

Nutritional Studies to Evaluate the Productivity and Quality of Preserved New Variety of Hybrid Maize : 2-On Growth Performance and Economic Efficiency in Growing Kids Zaribi Goats .

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ABSTRACT

Use of new variety of hybrid El-Ryanah x El-Shamia maize as a new type of silage and has many attention due to their high protein efficiency, relatively high digestible energy and total digestible nutrients. Thus, the objective of this study was to evaluate feed intake, growth performance, nutrients digestibility and economic efficiency in growing kids zaribi goats. Twenty four growing zaribi kids were selected from the herd with nearly similar live body weight 13.67 kg and age 4 months old . Animals were divided into three groups (n=8 in each). All kids groups were housed in separated pens under similar environmental condition. All animals were nourished tested diet consisted of concentrate feed mixture (CFM) to cover 50% of protein requirements recommended by NRC (1989). Besides *ad libitum* supplement rations, where silage made of 100 % berseem (BS) offered to group1 (T₁) as control ,silage made of 100% hybrid Raianah maize silage (HRMS) to group 2 (T₂) and silage made of 50 % berseem + 50 % hybrid Raianah maize (HRMBS) to group 3 (T₃). Feeding trails lasted for 180 days .The obtained results showed that T₁ ration (100% berseem silage) had higher NDF , ADF and ADL than those of T₂ , T₃ rations (100% hybrid corn silage). Moreover, the supplementing of hybrid maize as silage to basal diet had contributed to a reduction giber fraction and an increase of Metabolizable energy particularly with T₂ ration .Hybrid corn silage alone (T₂) was higher of CP, NFE and NFC (14.89, 56.42 and 41.84 respectively), than T₁ (14.67, 51.63 and 41.58 respectively) and T₃ (14.03, 52.23 and 40.60 respectively). On the other side T₂ was lower of CF ,EE and Ash (17.02, 2.54 and 9.13) in comparison of T₁ (21.45, 2.94 and 9.31) and T₃ (14.03, 2.79 and 10.17 respectively) .In addition to metabolisable energy (ME) recorded the highest value with T₃ ration (10.01) followed by T₂ (9.93) ration and the lowest value had detected with T₁ ration (9.43). Growth rate and daily body weight gain of kids fed experimental diets were recorded average daily gain values (146,154 and 167 g/h/d) for T₁, T₂ and T₃ respectively. Advantages percentage of total body weight of the experimental groups as found to be 3.39 % and 1.27 % for animal fed T₂ and T₃ ration compared to the control group (T₁). Also, daily dry matter intake increased with T₁ ration (1415) and T₃ ration (1397) than those of the T₂ ration (1367 g). Meanwhile , feed conversion was significantly among treatments (T₁ , T₂ and T₃) , being (9.69 , 8.88 and 8.37 respectively) . Moreover, TDN of T₁ ration (60.68%) ,T₂ (64.65 %) and T₃ (63.45%) being DCP as same trend and the values were (9.79 %,10.03% and 9.56 %) for T₁,T₂ and T₃ respectively with significant (p<0.05) increase for T₂ ration than those of T₁ and T₃ .The energy concentration of tested diets showed significantly among treatments (P<0.05) and T₃ ration had the highest values of NE , ME , and DE concentration (1.420 , 2.227 , 2.716) for T₁ , T₂ , T₃ respectively . On the other hand, growth energy (GE) value of T₂ ration had decreased (1.765) than those of T₁ ration (1.777) and T₃ ration (1.760) . Finally , economic return of kids fed T₁ ration showed the highest average feed cost / kg of BWG (14.45 LE) than T₂ (13.51) and T₃ (12.52) . Moreover, Price of body weight gain of T₁ ration was higher (14.45 LE) followed by T₂ (13.51 LE) and the lowest price had recorded with T₃ ration (12.52 LE). On the other hand Improved of economic efficiency (%) had recorded the highest value with T₃ ration (12.40 LE) while T₂ ration had detected the lowest value (6.04 LE) in comparison of control ration (T₁) .

Keywords: Zaribi kids, hybrid El-Raianah x El-Shamia maize, growth performance, digestion coefficient and economic efficiency

INTRODUCTION

Corn hybrids Ryanah x Shamia mixed to make silage for animals to increase the milk and performance production because it produce high yields of quality silage. A number of studies have shown that grain yield alone is the best indicator of a hybrid's performance for silage .Small ruminant production as goats and sheep are very significant component of livestock production throughout the world and more specifically in the developing countries (Thornton *et al.* ,2009). Thus, feeding system of ruminants specially small ruminants (goats and sheep) with conserved forages has become an important feeding strategy since they could be made available throughout the year. Nowadays, the use of corn silage as green forage in ruminant feeding has increased rapidly due to its high yielding properties, relatively high content of energy, palatability and easy incorporation in total mixed ration (Kerney *et al.* ,2004) . In addition to, the nutritive values of the feed would be more consistent for daily feeding . Maize as silage can be an economic source of nutrients for lactating animals ,especially on large farms where feeding can be automatically . However, hybrid corn plant silage contains high amount of starch which could possibly

attribute to depression in fiber degradation some studies reported that maize plant silage can be used not only as a main source of feed for goats and cattle but also as a combination with other forages including pasture grass Doglan (2014). The amount of feed intake increased when corn silage was included in the grass silage based diets as the sole forage in sheep and goats (Charles *et al.* 2010). Similarly, Thiper *et al.* (2011) reported the inclusion of corn silage - grass silage has the potential to decrease the time required for finish goats and sheep . Meanwhile, when supplements of hybrid maize to grass on the form of silage showed decrease of organic matter (OM) digestibility overall period in dairy cattle and sheep Omar *et al.* (2008). found that the production of animals was increase by supplementation right amount of hybrid corn silage. Hybrid maize silage manipulation is used to improve animal growth performance as well as ruminant production. This feeding practice is showing interest in including whole corn plant silage to berseem for the ruminants particularly small ruminants like growing goats to improve the efficiency of nutrient utilization and to obtain optimum body weight. Currently a very limited number of goat farmers are feeding their animals with whole corn plant silage in Egypt . A few studies have

evaluated the effects of the inclusion of hybrid Raianah x El-Shania corn plant silage to grass silage

Therefore, the objective of this study was to determine feed intake, growth performance and nutrient digestibility in goats fed different inclusions of hybrid corn plant silage to legume based diets.

MATERIALS AND METHODS

Animal and housing

The present experiment was conducted to evaluate feed intake, growth performance, nutrients digestibility and economic efficiency in growing kids zaribi goats. 24 kids aged 4 months old and average weight 13.67 kg were divided into three similar groups (8 animals each) according to their body weight. All kids were housed in separated pens under similar environmental condition. Animals distributed on the one of four experimental rations, the usual period for 180 days was applied. Weighing kids performed at the beginning and end of each month and once after 12 hours of deprivation of feed and water to obtain weight gain resulting in various stages of the trial course and also conducted for utilization from a new variety of hybrid corn silage.

Feeding and performance

Animal in all groups were fed a concentrate feed mixture (CFM) to cover 50 % of protein requirement according to NRC(1989), addition to *ad libitum* supplement hybrid maize silage alone or with berseem mixture where 100 % berseem silage (BS) offered to group₁ (T₁), 100 % hybrid maize silage (HMS) group₂ (T₂) and 50 % berseem silage + 50 % hybrid maize silage for group₃ (T₃). Rations were offered twice daily at 8 a.m. and 4 p.m. while water was offered freely.

Chemical composition of feed used are presented in Table (1). Feed intake (FI), daily weight gain (DWG) and feed conversion (FC) were recorded and the live body weight (LBW) presented as average of growth performance. All diets in terms of energy and protein concentrations were similar. Dry matter intake, feed was presented 2 time daily 8 am and 4 pm. The next morning and before daily feeding, the remaining feed of the manger was daily collected and weighed to calculate DMI. During experimental period, water is available all time through the experimental period. Weighing kids biweekly with a 12 hours retrieving feed was done before every morning feeding and the results were calculated. body weight gain were determined.

Concentrate feed mixture (CFM) consisted of 25% undecortecated cottonseed meal, 38% yellow corn, 10% soybean meal, 20% wheat bran, 3% molasses, 2.5% limestone, 1.0% common salt and 0.5% minerals mixture.

Silage preparation

Fresh hydride maize and berseem which collected from El-Serw, Damietta's governorate after harvested was sun dried for a period of 3 days to reach a moisture content of about 65–70% and chopped (10–15 cm) by a chopper machine. The silage was prepared by filling successive layers of the chopped materials and

heavy trodden before adding the next layers with chopped rice straw (4:1). All silages were put in plastic bags for 8 weeks, the color and odor were examined directly. Representative samples were taken before and after ensiling for chemical analysis. pH value and concentration acids of hybrid corn silage were recorded for whole corn samples throughout the feeding and digestibility trials. The pH value was measured immediately using a pH meter. Immediately after the measurement was completed the remaining filtrate was preserved with 2–3 drops 5% of sulphuric acid and kept frozen at -20°C pending for fermentation acid analysis. Lactic acid and VFA's concentration in the silage extract were determined by using gas chromatography.

Digestibility Trial

Three growing kids from each treatment were transferred to metabolic crates with facilities to separate the collection of urine and feces to carry digestibility trials. After two weeks as preliminary period (adaptation period), the collection period for 7 days. The amounts, of feed offered were recorded, and refuse were collected, weighed and sampled daily preparing for chemical analysis. Feces were collected and recorded daily during collection period. Feces samples were prepared to chemical analysis. Finally, representative samples from faces and refusal from them were taken to analysis.

Rumen liquor

Change in the pH and total volatile fatty acid (TVFA's) and nitrogenous constituents of rumen liquor were studied by collecting 250 ml of rumen liquor from each animal, using a stomach tube employing suction Lane *et al.* (1968). The rumen liquor was immediately brought to the laboratory and strained through four layers of cheese cloth. The pH was determined immediately using a digital pH analyzer. Soluble-N in rumen liquor was estimated by Kjeldahl's method.

Hematological parameters

Blood samples were withdrawn from the left jugular vein of all animals before feeding. It collected into tubes with anticoagulant for determination of the total Neutrophil, Lymphocyte, Monocyte and Eosinophil on blood film stained with wrights stain according to Coles (1986).

Proximate analysis and equations calculated

Ground samples of feed offered and feces were analyzed for DM and CP percentage of corn silage and berseem according to the procedure of (AOAC, 1998), while the percentage of NDF, ADF and ADL were determined according to (Van-Soest *et al.*, 1991). Digestible energy (DE, Mcal/kg DM) and (NFC) were calculated as following :-

- Gross energy (GE, MJ/kg DM) = $0.0226 \text{ CP} + 0.0407 \text{ EE} + 0.0192 \text{ CF} + 0.0177 \text{ NFE}$ (Maff, 1975).
- Digestible energy (DE, Mcal/kg DM) = $\text{TDN\%} \times 0.04409$ (NRC, 1995).
- Metabolizable energy (ME, Mcal/kg DM) = $0.82 \times \text{XDE}$ (Mcal/kg DM) (NRC, 1995).
- Net energy (NE, Mcal/kg DM) = $0.025 (\text{TDN\%}) - 0.12$ (NRC, 1998).

- Non-fibrous carbohydrate (NFC) OM -(CP+EE+NDF) (Calsmigilia *et al.*,1995) .

Statistical Analysis

Data obtained results of experimental groups were analysed by (SAS 2009) .When F test was positive least significant differences Duncan's (1955).

RESULTS AND DISCUSSION

Chemical compositions

Chemical analysis of ingredients and rations are presented in Table (1) .The obtained results showed that T₁ ration (100% berseem silage) was higher of NDF ADF and ADL (31.50 and 23.7 and 15.5 respectively) than those of T₂ 100 % hybrid corn silage (30.80 , 20.20 and 12.50 respectively) and T₃ ration (31.40 and 19.70 and 14.60 respectively) .

Table 1. Chemical composition, cell wall constituents and content of the feed stuffs (on % DM bases %) .

Items	Ingredients					Experimental Rations		
	CFM	RS	BS	HRSS	HRSBS	T ₁	T ₂	T ₃
DM	91.53	89.13	87.17	88.63	86.72	88.32	87.79	90.46
OM	90.27	88.65	87.41	88.91	88.62	90.69	90.87	89.83
CP	14.39	1.36	14.12	14.25	14.17	14.67	14.89	14.03
EE	3.27	1.45	2.31	2.76	2.27	2.94	2.54	2.79
CF	12.63	28.31	22.93	22.73	22.77	21.45	17.02	20.78
NFE	59.98	57.53	48.05	49.17	49.48	51.63	56.42	52.23
Ash	9.73	11.35	12.59	11.09	11.38	9.31	9.13	10.17
NDF	38.57	39.11	38.73	40.75	39.53	31.50	30.80	31.40
ADF	20.76	29.44	21.55	19.79	18.92	23.70	20.20	19.70
ADL	8.34	9.67	8.39	7.62	8.85	15.50	12.50	14.60
NFC	34.04	46.73	32.25	31.15	32.65	41.58	41.84	40.60
DOM**	-	-	-	-	-	58.91	62.06	62.54
Metabolisable energy (MJ / kg DM) *	-	-	-	-	-	9.43	9.93	10.01

*Calculated value [ME (MJ / kg DM)] = 0.16 x DOM (g digestible) : (NRC ,1998). **DOM = Digestible organic matter

On the other hand the inclusion of hybrid corn plant silage to basal diet had contributed to a reduction in NDF, ADF and ADL and an increase of ME particularly with T₂ ration . T₂ was higher of CP, NFE and NFC (14.89, 56.42 and 41.84 respectively), than T₁ (14.67, 51.63 and 41.58 respectively) and T₃

(14.03, 52.23 and 40.60 respectively).On the other side T₂ was lower of CF ,EE and Ash (17.02, 2.54 and 9.13) in comparison of T₁ (21.45,2.94 and 9.31) and T₃.(14.03, 2.79 and 10.17 respectively) .In addition to metabolisable energy(ME) recorded the highest value with T₃ ration (11.77) followed by T₂ (11.39) ration and the lowest value had detected with T₁ ration (11.26).These results are agreement with Anonymous (2005) .

Growth performance and feed intake

The growth rate of live body weight from starting of the trial (4 to 10 months) of age are shown in Table(2). Average daily gain values were 146 ,154 and 167 g/h/d for T₁,T₂ and T₃ respectively. Corresponding values of total body weight gain were 26.24,27.65 and 30.14kg, respectively .This results indicated that the feeding hybrid corn silage alone (T₂ ration) or with berseem in (T₃ ration) had significant (p<0.05) higher in total body weight gain compares to control group (T₁ ration). On the other hand, the obtained data showed that total dry matter intake increase with T₁ ration (1415 g) and T₃ ration(1397 g) than those of T₂ ration

(1367 g).Similar study to the present findings corn silage based diets is good feed intake for goat and sheep (Belewu *et al.*(2010) .this could be due to the palatability and good fermentation characteristics of feed which attracted the goats to consume less amount of DMI particularly with T₂ ration . other reason for reduction in dry matter intake (DMI) may be due back to composition of the hybrid corn silage which content the lower cell wall and high amount of carbohydrate and energy, which had increased the digestibility of the corn silage compared to berseem silage .Meanwhile, TDN and DCP % were significantly (p<0.05) higher with T₂ ration (64.83 and 10.03 respectively) than T₁ ration (60.68 and 9.79 respectively) and T₃ ration (64.54 and 9.56 respectively) In addition to, advantages percentage of total body weight of the experimental groups was found to be 3.39 % and 1.27 % for animal fed T₂ and T₃ rations respectively , in comparison with control ration (T₁) . decrease of DMI of silage may be due to more rapid fermentation and physical breakdown in the rumen Dewhurst(2013).The DMI differences had been attributed to rapid rate of fermentation occurring in the rumen .

Table 2. Live body weight , body weight gain , feed intake and feed conversion of kids Zaribi goats fed tested rations .

Items	T ₁	T ₂	T ₃
Initial BW , Kg	13.61	13.97	13.42
BW ^{0.75}	7.09	7.26	7.01
Final BW ,kg	39.85 ^B	41.62 ^A	43.56 ^A
Final BW ^{0.75}	15.86	16.39	16.96
BWG ,kg	26.24 ^B	27.65 ^B	30.14 ^A
Daily WG, g / h / d	146 ^B	154 ^A	167 ^A
Feed intake Kg/ day			
Total DM intake (g / h / d)	1415	1367	1397
Total DM intake / (g / kg BW / day)	35.51	32.84	32.07
Total DM intake / (g / BWG)	53.93 ^A	47.71 ^B	46.35 ^B
Total DM intake / (g / kg BW ^{0.75})	89.22	83.41	82.37
Total CP intake (g / h / d)	207.58	203.55	196.99
Nutritive value %			
TDN %	60.68 ^B	64.65 ^A	63.45 ^A
DCP %	9.79 ^B	10.03 ^A	9.56 ^B
Feed conversion (feed kg DM / kg gain)	9.69 ^A	8.88 ^B	8.37 ^B
Feed conversion			
TDN (g/day)	860.75	883.77	886.59
TDN (g / W ^{0.75})	54.27	53.92	52.26
DCP (g/day)	138.53	137.11	133.55
DCP (g / kg gain)	0.949	0.890	0.800
Feed advantages %	-	3.39	1.27

A and B Means in the same row with different superscripts differ significantly at P < 0.05 .

Wiese *et al.*(2003). Reported that dry matter intake may be due to a better availability of nutrients are readily been degraded by rumen microbes. Inclusion of corn silage to the legume silage had a positive effect on feed intake as observed by feed intake as observed by Browne (2000),reported that the DRY ,dry matter intake (DMI) of kids increased within as the inclusion of corn silage with berseem in basal diet . This is due to high moisture and NDF content of the silage which physically restricts DMI . In addition to , the results Indicated that average of feed conversion (kg DMI / kg gain) was 9.69 , 8.88 and 8.37 for (T₁) , (T₂) and (T₃), respectively with significant differences among treatment .The lower feed conversion ratio was

observed within hybrid corn silage alone (T2) or mixed with berseem (T3). Kariuki *et al.* (2001) stated that cell wall content of berseem degraded slowly in the rumen and was more resistant to rumen microbial fermentation

Silage quality

Results in Table (3) illustrated that, no marked differences were noticed among the three experimental treatments for pH, while T3 appeared to somewhat higher value of lactic acid, total acidity, total acetic acid and TVFS. Meanwhile, butyric acid and ammonia of T3 ration were lower values than other tested rations. Also, results showed that the concentration of VFAS was significantly ($p < 0.05$) higher with T1 rations (22.55) and T3 rations (24.71) than those of T2 being (19.92). On the contrary the butyric acid % and total acetic acid had higher with T2 than those of T1 and T3. The data are agreement with that reported by Mostafa *et al.* (1999).

Table 3. Anaerobic fermentation of silage quality

Items	T1	T2	T3
pH value	4.21	4.28	4.36
Lactic acid %	6.03	6.17	6.19
Acetic acid %	2.61	2.29	2.43
Butyric acid %	0.39	0.41	0.32
Ammonia %	0.23	0.22	0.18
Total acidity(ml in NaOH / 100 g)	27.92 ^B	28.19 ^B	29.68 ^A
Total butyric	0.22	0.20	0.17
Total acetic	1.28	1.44	1.63
TVFAs(ME q / 100g)	22.55 ^A	19.92 ^B	24.71 ^A

A and B Means in the same row with different superscripts differ significantly at $P < 0.05$.

Digestibility of nutrients

The digestibility of DM was higher for T3 ration followed by T2 as compared to T1 ration Table (4). Moreover, the digestibility of CP, CF, EE and NFE were significantly ($P < 0.05$) higher with T3 ration and the lowest value had detected with T1 ration and T2 ration was moderately values. On the contrary Katole *et al.* (2011) observed the comparable digestibility of DM, OM and CP to control group in sheep. Generally it could be notice that T3 showed the spurious values of digestibility of most nutrients and nutritive values.

Table 4 . Digestion coefficient and daily feed intake of differential rations .

Items	T1	T2	T3
Digestion coefficient (%)			
DMI g / h/d	1415	1367	1397
Digestion coefficient %			
DM	62.93 ^B	65.81 ^A	77.33 ^A
OM	64.96 ^B	68.30 ^A	69.62 ^A
CP	66.71 ^B	67.38 ^A	68.14 ^A
CF	64.18 ^B	66.23 ^A	70.71 ^A
EE	65.19 ^B	69.83 ^A	71.11 ^A
NFE	63.54 ^B	69.77 ^A	68.52 ^A

A and B Means in the same row with different superscripts differ significantly at $P < 0.05$.

Hematological parameters

The hematological picture of growing kids fed hybrid maize silage alone or mixture with berseem (Table 5) Showed significant ($p < 0.05$) decrease in white blood cells with T3 (9.78) in comparison to T1 ration (10.64) and T2 ration (10.11). On the other side, T1 ration had significantly higher ($p < 0.05$) in Leucocytes and Eosinophil's (17.28 and 4.36 respectively) than T2 (10.66 and 3.46 respectively) and T3 (10.34 and 3.54

respectively). Moreover, T2 ration was higher value of Neutrophils (46.11) followed by T1 (43.59) and the lowest values had detected with T3(39.81). In addition to, Lymphocytes and Monocytes were higher with T3 (55.19 and 17.48 respectively) and lower values were recorded with T2 ration (51.70 and 12.29 respectively), while T1 had moderate values (53.81 and 14.61 respectively). This is in line with Jain (1986). Generally, the obtained values are within the normal physiological ranges reported by Keneko (1989).

Table 5. White blood cells fractionation of zaribi kids fed tested rations .

Items	Experimental groups		
	T1	T2	T3
WBC $\times 10^3 / \mu\text{L}$	10.64 ^A	10.11 ^A	9.78 ^B
Leucocytes $\times 10^3 / \mu\text{L}$	17.28 ^A	10.66 ^B	10.34 ^B
Neutrophils %	43.59 ^A	46.11 ^A	39.81 ^B
Lymphocytes %	53.81 ^A	51.70 ^B	55.19 ^A
Monocytes %	14.61 ^B	12.29 ^B	17.48 ^A
Eosinophil's %	4.36 ^A	3.46 ^B	3.54 ^B

A and B Means in the same row with different superscripts differ significantly at $P < 0.05$.

Rumen fermentation study

The average value of pH in rumen liquor (RL) of animals in T1, T2 and T3 recorded 6.40, 6.70 and 6.50 respectively, with no significant differences (Table 6).

Table 6 . Concentration of some rumen liquor parameters .

Items	T1	T2	T3
pH value	6.4	6.7	6.5
TVFA's (ml/100ml)	26.95 ^B	29.41 ^A	25.72 ^B
Molar proportion of individual VFA's (%)			
Acetic Acid	27.91 ^A	28.05 ^A	25.27 ^B
Propionic acid	15.63 ^A	16.53 ^A	13.80 ^B
Butyric acid	11.78 ^A	11.94 ^A	10.96 ^B
A/P ration	1.79	1.70	1.83
Total Nitrogen (mg/100ml)	124.40 ^B	128.17 ^A	131.36 ^A
Ammonia nitrogen (mg/100mL)	51.76 ^A	48.15 ^B	56.62 ^A
Microbial protein (mg/100mL)	52.38 ^B	54.86 ^A	55.73 ^A

A and B Means in the same row with different superscripts differ significantly at $P < 0.05$.

However, concentration of TVFA's and molar proportion of propionic, acetic and butyric acid were significantly ($p < 0.05$) higher with T2 followed by T1 ration, on the other side, the lower values had detected with T3 ration Offmann *et al.* (2003). Meanwhile, ratio of acetic acid to propionic acid was the highest ($p < 0.05$) in T3, moderate in T1 and lowest ($p < 0.05$) in T2. The results with in agreement with those obtained by EL-Ashry *et al.* (1997), who reported that the minimum of pH ranged between (6.29 and 6.83). The results of TVFA's are in agreement with Richard and Allen (1997), who reported that the rumen liquor could detected differences in TVFA's concentration owing to feeds containing different levels of concentrate or soluble carbohydrate this result are agreement with Thalib and Widiawati (2009). Concentration of ammonia nitrogen (NH₃-N), total nitrogen (TN) and microbial protein were significantly ($P < 0.05$) increased with T3 ration (131.36, 56.62 and 55.73 respectively) than those of T1 (124.40, 51.76 and 52.38 respectively) and T2 rations (128.17, 48.15 and 54.86 respectively), which mean that the microorganisms used soluble

carbohydrate, and NH₃-N to convert it into microbial protein Wanapat (2007).

Energy concentration

The approximately equal values of energy concentrations in diets of kids zaribi goats are shown in Table (7). Obtained data of tested diets had differences among treatments ($P < 0.05$) and T3 ration had the highest values of NE, ME DE concentrations and the values were (1.420, 2.227 and 2.716 respectively), while GE had detected the lowest value (1.76) than others. Meanwhile the lowest values of (ME/GE) and (NE/ME) had recorded with T2 ration (1.244 and 63.65 respectively), while the highest values were recorded with T3 ration (1.265 and 63.76 respectively). Stock *et al*, (2000) suggested that the improved energy responses from feeding hybrid maize silage may be due to higher fat content or potential for reducing acidosis.

Table 7. Energy concentration of kids zaribi goats fed tested rations.

Items	Experimental groups		
	T ₁	T ₂	T ₃
Energy concentration			
NE (Mcal/kg)	1.398	1.397	1.420
ME (Mcal/kg)	2.194	2.195	2.227
GE	1.777	1.765	1.760
DE	2.676	2.677	2.716
ME / GE	1.235	1.244	1.265
NE / ME	63.71	63.65	63.76

Economic efficiency

Economic efficiency of growth performance are presented in Table (8). Data clearly that there is differences ($P < 0.05$) among experimental groups. T1 ration showed the highest average feed cost / kg of BWG (14.45 LE) and the lowest value had detected with T1 (12.46).

Table 8. Economic efficiency (LE) of tested rations on productivity of kids zaribi goats

Items	Experimental groups		
	T ₁	T ₂	T ₃
BWG, kg	26.24	27.65	30.14
Daily WG, g / h / d	146 ^B	154 ^A	167 ^A
Concentrate feed mixture (g/h/d)	640	650	645
Silage (g/h/d)	775	717	752
Total DM intake (g / h / d)	1415	1367	1397
Feed cost and economic efficiency			
Cost of feed consumed (LE)	2.11	2.08	2.08
Price of daily weight gain (LE)	4.38 ^B	4.62 ^B	5.01 ^A
Feed cost / kg gain (LE)	14.45 ^A	13.51 ^B	12.46 ^B
Revenue (LE / h/d)	2.27	2.54	2.92
Profit (%)	51.85 ^B	54.98 ^B	58.28 ^A
Improved of economic efficiency (%)	-	6.04	12.40

A and B Means having different superscripts within the same row are significantly different at ($P < 0.05$).

- Market price of CFM = 3000 LE / ton, price of live weight gain = 30 LE / kg.
 - Price of hybrid corn = 180 LE / ton,
 - Price of Egyptian berseem silage = 240 LE / ton
 Price of Egyptian berseem x hybrid corn silage = 210 LE

Moreover, Price of daily weight gain of T3 ration was significantly ($p < 0.05$) higher (5.01 LE) followed by T2 (4.62 LE) and the lowest price had recorded with T1 ration (4.38 LE). However, the kids fed T2 and T3 ration showed that the lowest feed cost (2.08 and 2.08 LE) and the highest price of kg gain (4.62 and 5.01 respectively). Profit (%) had recorded

with T3 ration (58.28%), in comparison of T2 ration (54.98%). On the other hand the lowest value had detected with T1 ration (51.85 LE). On the other hand, improved of economic efficiency was higher with T3 and T2 rations (12.40 and 6.04 respectively).

These results may be due to saving higher amount of high expensive feed mixture and also replacing high expensive berseem hay by cheaper silages (Murdoch, 1962).

CONCLUSIONS

Diet based on 50% hybrid corn silage and 50% berseem or 100% hybrid corn silage achieved a greater growth performance when compared with those of berseem silage alone. Therefore, in terms of growth performance maize is preferable to berseem as a starch source for meat ruminants. In practice the result of the present study showed that inclusion of a new hybrid corn silage to the basal diet had resulted in linear improve in feed intake, BW gain and feed conversion ratio. The highest efficiency of these parameters was observed in kids fed with T2 diet, also goats fed the mixture diet is likely to be influenced by the relative cost of the three starch sources. Finally, From the results of this study could be concluded that feeding ration contained hybrid corn silage to zaribi kids improved growth performance, feed conversion and decreased feed cost of producing one Kg gain (by 12.95 and 5.23%) compared to kids fed T1 ration.

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دراسات غذائية لتقييم الانتاجية وجودة صنف جديد من هجين الأذرة المحفوظة ٢- على أداء النمو والجدوى الإقتصادية في الجديان الزرايبي النامية

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استخدم في هذه الدراسة ٢٤ رأس من الجداء الزريبي بمتوسط وزن ٦٧ و ١٣ كجم وعمر ٤ شهور. إستهدفت الدراسة تقييم صنف جديد من هجين الأذرة الريانة بالشامية سواء بمفرده أو مختلطا مع الرسم في صورة سيلاج على النمو ونشاط الكائنات الدقيقة بالكرش وتصنيفها وبعض مقاييس الدم والكفاءة الإقتصادية في الجداء الزرايبي النامية . قسمت الحيوانات الى ثلاث مجاميع متمثلة بكل مجموعة ٨ حيوانات واستمرت التجربة ١٨٠ يوما . و غذيت جميع الحيوانات على علف مركز يغطي ٥٠% من الإحتياجات البروتينية بينما اعطى السيلاج حتى الشبع وكانت كانت المجاميع التجريبية تتغذى كالألى : أ- المجموعة الأولى تناوات (١٠٠%) سيلاج البرسيم (كنترول) للشبع . ب- المجموعة الثانية تناوات (١٠٠%) سيلاج هجن الأذرة الريانة بالشامية للشبع . ج- المجموعة الثالثة تناوات (٥٠%) سيلاج هجن الأذرة الريانة بالشامية +(٥٠%) سيلاج برسيم للشبع . أظهرت النتائج المتحصل عليها مايلي : ١- ارتفاع محتوى عليقة الكنترول (مج ١) المحتوية على (سيلاج البرسيم بمفرده ١٠٠%) في الـ ان دى اف والـ الأيه دى اف عن سيلاج هجن الأذرة الريانة بالشامية ٢- تميزت العليقة المحتوية على هجن الأذرة الريانة بأنخفاض محتواها من الـ ان دى اف والـ الأيه دى اف عن سيلاج البرسيم بينما أرتفع محتواها من الطاقة القابلة للتمثيل ٣- ارتفاع محتوى المجموعة الاولى والثانية (مج ١، مج ٢) من البروتين الخلم والـ ان دى اف وان اف سى . لهاتين المجموعتين مقارنة بمجموعة المقارنة (مج ٣) . ٤- اوضحت النتائج المتحصل عليها ان مج ٣ حققت أعلى انتاجية للنمو للمجموعات الثلاثة بالترتيب (٣٩.٨٥ و ٤١.٦٢ و ٤٣.٥٦ كج (للمجاميع (مج ١، مج ٢ و مج ٣ على التوالي) وكذا معدل النمو (٢٦.٢٤ و ٢٧.٦٥ و ٣٠.١٤ كج / رأس / على مدار التجربة على التوالي) ومعدل النمو اليومي (١٤٦، ١٥٤ و ١٦٧ جم / رأس / اليوم على التوالي) واكدت النتائج ان المجموعة الاولى (مج ١) هي الاقل في قيم النمو على الإطلاق مقارنة بتلك المتحصل عليها من المج ٢ و مج ٣ . ٥- حققت الزيادة الوزنية نسبة مميزة لكل من المج ٢ (٥٣,٣٧%) والمج ٣ (١٤,٨٦%) قياسا بمجموعة الكنترول مج ١. ٦- أما معاملات الهضم فقد سجلت المج ١ أقل معاملات للهضم (المادة الجافة ، المادة العضوية ، البروتين الخام ، المستخلص الاثيري، المستخلص خالي الأزوت . بينما كانت المج ٣ أعلى القيم متبوعة بالمج ٢ . ٧- سجلت المج ١ أعلى قيم للمادة الجافة المأكولة والبروتين المأكول يوميا % من وزن الجسم أو حيز الجسم التمثيلي (٥٣.٩٣، ٨٩.٢٢ و ٢٠٧.٥٨ على التوالي) تبعها المج ٢ (٤٧,٧١، ٨٣,٤١ و ٢٠٣.٥٥ على التوالي) مقارنة بالمج ٣ (٤٦,٣٥، ٨٢,٣٧ و ١٩٨ على التوالي) . ٨- الكفاءة الغذائية لحيوانات المج ٢ والمج ٣ كانت الأفضل (٨٨,٨٨ و ٩٠.٦٩ على التوالي) مقارنة بالمج ١ (٨٣,٣٧) -٩- الربحية والعائد والاقتصادى سجلت المج ٢ ومج ٣ أعلى عائد (٥٨,٠٢٨% و ١٢,٤٠% على التوالي) بينما سجلت المجموعة ٢ ليقسم التالية (٥٤,٩٨ و ٦,٠٤ على التوالي) بينما اعطت المجموعة الاولى مج ١ اقل عائد (٥٢,٠٥) . نستنتج من النتائج أن تغذية الجداء الزرايبي النامية علي سيلاج هجن الأذرة الريانة بالشامية المستحدثة بمفرده أو مخلوط مع البرسيم (بنسبة ١: ١) قد حسنت وزن الجسم النهائي ومعدلات الزيادة اليومية وكفاءة التحويل الغذائى وتحسنت معاملات الهضم وكذا تحسنت بيئة الكرش والطاقة الكلية والكفاءة الاقتصادية .