003).**

Moreover it may lead to significant low dairy feeding cost **(Bendary and Younis, 1997)** and minimizing other problems such as plant diseases, environmental pollution and risk of rats. The small holders have become increasingly aware of the impact of silage made from fresh corn stover in rations of lactating animals on milk production and cost.

The objectives of this study were to evaluated the silages made from corn stover without or with additives (molasses and corn grain) and its effect on milk yield and its composition.

MATERIAL AND METHODS:

The present study was conducted at a commercial farm, Fayoum Governorate, Egypt.

Corn stover silage (CSS) making and evaluation:

Fresh corn stover was ensiled just after harvesting the grain. The stover was chopped (about 1–1.5 cm) by chopping machine and ensiled alone or plus 3% molasses (CSSM) or 5% granulated corn grain (CSSG). Built silo was used where stover was compressed by wheel tractor to insure good packing. When each bunker was filled, it was tightly covered by plastic sheet then with 20-30 cm layer of soil to get anaerobic condition. After two months, bunkers were opened and silage color and odor were tested and silage was sampled for chemical analysis and quality test. The pH was measured using Bechman pH meter; ammonia-N and volatile fatty acids (VFA's) were determined according to **RICF (1961)** and lactic acid was determined as described in **Analytical Chemistry of Foods (1995).** Also *in vitro* dry matter (IVDMD) and organic matter disappearance (IVOMD) were determined using the two stage *in vitro* technique developed by **Tilly and Terry, (1963).**

Three digestibility trials were carried out to determine nutrients digestibility and nutritive values of corn stover silages using mature Ossimi rams (3 in each) with average body weight 50 ± 1 kg. Each trial consisted of 14 days preliminary period followed by 7 days collection period. The proximate analysis for feed and faces were carried out according to **A.O.A.C (1990).** Gross energy (GE) of feeds was calculated after **Nehring and Haenlien (1973).**

Rumen liquor samples were taken at zero, 3 and 6 hours post morning feeding using stomach tube. Ruminal pH was measured using pH meter, ammonia-N was determined according to **Conway (1962)** and total VFA's were determined according to **Abou-Akkada and El-Shazly (1964).**

Lactation trials:

Eighteen Friesian crossbred cows averaging 460 kg in body weight and at their 2nd to 4th parity were chosen after 50 ± 5 days of calving. Cows were divided into three similar representative groups (6 cows / group). Each group was randomly fed one of the following experimental rations: R_1, 50% concentrate feed mixture (CM) + 50% CSS; R_2, 50% CM+50% CSSM and R_3, 50% CM + 50% CSSG. Cows were individually fed according to NRC allowance (1988) for dairy cattle. Three weeks preliminary period followed by one week milk collection was applied. Daily feed intake and milk yield were recorded individually. Milk representative samples of seven connective evening and morning milking per each cow were taken, refrigerated and chemically analyzed. Milk samples were analyzed for fat, protein, ash and total solids (TS) **(Ling, 1963)** and lactose **(Barnett and Abd El-Tawab,**

1957); 4% fat corrected milk (FCM) was calculated according to **Gaine's (1923)** equation.

At milk collection period (for each rations) the nutrient digestibility and feeding values were determined for all cows using acid insoluble ash (AIA) technique **(Van Keulan and Young, 1977).** Samples of feed and feces were analyzed according to **A.O.A.C. (1990).**

Statistical analysis:

Complete randomized design was used for digestibility and lactation trials. The general linear model procedure adapted by **SPSS (1997)** was used according to the following model:

$$Y_{ij} = \mu + T_i + e_{ij}$$

where Y_{ij}, is the dependent variable; μ, is the overall mean; T_i, is the effect of treatment; e_{ij}, is the residual error. Least significant difference test (LSD) was used to compare the treatment means **(Steel and Torrie, 1980).**

RESULTS AND DISCUSSION:

Corn stover silages evaluation:

Table (1) presents the chemical composition and quality traits of silages. The chemical analysis and quality traits of silages indicated that all silages were of good quality and containing reasonable amount of nutrients. These results are in the same direction with those of **Gad Alla (1991), Etman *et al.* (1994), Bendary and Younis (1997), Mohamed *et al.* (1999), Bendary *et al.* (2001) and Ahmed *et al.* (2003).** Comparing silages, the corn stover silages with additives contained more CP% ranging from 6.67 to 7.03% (7.2 to 13% improvement) compared with CSS, which may be attributed to the increase in microbial nitrogen content due to the good fermentation during ensiling. The other contents of silages were insignificantly different and were within the ranges obtained by **Gad-Alla (1991); Etman *et al.* (1994); Bendary and Younis (1997); Ghanem *et al.* (2000); Bendary *et al.* (2001) and Ahmed *et al.* (2003).**

Observations concerning silage quality indicated that tested fresh corn stover silage without or with additives produced good quality silage with suitable fermentation characteristics, yellowish green color and good smell. The pH values of tested silages ranged from 3.72 to 3.92 which were within the normal ranges of the good quality silage as reported by **Hellberg (1963).** Total VFA's and lactic acid% of DM in the tested silages indicated the good quality as mentioned by **Chatterjee and Maiti (1982).** The ammonia-N concentration of tested silages indicated good quality silages, which agree with **McDonaled *et al.* (1995)** who reported that the concentration of ammonia-N of good quality silage to be usually less than 10% of total-N. However, feed additives used (molasses and corn grain) significantly ($P \leq 0.05$) increased lactic acid (44-45% in average) and VFA's (34-38% in average) and decreased ammonia-N (9-10% in average) production compared with silage without additive. These results may be due to the source of available fermentable carbohydrates, which is the main source of lactic acid production. Many studies **(Saddick *et al.*, 1993; El-Ready, 2000 and Ahmed, 2005)** reported that soluble carbohydrate sources (such as molasses or corn grain) lead to higher total acid production.

The results of *in vitro* DM and OM disappearance (IVDMD and IVOMD, Table 1) indicated that corn stover silage with molasses or corn grain significantly ($P \leq 0.05$) improved both IVDMD and IVOMD compared with

silage without additive. This improvement may be attributed to the good fermentation during ensiling silage with additives, which may shorten the bonds of CF in corn stover more than the control. These results are in agreement with those of **Saddick *et al.* (1993), Ahmed (1998), Ahmed and El-Dabeeb (2002) and Ahmed (2005)** who showed that supplemented silage (such as molasses or corn grain) improved the *in vitro* as well as the *in vivo* digestibility.

The results of *in vivo* digestibility trials (Table 2) indicated that feed additives significantly (P≤0.05) improved the digestion coefficients of OM, CP and NFE, and insignificantly improved EE and CF digestibility compared to silage without additive. The total digestible nutrients (TDN%) and digestible crude protein (DCP%) of corn stover silages showed significant variation (P≤0.05). The highest values were observed with silages with additives, these improvement are 8% and 18-28% for TDN% and DCP%, respectively. Many invistigator **(Gad-Alla 1991, Ghanem *et al.* 2000, Bendary *et al.* 2001 and Ahmed *et al.* 2003)** reported the same direction with corn stover silage. In general the increase in CP content in the roughage improves its digestibility.

Table (1): Chemical analyses and silage quality of tested corn stover silages.

Item	CSS	CSSM	CSSG	±SE*
DM	36.72	35.81	36.95	0.46
Chemical analyses %, on DM basis				
OM	89.63	89.58	90.16	1.87
CP	6.22 ^{b}	6.67 ^{ab}	7.03 ^{a}	0.13
EE	1.59	1.52	1.62	0.01
CF	27.54	28.32	27.41	0.68
NFE	54.28	53.07	54.10	1.09
Ash	10.37	10.42	9.84	0.03
GE**(Mcal/kg DM)**	4.01	4.02	4.04	0.02
Silage quality				
pH value	3.92	3.72	3.81	0.04
Lactic acid %of DM	2.61 ^{b}	3.79 ^{a}	3.76 ^{a}	0.02
VFA's %of DM	1.89 ^{b}	2.53 ^{a}	2.61 ^{a}	0.01
NH_3-N%of total N.	4.22	3.82	3.79	0.02
IVDMD%	35.75 ^{b}	43.92 ^{a}	42.73 ^{a}	0.45
IVOMD%	36.24 ^{b}	44.51 ^{a}	43.66 ^{a}	0.58

*SE, stander error.

Averages in the same row with different superscripts are different (P≤ 0.05).

Rumen liquor parameters of wethers fed the tested corn stover silages are presented in Table (3). Results showed that the pH values for all tested silages were found to be within the normal range. No significant variation in pH values between wethers fed tested silages was reported. Ruminal VFA's values showed that CSSM and CSSG had higher (P≤0.05) values at 3, 6 hours sampling time compared with CSS. Such result may indicate the improvement in microbial activity. Concentration of NH_3-N in rumen liquor tended to be lower in wethers fed corn stover silages with additives than those fed CSS. However, the differences were not significant (Table, 3). These results are paralled to that of **Ghanem *et al.* (2000), Mohsen *et al.* (2001) and Shehata**

***et al.* (2003).** Such result may reflect in such a way the increase in microbial protein.

Table (2): Digestion coefficients and feeding values of tested corn stover silages (on DM basis).

Item	CSS	CSSM	CSSG	±SE
Digestion coefficients %				
OM	62.22 [b]	66.75 [a]	65.43 [a]	1.01
CP	59.34 [b]	65.58 [a]	67.21 [a]	0.95
EE	58.72	61.44	60.76	0.97
CF	60.36	63.92	63.04	1.18
NFE	61.40 [b]	67.28 [a]	66.63 [a]	1.11
Feeding values %				
TDN	55.73 [b]	60.27 [a]	60.26 [a]	1.12
DCP	3.69 [b]	4.37 [a]	4.72 [a]	0.13

Averages in the same row with different superscripts are different (P≤ 0.05).

Table (3): Rumen liquor parameters of wethers fed of tested corn stover silages.

Item	Time	CSS	CSSM	CSSG	±SE
	0	6.95	6.92	6.97	0.14
pH value	3	6.42	6.37	6.32	0.16
	6	6.61	6.50	6.47	0.19
VFA's	0	7.82	7.91	7.74	0.45
meq/100ml	3	9.43 [b]	9.71 [a]	9.63 [a]	0.42
	6	8.06 [b]	8.52 [a]	8.44 [a]	0.41
NH_3-N	0	14.82	14.74	15.11	0.48
mg/100ml	3	24.11	23.68	23.51	0.25
	6	21.21	19.62	20.06	0.27

Averages in the same row with different superscripts are different (P≤ 0.05).

Lactation performance:

Table (4) presents the chemical analysis of concentrate feed mixture (CFM) and that of the rations formulated. Tested rations were nearly similar in their CP and GE contents.

Table (4): Chemical analyses of concentrate mixture (CM) and experimental rations (on DM basis) fed to lactating cows.

Item	DM%	% on DM basis						GE Mcal/kg DM
		OM	CP	EE	CF	NFE	Ash	
CM	90.65	90.15	15.92	3.22	11.94	59.07	9.85	4.17
Experimental rations								
R1	63.69	89.89	11.07	2.41	19.74	56.67	10.11	4.09
R2	63.23	89.87	11.30	2.37	20.13	56.07	10.13	4.10
R3	63.80	90.16	11.48	2.42	19.68	56.58	9.84	4.11

Concentrate mixture consisted of 25% undecorticated cotton seed cake, 15% linseed cake, 25% yellow corn, 10% rice bran, 18% wheat bran, 4% molasses, 2% lime stone, 1% common salt.

Digestion coefficients and nutritive values of tested rations fed to lactating cows are shown in Table (5). Digestion coefficients of CP and EE increased significantly (P≤0.05). Digestion coefficients of OM, CF and NFE were improved insignificantly when cows fed rations containing silage with

additives (R_2 and R_3) compared to the control ration, CSS (R_1). The same trend was observed with the feeding values. Other investigators followed the same direction **(Bendary and Younis, 1997; El-Saadany *et al.*, 2001 and Ahmed *et al.*, 2003).**

Table (5): Digestion coefficients and feeding values of the experimental rations (on DM basis) fed to lactating cows.

Item	Experimental rations			±SE
	R1	R2	R3	
Digestion coefficients %				
OM	61.21	63.75	62.63	1.12
CP	57.84 [b]	61.52 [a]	60.97 [a]	0.98
EE	55.23 [b]	58.31 [a]	57.29 [ab]	0.92
CF	54.92	56.91	55.78	1.21
NFE	60.34	62.78	63.02	0.98
Feeding values %				
TDN	54.38 [b]	56.72 [a]	56.77 [a]	0.87
DCP	6.36 [b]	6.95 [a]	7.00 [a]	0.23

Averages in the same row with different superscripts are different ($P \leq 0.05$).

Data in Table (6) revealed that 4% fat corrected milk (FCM) and all milk components significantly ($P \leq 0.05$) increased for rations containing silages with additives (R_2 and R_3) compared with the control ration. Rations included corn sover silage with additives might have a positive biological effects that improve milk productivity compared to CSS (without additive). Such results refer to the good fermentation during ensiling silage with additive and the high digestibility and feeding values (Table, 5) which may explain the higher milk yield and its components. Results obtained herein were in the same trend to that of **Bendary and Younis (1997) and El-Saddany *et al.* (2001).**

Feed intake and economical evaluation:

Table (7) shows daily feed intake, feed efficiency and economic efficiency. Feed intake and feed efficiency as DM, TDN or DCP were not affected by dietary treatments. These results may have been due to the use of **NRC (1988)** requirements since the energy values are used to estimate feed intake. Corn stover silage with additives significantly ($P \leq 0.05$) improved both economic efficiency and cost of kg FCM compared with silage without additive. These results are in harmony with **El-Saadany *et al.* (2001) and Ahmed *et al.* (2003).**

In conclusion, making silage with tested additives could improve the silage quality and could be used economically and successfully in lactating cow rations to improve digestibility, feeding values and economic efficiency.

Table (6): Daily milk yield and milk composition of cows fed the experimental rations containing corn stover silages.

Item	Experimental rations			±SE
	R1	R2	R3	
Milk yield, kg	12.62 [b]	13.75 [ab]	14.02 [a]	0.22
4% FCM, kg	11.60 [b]	12.86 [ab]	13.06 [a]	0.33
Milk composition				
Fat, %	3.46 [b]	3.57 [ab]	3.55 [a]	0.03
Fat, g	436.65 [b]	490.88 [a]	497.71 [a]	6.02
Protein, %	3.21	3.26	3.31	0.05
Protein, g	405.10 [b]	448.25 [a]	464.06 [a]	4.29
Lactose, %	4.42	4.45	4.40	0.06
Lactose, g	557.80 [b]	611.88 [ab]	616.88 [a]	6.58
Ash, %	0.71	0.68	0.72	0.01
Ash, g	89.60 [b]	93.50 [ab]	100.94 [a]	1.10
SNF, %	8.35	8.41	8.45	0.13
SNF, g	1053.77 [b]	1156.38 [a]	1184.69 [a]	9.09
TS, %	11.81	11.98	12.00	0.24
TS, g	1490.42 [b]	1647.25 [a]	1682.40 [a]	8.51
Energy, kcal/kg	673.19	686.28	686.41	6.24

FCM, fat corrected milk; SNF, solid not fat; TS, total solid.

Milk energy, kcal/kg = 92.25 fat% + 49.15 SNF% - 56.40 (McDonald 1978).

Averages in the same row with different superscripts are different ($P \leq 0.05$).

Table (7): Daily feed intake, feed efficiency and economic efficiency of cows fed the experimental rations.

Item	Experimental rations			±SE
	R1	R2	R3	
LBW, kg	460	464	455	6.22
Feed intake				
DM, kg/head	12.72	12.41	12.46	0.11
DM, g/kgw$^{0.75}$	128.06	124.14	126.47	1.47
TDN, kg/head	6.92	7.04	7.07	0.08
DCP, kg/head	0.81	0.86	0.87	0.02
Feed efficiency, /kg 4% FCM				
DM, kg	1.10	0.97	0.95	0.01
TDN, kg	0.60	0.55	0.54	0.003
DCP, g	69.83	66.87	66.56	0.85
Economic efficiency				
CM as fed, kg/head	7.02	6.85	6.87	
CSS as fed, kg/head	17.32	17.33	16.86	
Input cost, LE	8.75	9.10	9.40	
Output cost, LE	15.14	16.50	16.82	
Economic efficiency	1.73 [b]	1.81 [a]	1.79 [a]	0.03
Feed cost/kg FCM, LE	0.75 [b]	0.71 [a]	0.72 [a]	0.002

Feed cost L.E/ton of concentrate feed mixture, corn stover silages (CSS, CSSM and CSSG) were 1000, 100, 130 and 150 respectively, and price of milk was 1.2 L.E /kg. LBW, live body weight.

Averages in the same row with different superscripts are different ($P \leq 0.05$).

REFERENCES:

Abou Akkada, A. R. and K. El-Shazly (1964). Effect of absence of ciliate protozoa from the rumen on microbial activity and growth of lambs. Appl. Microbial., 12: 284.

Agricultural Economics (1999). Central Administration, Agricultural Economics. Summer and Nile croups. June. ARE, Ministry of Agric. Economic Affairs Sector.

Ahmed, B.M. (1998). Influence of moisture/ additive interrelationship on silage quality of Rhodes grass (*Chloris gayana*). Proc. Saudi Biological Society, 18th annual meeting held at the Royal Commission for Jubail & Yanbu. Kingdom of Saudi Arabia. 24-26.

Ahmed, B. M. (2005). Influence of different additives on the quality on silage made from Alfalfa and/or Rhodes grass under laboratory conditions. Egyptian J. Nutr. and Feeds, 8 (Special Issue): 245.

Ahmed, B. M. and S. N. El-Dabeeb (2002). The quality of silage made from Rhodes grass (*Chloris gayana*) as influence by moisture contents and feed additives. Egyptian J. Nutr. and Feeds, 5: 13.

Ahmed, B.M; H.T. Taie; M.M. Bendary and K.F. Abdel-Lateif (2003). Influence of dietary corn silage on digestibility, performance and economical efficiency of dairy cattle. Egyptian J. Nutr. and Feeds, 6 (Special Issue): 587.

Analytical Chemistry of Foods (1995). Published by Blockie Academic and Professional, an Imprint of Champman and Hall, Western Cleddens Road, Bishopbriggs, Glasgow G64 2NZ, UK.

A.O.A.C. (1990). Association of Official Analytical Chemists. Official methods of analysis. 13th ed. Washington, DC, USA.

Barnett, A.J.G. and G. Abd El-Tawab (1957). Determination of lactose in milk and cheese. J. Sci. Food Agric., 8: 437.

Bendary, M. M; G. H. A. Ganem; E. S. Soliman; E. A. Amer and F. A. El-Zeer (2001). Nutrition evaluation of ensiling fresh maize Stover. Egyptian J. Nutr. and Feeds 4 (Special Issue): 105.

Bendary, M.M. and M.A. Younis (1997). Evaluation of maize stalks for feeding dairy cows. Egyptian J. Appl. Sci., 12: 11.

Chatterjee, B. N. and S. Maiti (1982). Silage and hay making. Indian Council of Agric. Res., New Delhi, India.

Colenbrander, V. F; L. D. Muller; J. A. Wasson and M. D. Cunningham (1971). Effect of added urea and ammonium polyphosphate to corn stover silages on animal performance. J. Anim. Sci. 5: 1091.

Conway, E. F. (1962). Micro diffusion analysis and volumetric error. Rev. Ed. Lockwood, London, U.K.

El-Ready, K. F. (2000). Effect of dietary silage on diary cattle performance. M. Sc. Thesis. Faculty of Agric., Shebin El-Kom, Menoufiya Univ., ARE.

El-Saadany, S.A; A.M. Abd El-Khabir; Bahira K. Mohamed and A.M. Zied, (2001). Comparative study on the effect of feeding maize stalks silage or whole maize plants silage versus traditional rations on crossbred Friesian lactating cows. Egyptian J. Nutr. and Feeds, 4 (Special Issue): 377.

Etman, K. E. L; E. A. Khafagi; W. H. Abdel-Malik; M. K. Hathout and M. F. El-Sayes (1994). Conservation of green summer forages as silage and its utilization in feeding growing lambs. Egyptian J. Anim. Prod., (Supplement Issue) 31: 75.

Gad-Alla, S. A. H. Z. (1991). Technology of making silage with special reference to its nutritive value. M. Sc. Thesis. Faculty of Agric., Zagazig Univ., ARE.

Gaines, W. L. (1923). Relation between percentage of fat content and yield of milk. I. Correction of milk yield for fat content, Agric. Handbook 379, USDA. Washington, D. C.

Ghanem, G.H.A; E.A. Amer and F.A. El-Zeer (2000). Evaluation of using maize Stover silage by sheep. J. Agric. Res. Tanta Univ., 26: 591.

Hellberg, A. (1963). Improved silage. Meddelanden fram Jordbruks-tekniska Institue, Uppsala. 73 Via Herbage Abstracts 37:160.

Ling, E.R. (1963). A text book of dairy chemistry. 3rd ed. Chapman and hall Ltd., London.

Mc-Donald, P.; R. A. Edwards and J. F. D. Greenhalgh (1978). Animal nutrition. (Text Book). Longman House, Burnt Mill, Horlow, EssexCM20 2JE, England.

Mc-Donald, P; R. A. Edwards; J. F. Edwards; J. F. D. Greenhalgh and C. A. Morgan (1995). Animal Nutrition. (Text Book). Copyright Licensing. LTD. London.

Mohamed, A. H; I. A. Goman; M. M. Mohy El-Deen and R. Khattab (1997). Effect of corn Stover silage or whole corn plant silage on the performance of lactating buffaloes. Egyptian J. Nutr. and Feeds (Special Issue): 251.

Mohamed, M.M; S.M.M. Ahmed and M.M. Bendary (1999). Productive and reproductive performance of growing calves fed rations containing maize silage. Egyptian J. Nutr. And Feeds. 2: 445.

Mohsen, M.K; S.A. Mahmoud; E.M. Abdel-Raouf; M.M. Bendary and H.M.A. Gaafar (2001). Performance of growing Friesian calves fed rations containing corn silage 1- Nutrient digestibility, rumen activity, live body weight gain and economic evaluation. Egyptian J. Nutr. and Feeds. 4 (Special Issue): 485.

Mostafa, M. R. M; M. F. El-Sayes; K. E. I. Etman and M. K. Hathout (2000). Evaluation of maize stover silage in comparision with whole maize silage in sheep rations. Proc. Conf. Anim. Prod. In the 21st . Century, (Sakha 18-20 Apr.) Kafr El-Sheikh, Egypt.

Nehring, K. and G. F. W. Haenlien (1973). Feed evaluation and ration calculation based on net energy. J. Anim. Sci. 36:949.

NRC (1988). Nutrient requirements of dairy cattle. National Academy of Science. National Research Council. 6th Revised ed., Washington, D. C. USA.

RICF (1961). Research Institute for Cattle Feeding. Some determinations for judging the silage quality. Horn, Holland.

Saddick, I. M; B. M. Ahmed; A. A. Kandil and G. F. Shahin (1993). Productive performance of Ossimi lambs fed silage containing rations. Menofiya J. Agric. Res., 18: 11.

Shehata, E.I; M.E. Ahmed; faten F. Abou Ammou; A.A.M. Soliman and M. El-H. Haggag (2003). Effect of partial replacement of maize (*Zea mays*, L.) with reep (*Arundo domax*, L.) in silage fed to growing Rahmani lambs. Egyptian J. Nutr. and Feeds, 6 (Special Issue): 969.

SPSS (1997). Statistical package for social science release 8.0 copyright (c), SPSS INC., Chicago, USA.

Steel, R.G. and J.H. Torrie (1980). Principles and procedures of Statistical. 2nd Ed. Mc-Grow-Hill, Book Co. Inc., London. U.K.

Tilly, J.M.A. and R.A. Terry (1963). Two stage technique for *in vitro* digestion forage crops. J. Brit. Grassland Soc., 18:104. Modifications by Barnes (1969). Proc. Nat. 1. Conf. on Forage Quality Evaluation and Utilization, Pp: 1:18.

Van Keulen, J. and B.A. Young (1977). Evaluation of acid insoluble ash as a natural marker in ruminant digestibility studies. J. Anim. Sci., 44: 282.

تقييم سيلاج حطب الذرة المعامل كغذاء للأبقار الحلوب

جمال محمود الجارحى

قسم الإنتاج الحيواني- كلية الزراعة - جامعة الفيوم - مصر

أجريت هذه الدراسة بهدف تقييم سيلاج نبات الذرة الأخضر بعد نزع الكيزان (سيلاج حطب الذرة) ودراسة تأثير استخدامه في علائق الماشية الحلابة على الأداء الإنتاجي. تم دراسة جودة السيلاج المصنع من حطب الذرة الطازج بمفرده أو مضافا إليه ٣% مولاس أو مضافا إليه ٥% حبوب ذرة مجروشة. حيث تم دراسة التحليل الكيماوي واللون والحموضة وحامض اللاكتيك والأحماض الدهنية الطيارة ونيتروجين الامونيا وكذلك معامل هضم المادة الجافة والمادة العضوية معمليا. استخدمت الكباش لتقدير معاملات الهضم والقيم الغذائية ونشاط الكرش. كما تم أيضا دراسة تأثير استخدام الأنواع المختلفة من السيلاج المذكورة بعالية مع العلف المركز بنسبة ١:١ في علائق الأبقار الحلابة على إنتاج اللبن ومكوناته. استخدمت ثمانية عشر بقرة خليط فريزيان حلابة في موسم الحليب الثاني- الرابع وكان متوسط وزن الجسم ٤٦٠ كجم حيث قسمت إلى ثلاث مجاميع متماثلة (٦ أبقار في كل مجموعة). درست أيضا معاملات الهضم والقيم الغذائية والغذاء المأكول والكفاءة الاقتصادية لهذه العلائق. وكانت أهم النتائج المتحصل عليها:

أظهر السيلاج المصنع من حطب الذرة مع الإضافات زيادة معنوية في نسبة البروتين الخام وحامض اللاكتيك ومجموع الأحماض الدهنية الطيارة وانخفاض في محتوى نيتروجين الأمونيا مقارنة بالسيلاج المصنع بدون إضافات. تحسنت معاملات هضم كل من المادة العضوية والبروتين الخام والكربوهيدرات الذائبة وكذلك القيم الغذائية للطاقة والبروتين مع العلائق المحتوية على السيلاج المصنع بالإضافات مقارنة بالعليقة المحتوية على سيلاج مصنع بدون إضافات. أظهر محصول اللبن وكل مكوناته زيادة معنوية مع العلائق المحتوية على سيلاج بالإضافات مقارنة بالعليقة المحتوية على سيلاج بدون إضافات. ولم يكن هناك أي تأثير معنوي على الغذاء المأكول والكفاءة الغذائية بين العلائق المختلفة. أظهرت نتائج الكفاءة الاقتصادية زيادة معنوية مع العلائق المحتوية على سيلاج بالإضافات مقارنة بالعليقة المحتوية على سيلاج بدون إضافات.