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IMPACT OF USING FEED ADDITIVES WITH CORN STOVER SILAGE IN LAMB RATIONS ON PERFORMANCE, DIGESTIBILITY, RUMEN ACTIVITY, SOME BLOOD CONSTITUENTS AND CARCASS TRIATS.

Ibrahim, Fathia A.; Safaa N. Abd El-Azeem.; KH.M.M. Mousa and Hoda M. El-Hosseiny

Animal Production Research Institute, Agricultural Research Center, Dokki, Cairo, Egypt.

ABSTRACT

Sixteen Ossimi male lambs weighed 21.69 kg on average and aged 5 months were used in a 204 days feeding trial. Animals were randomly divided into four equal groups (4 animals each) to study the effect of feeding corn stover silage with different feed additives on nutrients digestibility, performance, carcass characteristics and feed efficiency in growing lambs. The experimental lambs were randomly assigned into four experimental rations with or without feed additives. The first group was considered as control (A) and fed at 1% of live body weight (LBW) CFM (concentrate feed mixture) plus 1% of LBW corn stover silage and rice straw *ad lib* without feed additive. While, the other three groups received the control ration plus 5g / h/ d More – yeast (MY), 5g /h/d Dina-ferm (DF) and 5g /h/d Biodian (BO) for B, C and D groups, respectively.

Results showed that MY,DF and BO supplementation with lambs rations did not show any Affect on nutrients digestibility of DM, OM, CP, EE and NFE . On the other hand, the CF digestibility was significantly ($P<0.05$) higher with MY,DF and BO supplementation compared with the control ration.

TDN values ranged between 60.33 and 61.68%.The lowest value was recorded with both rations of C and A (control) ; while, D and B rations had the highest value . DCP percentage tended to decreased with rations supplemented with MY,DF and BO than that in the control ration. However, TDN and DCP values did not significantly influence by the supplementations.

Supplemented MY, DF and BO rations had lower ruminal pH at zero, 3 and 6 hrs. in all groups (except with those fed D ration at 6 hrs.) compared with the control group. Supplemented rations with MY and DF had significantly ($P<0.05$) lower NH_3-N concentration at 3 hrs. than those fed the control ration. Also, ration D gave lower NH_3-N concentration, but with no significant difference, compared with the control ration. Whereas,NH_3-N concentrations at 6 hrs. post feeding were significantly ($P<0.05$) decreased with C and D rations compared with those fed both the control (A) and B rations. Although, ruminal TVFA's values at 3 hrs post feeding were significantly ($P< 0.05$) higher for ration C supplemented with DF and significantly ($P< 0.05$) lower for ration B than the control (A) and D rations. Moreover, ruminal TVFA's values at 6 hrs. post feeding were significantly ($P< 0.05$) higher for ration D and significantly lower for ration B than the control and C rations .

Results showed no significantly differences between the tested groups and the control group in blood serum total protein ,globulin and urea concentration .While, animals fed B and C rations recorded significant ($p<0.05$) decrease in concentration of serum albumin (3.72 and 3.30 g/dl ,respectively) compared to the control group (4.88 g/dl) and insignificant decrease with those fed D ration (4.33 g/dl).

The decreases in DM intake (kg/h/d) recorded with lambs fed C and D rations were 7. 40 and 2.61% ,respectively compared with those fed A ration (control) . TDN intake (kg/h/d) was nearly similar in all groups ; while, DCP intake (kg/h/d) was higher

for lambs fed A ration (control) than those fed ration B (by 16.28 %), ration C (by 17.44 %) and ration D (by 16.28 %) .

Average daily gain (g/h) was the highest with lambs fed C ration (156.9) followed by those fed D ration (152), B ration (151) and then control ration (149.51). The differences among groups were not significant. Feed conversion as kg DM,TDN and DCP intake to obtained one kg gain showed that rations B,C and D ,respectively had the best values than those fed the control ration.

On the other hand, dressing percentages (on the basis of hot carcass weight without or with edible organs relative to fasting weight) showed that animals group fed A and D rations were nearly similar and higher; whereas, those fed ration B recorded the lowest values (44.68 and 48.91 %, respectively) .The differences were not significant.

Feed cost per kg gain was lower in A ration (control), whereas, D ration was the highest feed cost/kg gain (3.23 L.E.).

Keywords: Corn stover silage , Feed additives, Feeding value, Lambs performance, Carcass traits, Economic efficiency.

INTRODUCTION

Corn stover residue is a large potential energy substrate for fermentation processes. Several studies (El-Hosseiny ,1984,El-Hosseiny *et al.*, 1990 ; Bendary and Younis 1997; Hanafy *et al.*, 2000; Bendary *et al.*,2001 and Ahmed *et al.*,2003) indicated that corn stover residue with or without additives can be used to produce good quality silage for ruminants feeding, especially in summer season. Use of such technique can reduce cost of feeding ,save considerable amounts of the expensive concentrate feed mixture and prevent environmental pollution.

Ruminants are unique in their ability to utilize fiber and therefore ,should be managed for maximum fiber degradation (Van Soest,1982). Researchers (Wiedmeier *et al.* ,1987) and (Martin *et al.*,1989) indicated that some microbial feed additive may increase the nutritive value of feedstuffs by increasing the dietary fiber digestibility. One of several feed additives is yeast culture . The addition of yeast culture (*S.cerevisiae*) in the diet increased net digestion in the stomach, particularly of fiber, and led to increase energy out put (Robinson,1997), increased nutrient digestibility (Wiedmeier *et al.*,1987, Williams *et al.*,1991, Harris *et al.*, 1992 and Dawson, 1993), increased cellulose degradation, *in vitro* rumen culture (Dawson and Hopkins ,1991) and reduced ruminal NH3 concentration (Harrison *et al.*,1988, Newbold *et al.*,1990 and Erasmus *et al.*,1992) .

Contrary to other researchers (Putman *et al* .,1997) who found that yeast culture had no effect on ruminal pH, concentrations of NH_3 and volatile fatty acids in ruminal fluid or ruminal digestibility . Angeles *et al.*, (1999) indicated that rumen pH was lower ($P< 0.01$) and there were no effects on volatile fatty acid concentration, molar proportion, ammonia-N , protozoa population and total tract digestibility of DM ,OM,NDF and ADF with yeast culture supplements .The objective of this study was to evaluate the effect of feeding corn stover silage with different kinds of biological additives (*S.cerevisiae*) on nutrients digestibility, rumen fermentation, performance, carcass characteristics and feed efficiency in growing lambs .

MATERIALS AND METHODS

The present study was carried out at Sids Experimental Station belonging to the Animal Production Research Institute, Agricultural Research Center, during 2005.

A feeding trial was carried out using sixteen Ossimi male lambs weighed 21.69 kg on average and aged 5 months for 204 days. Animals were randomly divided into four equal experimental groups (4 animals each). Each group was housed in separate shaded pen. The experimental lambs were randomly assigned into four experimental rations with or without additives . The first group was assigned as a control (A) fed on 1% of LBW CFM plus 1% of LBW corn stover silage without additive and rice straw *ad lib* . While, the other three groups received control ration plus 5g /h/d More yeast, 5g /h/d Dinaferm and 5g /h/d Biodian for B, C and D groups, respectively .All additives were commercial products available in the local market of Egypt. The composition of the three additive (More yeast, Dinaferm and Biodian) are as follows: More- yeast (MY) consists of *Saccharamyces cerevisiae* 14.8 x 10^6 CFU/g ; Dina-ferm (DF) consists of : 35% CP, 5% EE ,10 % CF , 10 % moisture , 27.500 units protease, 27.500 units lipase, 2.250 units amylase and *Saccharomyces cerevisiae* 1 x 10^8 CFU/g , while, Biodian (BO) consists of : methionine 40 g (di-methionine), 20 g zinc (zinc oxide), 23 g glucose , 20 g choline (choline chloried), 758 g (*Saccharomyces cerevisiae*) and carrier to 1000g .

Corn stover silage, rice straw and concentrate feed mixture were used from the available feedstuffs in the Sids Experimental Station.

The concentrate feed mixture consists of 37 % yellow corn , 30 % undecortecated cotton seed , 20 % wheat bran, 6.5 % rice bran , 3% molasses, 2.5 % limestone and 1% common salt. The chemical compositions of the feedstuffs used in the experimental rations are shown in Table 1.

All experimental groups were fed CFM once daily at 8 a.m. ,corn stover silage twice daily at 9 a.m. and 13 pm. ,while, rice straw was given *ad lib.* Fresh water was available freely at all times.

Concentrate feed mixture (CFM) was adjusted biweekly according to body weight change .Animals were individually weighed biweekly just before eating and drinking. Daily feed intake and refusals were recorded. Weight gain and feed conversion were calculated.

At the middle of the experimental feeding period (100 days) ,three lambs were randomly chosen from each groups to estimate nutrients digestibility coefficients. Animals were placed in metabolism cages and fed on the previous rations for 7 days as preliminary period and then 3 days for collection period, samples of feedstuffs, feces and refused feeds were dried for chemical analysis according to A.O.A.C (1995). At the last day of the collection period, rumen liquor samples were withdrawn using stomach tube at 0, 3 and 6 hrs. post morning feeding. The samples of rumen liquor were filtered through four layers of cheese cloth and immediately tested for pH values using digital pH meter (Orian Res - EARH, Model 30) ,ammonia –N concentrations according to Conway (1958) and total volatile fatty acids

(TVFA'S) according to Warner (1964). Blood samples were collected from jugular vein and blood serum was separated by centrifugation at 4000 rpm for 20 minutes . Blood serum was tested for total protein ,albumin and urea concentrations using commercial Kits and the methods reported by Biomerieux laboratory reagents and products. Serum total globulin was calculated by difference. After finishing the digestibility trials, all animals returned back again to their feeding groups.

At the end of the experimental feeding trials (204 days) ,three animals from each feeding group were randomly chosen, fasted for 16 hours and weighed immediately before and after slaughtering .Hot carcass ,body offal's and internal organs were separately weighed and dressing percentage was calculated. Carcass components were estimated according to Colomer *et al.* (1987). Samples were taken from 9^{th} -11^{th} ribs cut for chemical analysis according to A.O.A.C (1995) and to determine some physical characteristics as the pH value, tenderness and water holding capacity. The pH value, tenderness and water holding capacity were measured according to the methods described by Grou and Hamn (1957). Area of eye muscle was measured by calk paper placed over the cut surface and measured by planemeter.

The data were statistically analyzed using a general linear model procedure (GLM) according to SAS (1995). Duncan multiple range test (Duncan, 1955) was used to determine the significant differences among dietary treatments .

Table (1): Chemical composition of the experimental feedstuffs (on DM basis).

Items	DM%	Nutrients % of DM					
		OM	CP	EE	CF	NFE	ASH
Concentrate feed mixture (CFM)	92.10	89.86	15.14	4.56	11.07	59. 09	10.14
Corn stover silage	36.72	93.16	10, 74	3.86	25.59	52.97	6.84
Rice straw	92.22	81.06	4.33	1.50	34.76	40.47	18.94

RESULTS AND DISCUSSION

Nutrients digestibility and nutritive values:

Data in Table(2) indicate that MY,DF and BO supplementation with lamb rations B, C and D,respectively did not show any effect on nutrients digestibility of DM, OM , CP,EE and NFE %. These results are in agreement with those reported by Angeles *et al.* (1999). On the other hand, the CF digestibility was significantly ($p<0.05$) higher with MY,DF and BO supplementation compared with the control ration without supplement. The improvement rates of CF digestibility were 28 56, 23.01 and 21.20 % for animals fed B ,C and D rations , respectively compared with A(control) ration . Similar results were reported by Wiedmeier *et al.* (1987) and Gomez-Alarcon *et al.* (1990) with yeast culture, who suggested that the improvement in fiber digestibility may be resulting in the increase in the numbers of bacteria, especially cellulolytic bacteria and fungi in the rumen. Proteolytic bacteria counts were also stimulated by yeast culture (Yoon and Stern,1996).

Table (2): Digestion coefficients and nutritive values for the tested rations.

Items	A	B	C	D
Digestibilities , % :				
DM	62.51	63.45	62.15	62.73
OM	65.07	65.5 2	66.87	66.61
CP	75.80	74.44	77.64	74.21
CF	40.89^{b}	52.5 7^{a}	50.30^{a}	49.5 6^{a}
EE	86.79	85.84	86.40	86.81
NFE	76.41	71.95	70.87	74.07
Nutritive value , % :				
TDN	60.75	61.47	60.33	61.68
DCP	9.40	7.89	8.30	8.00

a and b : Means with different superscripts in the same row are significant (P<0.05).

Regarding the nutritive value as TDN and DCP in Table (2),the results revealed that TDN values ranged between 60.33 and 61.68%.The lowest value was recorded with both C and A rations ; while, D and B rations had the highest values .The differences were not significant among the experimental rations. These results in contrast with those reported by El-Badawi *et al.* (1998), Angeles *et al.* (1999) and El-Talty *et al.* (2001). They found that yeast culture additive into goats ration had no significantly effect on the nutritive values as TDN and SV.

Also, DCP values in Table (2) ranged between 7.89 and 9.40 %.The lowest value was found in B ration (7.89) and the highest value with A ration . The results in Table (2) showed that all rations supplemented with MY,DF and BO tended to decrease the DCP values compared to the control .The differences were not significant. Newbold *et al.* (1996) reported that some strains of yeast are effective whereas others are not.

Rumen liquor parameter:

Results of ruminal pH,ammonia nitrogen and total volatile fatty acids are presented in Table (3). There are a significant differences among treatments in pH values at zero and 6 hrs. post feeding. Supplemented MY, DF and BO with rations B ,C and D ,respectively had lower ruminal pH at zero, 3 and 6hrs. in all groups (except with those fed D ration with BO supplementation at 6hrs.) compared with control group. Similar results were obtained by Khattab *et al.* (2003) who, found that addition of Yea-sacc and Lacto-sacc to lambs ration led to lower ruminal pH at different times compared with the control rations. However ,data of Sohn and Song (1996) and Sharma *et al.*(1998) were in disagreement with these results, they found a significant increase in ruminal pH with yeast supplemented ration. Also, Putman *et al* .(1997) found yeast culture additive had no effect on ruminal pH of early lactation dairy cows . Ruminal pH values at zero time were significantly (P<0.05) higher on the control ration (A) than that in B ration and insignificant higher than with the other rations. While, at 3 hrs post feeding ,there were no significant differences between the control and the other treatments in pH values. The ruminal pH values at 6hrs.post feeding were significantly (P<0.05) higher with ration D (supplemented with BO) than that

in ration B (supplemented with MY) and insignificantly higher with A (control) ration and C ration (supplemented with DF) . The pH values of rumen liquor in the present study are within the range reported by Rakha (1988), who reported that the normal ruminal pH of sheep ranged between 4.96 and 7.92.

Table (3): Effects of experimental rations on some rumen liquor parameters at different sampling times.

Item	Sampling times	A	B	C	D
	0	7.01^{a}	6.93^{b}	6.98^{ab}	6.95^{ab}
pH value	3	6.79	6.52	6.73	6.52
	6	6.92^{ab}	6.67^{b}	6.91^{ab}	7.10^{a}
	0	18.75	17.20	16.10	16.80
Ammonia nitrogen (mg/100 ml)	3	23.85^{a}	18.90^{b}	19.45^{b}	21.68^{ab}
	6	20.90^{a}	21.32^{a}	18.32^{b}	18.90^{b}
	0	28.69	28.65	30.07	33.99
TVFA's (meq/100 ml)	3	36.61^{b}	27.38^{c}	43.55^{a}	35.56^{b}
	6	40.72^{ab}	36.61^{b}	42.66^{ab}	45.30^{a}

a, b and c : Means with different superscripts in the same row are significant (P<0.05).

Ammonia –N concentration at zero time (Table 3) was higher with the control ration than those in other rations, with no significantly differences. After feeding, ruminal NH_3-N concentration increased by increasing sampling time ,reaching its peak values at 3 hrs. for all rations and declined at 6 hrs., except with B ration supplemented with MY . Increasing ammonia –nitrogen concentrations in the rumen media may be attributed to reduction of ammonia nitrogen absorption by rumen epithelium or to a decrease in the efficiency of microbial protein synthesis (Ikwuegbu and Sutton,1982).

Supplemented ration B and C with MY and DF, respectively had significantly ($P<0.05$) lower NH_3-N concentration at 3 hrs. than those fed the control ration. Also, ration D supplemented with BO decreased NH_3-N concentration but without significant differences compared with the control ration. Whereas,NH_3-N concentrations at 6 hrs. post feeding were significantly ($p<0.05$) decreased with C and D rations which supplemented with DF and BO, respectively compared with those fed both of control (A) and B rations . These results are in disagreement with those of Kobayashi *et al* . (1995), Yoon and Stern (1996) and Putman *et al.* (1997) who noticed that NH_3-N concentration was not affected by yeast culture supplementation of dairy cow raticns. The differences between the present results and the other published data could be attributed to differences in the quantities used and /or different strains of yeast culture (Hadjipanayiotou *et al.*,1997).

Total volatile fatty acid values at zero time, for rations C and D were higher than the control and B rations. The differences were not significant. Although, ruminal TVFA's values at 3 hrs. post feeding were significantly ($P< 0.05$) higher for ration C and significantly ($P< 0.05$) lower in ration B than the control (A) and D rations. Moreover, ruminal TVFA's values at 6 hrs.post feeding were significantly ($P< 0.05$) higher for ration D than for ration B but not significantly differed than the control and C rations . Allam, *et al.* (1984) found that the TVFA's concentration in rumen is governed by

several factors such as DM digestibility, rate of absorption , rumen pH, transportation of the digesta from the rumen to other parts of the digestive tract and the microbial population in the rumen and their activities.

Blood serum parameters:

Data in Table (4) showed no significantly differences among the tested groups and control groups on blood serum total protein ,globulin and urea concentrations .This indicates that MY, DF and BO supplementation in lambs ration did not affect protein synthesis in liver and kidney function . Values of total serum protein ranged 8.93 -10.67 g/dl , it was slightly higher in the experimental groups B and C. Such trend may be related to the higher nitrogen intake from the experimental rations. This is in accordance with the conclusion of Kumar *et al.* (1980) , who reported a positive correlation between dietary protein and plasma protein concentration. Whereas, animals fed B and C rations supplemented with MY and DF resulted in significant ($P<0.05$) decreased in concentration of serum albumin (3.72 and 3.30 g/dl ,respectively) compared to the control group (4.88 g/dl) and insignificant decreased with those fed D ration supplemented with BO (4.33 g/dl). The obtained results came in line with those reported by Abdel-khalek *et al* . (2000), who found that concentration of albumin was significantly ($p<0.05$) higher by about 6.5 % in calves fed diets supplemented with Lacto-Sacc containing yeast culture than those fed the control diet; however, globulin did not differ significantly.

Table (4) : Blood parameters of growing lambs fed the experimental rations.

Item	A	B	C	D
Total protein,g/dl	9.16	10.67	9.25	8.93
Albumin,g/dl	4.88^{a}	3.72	3.30^{c}	4.33^{ab}
Globulin,g/dl	4.28	6.95	5.95	4.60
A/G ratio	1.12^{a}	0.54^{b}	0.56^{b}	0.94^{a}
Urea,mg/100ml	31.62	35.75	36.61	36.04

a, b and c : Means with different superscripts in the same row are significant (P<0.05).

On the other hand, albumin / globulin ratio was significant ($P<0.05$) increased with lambs fed the control A (1.12) and D (0.94) rations than those fed B (0.54) and C (0.56) rations. Albumin/ globulin ratio did not exceed the unit of that fed the control ration (1.12) .

Growth performance and economic efficiency :

Results in Table (5) indicated that the feed intake expressed as DM intake (kg/h/d) was the highest value with lambs fed A ration without supplementation and B ration supplemented by MY. Whereas, the lowest DM intake as (kg/h/d) was recorded with lambs fed C and D rations by 7. 40 and 2.61% ,respectively compared with those fed A ration (control) . TDN intake (kg/h/d) was nearly similar in all groups ; while, DCP intake (kg/h/d) was higher for lambs fed A ration (control) than those fed ration B by 16.28 %, C ration by 17.44 % and D ration by 16.28 % . Similar results were found by Fayed (2001) on sheep when used Yea-Sacc, who found that TDN

intake(g/kg BW $^{0.75}$) was not higher than the control. El-Basiony *et al.* (1998) obtained also the same trend. El-Ashry *et al.* (2003) found that TDN and DCP intake (g/kg BW or g/kg BW $^{0.75}$) were not significant differed with lambs fed flavomycin or yeast supplementation compared with the control lambs.

The results revealed an increase in average daily gain (g/h) for lambs fed C ration (156.90) with DF supplementation followed by those fed D ration with BO supplementation (152), B ration with MY supplementation (150.74) and then the control ration, A (149.51). The differences among groups were not significant. Similar results were obtained by Khattab *et al.* (1997), El- Basiony *et al.* (1998) and Gado *et al.* (1998), who reported that yeast culture supplementation increased average daily gain of goat. Feed conversion as kg DM,TDN and DCP intake to obtained one kg gain showed that My, DF and BO supplementation to rations B,C and D ,respectively had the best values than those fed the control ration without supplement. The present results are in agreement with those of Khattab *et al.* (1997) on Lacto –Sacc and , Salem *et al.* (2000) and El-Ashry *et al.* (2001) with yeast culture. Although the more feed efficiency as kg DM and TND per kg gain were recorded with lambs fed C ration supplemented with DF (Table 5), this may be due to efficiency of feed utilization as indicated by the highest average daily gain and lower feed intake ;while, lambs fed D ration supplemented with BO was the best feed conversion as kg DCP/ kg gain . The differences among supplemented ration (B, C and D with MY, DF and BO, respectively) and control were slightly differed , this may be due to the recommended dose was not enough to cause a positive effect on lamb performance.

Feed cost per kg gain in (Table 5) was lower in ration A (control), whereas, D ration was the highest feed cost / kg gain (3.23 L.E.). It was noticed that MY, DF and BO supplementation in silage rations did not lower feed cost / kg gain . This may be tended to the three additives were imported and expensive in their price . Economic efficiency was decreased by 13.75, 18.03 and 22.85% in rations B, C and D , respectively than the control ration (A) . These results disagreement with those reported by Salem *et al.* (2000) and El-Ashry *et al.* (2003), who found that yeast culture improved economic efficiency of growing lambs.

The differences between the present results and other published data may be due to the different strains of yeast culture particularly between imported compounds and local manufactured preparing.

Table (5): Growth performance of growing lams fed the experimental rations.

Item	A	B	C	D
No. of animals	4	4	4	4
Experimental periods (days)	204	204	204	204
Av. Initial body weight (kg)	21.25	21.75	21.25	21.50
Av. Final body weight (kg)	51.75	52.50	54.25	52.50
Total gain (kg)	30.50	30.75	33.00	31.00
Av. Daily gain (g/h/d)	149.51	150.74	156.90	152.00
Dry mater intake (kg/h/d):				
Concentrates	0.320	0.323	0.320	0.323
Corn stover silage	0.320	0.323	0.295	0.323
Rice straw	0.278	0.260	0.235	0.248
Daily nutrient Intake (kg/h/d:				
DM	0.918	0.906	0.850	0.894
TDN	0.558	0.557	0.513	0.551
DCP	0.086	0.072	0.071	0.072
Feed Conversion (kg/kg gain):				
DM	6.14	6.010	5.418	5.882
TDN	3.732	3.695	3.268	3.625
DCP	0.575	0.478	0.453	0.211
Feed cost (L.E) :				
*Total feed cost (L.E /h/d)	0.395	0.447	0.484	0.491
Feed cost /kg gain (L.E)	2.642	2.967	3.085	3.23
**Economic efficiency	3.921	3.382	3.214	3.025

*Local price of feed: 800 L.E./ton of CFM, 100 L.E./ton of corn stover silage, 100 LE/ton of rice straw, whereas Moro- yeast , Dina-ferm and Biodian prices per kg were 10.00, 20 and 19 L.E. and price of kg gain was 13.00 L.E. (based on year 2005 prices).

**Economic efficiency = $\frac{\text{Price of Kg gain} - \text{Feed cost /Kg gain}}{\text{Feed cost/kg gain}}$

Carcass traits, physical characteristics and chemical composition:

Data in Table (6) showed that animals fed B and C rations with MY and DF supplementation , respectively were higher in fasting body weight than those fed A (control) and D rations. While, animals fed rations of A and D were similar and lower in fasting body weight than the other groups. The differences were not significant . Hot carcass weight (without or with edible offals) was nearly similar in all experimental groups. On the other hand, dressing percentages (on the basis of hot carcass weight without or with edible organs relative to fasting weight) showed that animals group fed A and D rations were nearly similar and higher; whereas, those fed ration B recorded the lowest values (44.68 and 48.91 %,respectively).The differences were not significant. These results are in accordance with those of Mir and Mir (1994) ,who noticed that corn silage diets supplemented with yeast culture did not alter carcass characteristics.

Table (6): Effect of the tested rations on dressing percentage and carcass cuts of lambs.

Item	A	B	C	D
Fasting body weight (kg)	49.00	51.50	50.50	49.00
* Hot carcass weight (kg)	22.14	23.01	22.89	22.63
** Hot carcass weight (kg)	24.83	25.19	24.87	25.10
Dressing percentage [1]	45.18	44.68	45.33	46.18
Dressing percentage [2]	50.67	48.91	49.25	51.22
Legs weight, kg	1.23	1.23	1.45	1.75
Head weight , kg	3.23	3.25	3.15	3.55
Tail weight, kg	3.36^{a}	2.71^{ab}	1.97^{b}	3.50^{a}
Full digestive tract, kg	7.07^{a}	4.81^{b}	5.39^{ab}	6.30^{a}
Empty digestive tract, kg	1.85	1.94	1.96	1.99
Edible offal (kg):				
Liver weight	0.75	0.81	0.65	0.71
Kidney weight	0.30	0.22	0.21	0.21
Heart weight	0.23	0.25	0.26	0.24
Testes weight	0.38	0.29	0.33	0.31
Spleen weight	0.06	0.06	0.05	0.05
Lungs and trachea weight	0.75^{a}	0.55^{b}	0.48^{b}	0.53^{b}
Total edible offal weight, kg	2.47	2.18	1.98	2.05

[1] Dressing % (hot carcass weight excluding edible offal relative to fasting weigh).
[2] Dressing % (hot carcass weight including edible offal relative to fasting weigh).
* Hot carcass weight without edible offals.
** Hot carcass weight with total edible offals .
a and b : Means with different superscripts in the same row are significant (P<0.05).

The effect of experimental rations on edible offal's (Table 6) showed that there were no significant differences among offal's weight of the slaughtered animals except the weight of lungs and trachea in the group fed A ration (control) which was significantly (P<0.05) higher than those fed the other rations. In addition , animals in group C was significantly (P<0.05) lower in tail weight than those in the other groups, may be related to the reduction in feed intake of corn stover silage in this group according to Mahmoud *et al* . (2003), who found that weights and percentages of carcass fat was increased significantly with increasing the level of corn silage in the rations.

Results of physical characteristics, carcass quality and chemical composition of eye muscle in Table (7) showed that area of eye muscle(cm^2) was significantly (P<0.05) higher with lambs fed D ration than those fed rations A (control) and B but non-significant with C. The differences among animals fed A ,B and C rations were not significant. Water holding capacity (cm^2) and tenderness values (cm^2) of fresh lambs meat were nearly similar for all groups and ranged from 8.5 to 9.5 cm^2 and from 3.5 to 4.5 cm^2 , respectively. The pH value of eye muscle of lambs ranged from 5.36 to 5.55. The differences were not significant among the testes groups in water holding capacity, tenderness and pH values of eye muscle. Also ,Table (7) showed that the highest weight of 9,10 and 11 ribs cut was found in animals fed on D ration (1.20 kg), whereas the lowest was recorded in animals fed C ration (0.94 kg). The difference was not significant. The highest value of meat % of eye muscles was found with animals fed rations of B, A and D being 56.43,

56.31 and 56.01% ,respectively, but the lowest value was recorded with lambs fed C ration. Whereas, the highest value of fat % of eye muscles was in animals fed D (25.84) followed by C ration (24.62) and B ration (24.48) and then the control ration (22.98%) .While, the highest value of bon % of eye muscles was observed with lambs fed the control ration followed by C ration ,while the lowest values were recorded for C and D rations. The differences were not significant among the tested groups in the percentages of meat , fat and bone of the eye muscle of lambs .

Table (7): Physical characteristics, carcass quality and chemical composition of eye muscle of lambs fed the experimental rations.

Item	A	B	C	D
Physiological characteristics:				
Eye muscle area (cm^2)	22.5^{ab}	20.0^{b}	19.5^{b}	25.5^{a}
Water holding capacity (cm^2)	9.5	9.0	9.5	8.5
Tenderness (cm^2)	4.5	3.5	4.5	3.5
pH-value	5.36	5.55	5.46	5.43
Carcass quality :				
Weight of ribs samples, kg	1.14	1.12	0.94	1.20
Meat % of ribs sample	56.31	56.43	54.98	56.01
Fat% of ribs sample	22.98	24.48	24.62	25.84
Bone % of ribs sample	20.71	19.09	20.39	18.15
Chemical composition % :				
Moisture	72.9	72.62	72.31	74.32
(On DM basis) :				
CP	81.11^{b}	80.75^{b}	80.67^{b}	86.41^{a}
EE	14.51^{a}	15.05^{a}	15.26^{a}	9.75^{b}
Ash	4.38^{a}	4.20^{ab}	4.07^{ab}	3.84^{b}

a and b : Means with different superscripts in the same row are significant (P<0.05).

The chemical composition of eye muscles in Table (7) indicated that lambs fed on D ration with BO supplementation had a significantly (P<0.05) increased CP% and significantly (P<0.05) decreased EE % of eye muscle (on DM basis)than those fed the other rations. Also, ash content of eye muscles was significantly (P<0.05) decreased with lambs fed ration D ration compared with those fed the control ration and insignificantly decreased with those fed B and C rations.

In conclusion, under the experimental condition, it is cleared that MY, DF and BO supplementation (5g/h/d) to growing lambs fed rations of corn stover silage, concentrate feed mixture (at rate of 1:1) and rice straw *ad lib.* did not show considerable effect concerning most studied trials . In addition , perhaps , the recommended dose (5g/h/d) of the aforementioned supplements was not enough to cause a significant improvement in the animal performance in this study, so that more studies are needed to reach an optimum doses in an applied trial with growing lambs or other animals , particularly by using local manufactured preparation to achieve economical production.

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تأثير استخدام إضافات غذائية مع سيلاج حطب الذرة في علائق الحملان على أداء النمو ومعاملات الهضم ونشاط الكرش وبعض خصائص الدم والذبيحة.

فتحية عبد العظيم إبراهيم، صفاء نادى عبد العظيم، خالد محمود موسى و هدى محمد الحسيني احمد

معهد بحوث الإنتاج الحيواني – مركز البحوث الزراعية –الدقي –جيزة

استخدمت في هذه الدراسة ستة عشر حملا ناميا (أوسيمي) عمر "٥" شهور و متوسط وزنها ٢١,٦٩ كجم لمدة ٢٠٤ يوم لدراسة تأثير الإضافات الغذائية مع سيلاج حطب الذرة على معاملات الهضم المختلفة ، معدل أداء النمو ، معدل أداء الكرش وبعض خصائص الدم والذبيحة لتلك الحملان وكذلك الكفاءة الاقتصادية. قسمت الحيوانات عشوائيا إلى أربعة مجاميع (أربعة حملان في كل مجموعة) وغذيت كل الحملان النامية على معدل ١% من وزن الحيوان لكلا من العلف مركز و سيلاج حطب الذرة وعلى قش الأرز لحد الشبع .وكانت المعاملات على النحو التالي :

A (عليقة المقارنة) بدون اي إضافة ، B (عليقة المقارنة) مضافا إليها ٥جم/للرأس/يوم من المورست ، C (عليقة المقارنة) مضاف إليها ٥جم/للرأس/يوم من دينافيرم ، D (عليقة المقارنة) مضافا إليها ٥ جم/للرأس/يوم من بيوديان .وقدر المأكول اليومي، ومعدل الزيادة الوزنية اليومية والكفاءة الغذائية والقيمة الهضمية وبعض مقاييس سائل الكرش بالإضافة إلى تقدير صفات الذبيحة. وأوضحت النتائج ما يلي :

جميع العلائق المحتوية على الإضافات الغذائية حسنت معنويا (عند مستوى ٥%) معامل هضم الألياف الخام عن العليقة A (عليقة المقارنة) ، بينما لم تؤثر معنويا على معاملات هضم المادة الجافة والعضوية والبروتين الخام والدهن الخام ومعامل هضم المركبات الكربوهيدراتية الكلية الذائبة الخالية من الازوت مقارنة بالعليقة A . وكانت القيمة الغذائية فى صورة مجموع المركبات الكلية المهضومة (TDN) مرتفع نسبيا فى العليقة B والعليقة D ومنخفضة فى العليقة C مقارنة بالعليقة A، بينما كان البروتين المهضوم (DCP) منخفض في كل العلائق المحتوية على الإضافات الغذائية عن المجموعة المغذاة على العليقة A . وكانت الاختلافات غير معنوية في كل من مجموع المركبات الكلية المهضومة و البروتين المهضوم بين مجموعة المقارنة والمجاميع الأخرى المختبرة المحتوية على الإضافات الغذائية.

نتائج قياسات سائل الكرش أن الـ pH انخفض في كل المجموعات المغذاة على العلائق المحتوية على الإضافات الغذائية في جميع الأوقات (صفر -٣-٦ ساعات من التغذية) ما عدا المجموعة المغذاة على العليقة D عند ٦ ساعات من التغذية مقارنة بمجموعة المقارنة وكانت الفروق معنوية عند مستوى ٥ % بين مجموعة الكونترول والمجموعة المغذاة على العليقة B وغير معنوية مع باقي المجموعات الأخرى أظهرت. انخفض تركيز نتروجين الأمونيا NH_3 -N في كل المجموعات المغذاة على العلائق المحتوية على الإضافات الغذائية في كل الأوقات (صفر -٣-٦ ساعات من التغذية) ما عدا المجموعة B كانت مرتفعة نسبيا بعد ٦ ساعات من التغذية عن المجموعة المغذاة على المقارنة.

وكانت الفروق معنوية عند مستوى ٥% بعد ٣و ٦ ساعات من التغذية بين مجموعة المقارنة والمجموعات الأخرى. لم يتأثر تركيز كل من بروتين الكلى ، الجلوبيولين ،اليوريا في سيرم الدم بالإضافات الغذائية عن المجموعة المغذاة على عليقة المقارنة بينما انخفض تركيز الألبيومين معنويا في المجموعة المغذاة على العليقة B والعليقة C عند مستوى ٥% ، وغير معنوية مع المجموعة المغذاة على العليقة D مقارنة بالمجموعة المغذاة على العليقة المقارنة .

- كان معدل الزيادة اليومية أعلى مع المجموعة المغذاة على العليقة C (١٥٦,٩جم / للرأس) يتبعها المجموعة المغذاة على العليقة D (١٥٢جم / للرأس) ثم المغذاة على العليقة B (١٥٠,٧٤جم / للرأس) عن مجموعة المقارنة A (١٤٩,٥١ جم /للرأس) ، وكانت الاختلاف غير معنويا بين المجاميع المختبرة ومجموعة المقارنة .
- انخفض المأكول من المدة الجافة للحملان المغذاة على العليقة C والعليقة D عن الكونترول بمقدار ٧,٤٠ و ٢,٦١ % على التوالي. بينما المأكول في صورة مجموع المركبات الغذائية الكلية المهضومة تتشابه في كل المجموعات ، بينما ارتفع المأكول في صورة بروتين مهضوم في عليقة الكونترول عن العليقة B بمقدار ١٦,٢٨ % وعن العليقة C بمقدار ١٧,٤٤ % وعن العليقة D بمقدار ١٦,٢٨ % .
- تحسنت الكفاءة التحويلية للغذاء لكل من المادة الجافة والبروتين مهضوم ومجموع المركبات الغذائية الكلية المهضومة منسوبة إلى معدل الزيادة الوزنية اليومية في الحملان المغذاة على العلائق B,C,D عن مجموعة المقارنة ، وكانت الاختلافات غير معنوية .
- نسبة التصافي على أساس وزن الذبيحة الساخن بدون الأعضاء الداخلية أو بالأعضاء الداخلية منسوبة إلى الوزن الصائم كان مرتفع في الحملان المغذاة على العليقة A والعليقة D عن المجموعة المغذاة العليقة C وعليقة B ، وكانت الاختلافات غير معنوية.
- وكان سعر تكلفة الغذاء منسوبة إلى كجم نمو أفضل في عليقة الكنترول عن العلائق المضاف إليها المركبات الغذائية .