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Productive Performance of Lactating Buffaloes Fed Different Types of Silages During Summer Period

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THE objective of this experiment was to study the performance of lactating buffaloes fed different types of silage. Twelve lactating buffaloes in complete switch-back design with four treatments.The ration R1 represent the summer traditional ration containing 46.0% concentrate feed mixture(CFM)+21.0% alfalfa hay (AH)+33.0% rice straw (RS) ,the ration R2 fed 33.0%CFM+43.0% berseem silage (BS)+ 24.0 % RS, The R3 fed 40.0 % CFM +35.0 % maize silage (MS)+25.0 % RS and the ration (R4) fed 38.0% CFM+38.0% maize teosinte hybrid silage (MTS)+24.0% RS. Incorporation of MS and MTS decreased CP% and ash% content in the tested ration but NFE % increased, while control and R2 rations were recorded the highest CP% and low NFE content. TDN and DCP values on DM basis of tested rations were nearly similar. Actual 7.0% of FCM yield was nearly similar for all groups. No significant differences between treatments on milk composition, expect protein content. There are no significant differences in the intake of DM, TDN and DCP among all different rations. Buffaloes fed RI recorded the lower amount of DM and TDN /one kg7% of FCM followed by R2 and R3 while R4 recorded the highest values. No differences among various treatments for DCP efficiency .Daily feed cost, was decreased in R2 and R4 followed by R1 and R3. Buffaloes fed R1 and R4 recorded the highest economic efficiency. The including of BS, MS and MTS reduce the daily amount of CFM, decrease the daily cost of feeding improve feed conversion and economic efficiency.

Key words: Maize silage, Maize teosinte, Hybrid silage, Berseem silage, Buffaloes, Milk production.

Introduction

One of the most critical factors that challenge animal production development is conserving sufficient amount of feedstuffs, especially green and dry forages [1]. The traditional green forage produced in Egypt is still insufficient to satisfy livestock requirements [1]. Animals are mainly fed on green berseem only during the winter season, while summer feeding depend mainly on agricultural by products which are poor quality, nutritionally imbalanced and don't cover the requirements of the animals either for protein or energy, especially when used without treatments to improve its nutritive value [1]. Improved feeding systems based on adding locally available feed resources will enhance milk and meat production at considerably low cost, and partially fill the gap in protein and energy shortage [1]. Also, decrease the cultivation area of clover to increase the cultivation area of wheat, is consider one of the most important objectives of Egyptian Ministry of Agriculture. But to achieve this objective the problem of animal feeds shortage must be solved, especially for the small holders, since they own more than 90% of buffaloes and cows number in Egypt [2]. Using whole corn silage –based diet for buffaloes feeding may be participate in solving this problem and encourage the small holders to sustain and develop the animal production. Corn silage is considered high-quality forage for feeding animals in many dairy farms in Egypt [2]. Moreover, making silage from berseem (*Trifolium alexandrinum* L.) is considered one the most of effective practical substitutes to ensure sustainable fodder supply during fodder capacity season. As well as, the use of Legumes forages can provide ruminants not only essential nutrients but also contain many anti- nutritional factors which have to be eliminated [3]. Berseem is highly nutritious, high yielding and bendability available multi-cut legumes forage and could be ensiled to regularize fodder availability [4].

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The aim to increase livestock productivity and farm income has led to introduction and adoption of new technologies, such as forages conservation as silage can be used to improve quality and availability of forages all the year round, and would be enhance and maintain milk production and avoid the dietary disorder as the result of feeding traditional rations along with significant decrease the feeding cost in summer feeding in Egypt [2].

However, the success of making good quality silage from maize, maize teosinte hybrid and berseem forages is of partial importance in animal feeding in summer season in Egypt [5].

The objectives of this study were to investigate productive performance of lactating buffaloes fed different types of silage during summer season

Material and Methods

The present study was carried out at Mehallet-Mousa, Animal Production Research Station, Kafr EL-Sheikh Governorate belonging to Animal Production Research Institute (APRI), Agric. Res. Center, Ministry of Agri. Egypt.

Maize and teosinte hybrid silage

Maize and teosinte hybrid crops were harvested at the dough stage of maturity. Plants were chopped (1.5-2.5 cm length) using a Holland shopping machine. Then, filled layer by layer (about 50 cm height) and the wheel of a farm tractor were used to ensure good pressing and packing of silage. When the silo was filled, it was tightly covered by plastic sheet then covered by approximately 20 cm layer of soil to get anaerobic conditions and ensiled for two months until started feeding lactating buffaloes.

Berseem silage

Berseem was wilted for 2-3 days and ensiled in layers in built silo, during ensiling every layer was well pressed using a wheel tractor and mixed with grinded maize grains (30kg/ton) and wheat straw (25kg/ton). When the silo was filled, it was tightly covered by a plastic sheet then covered by an approximately 20cm layer of soil to get anaerobic condition before feeding, physical and chemical characteristics for all tested silages, quality color and odor were examined, and samples were taken for chemical analysis and quality determination.

Experimental animals and design

Twelve lactating buffaloes with live body weight from 550-650kg and at 2ndto 5th lactating season were used after 6 - 8 weeks of calving. Buffaloes were free from any disease with normal healthy appearance and were housed individually under open sheds. Complete switch Back design with four treatments and three successive experimental periods. Each period consisted of 28 days as described by Lucas *et al.* [6].

The first 21 days of each period were considered a transition period followed by 7 days as a tested period[6]. Experimental buffaloes were put in three random blocks, each block containing four buffaloes one buffaloes was assigned randomly to each treatment. The rows represent experimental periods, and the columns upside treatments sequences as shown in Table (1).

TABLE 1. Experimental design (four treatments and complete design)

Items		Blok 1				Blok 2				Blok 3			
Period1	**Treatment**	A	B	C	D	A	B	C	D	A	B	C	D
	Animal No	1	2	3	4	5	6	7	8	9	10	11	12
Period2	**Treatment**	B	C	D	A	C	D	A	B	D	A	B	C
	Animal 1	2	3	4	1	7	8	5	6	12	9	10	11
Period3	**Treatment**	A	B	C	D	A	B	C	D	A	B	C	D
	Animal N.	1	2	3	4	5	6	7	8	9	10	11	12

A:-control ration (R1) B: Tested ration1 (R2) C: Tested ration2 (R3) D: Tested ration3 (R4).

Treatment rations and management

Buffaloes were individually fed according to Paul *et al.* [7] requirement of lactating buffaloes. Rations were adjusted every week according to live body weight and milk production. Animals were fed the following rations on DM basis The1st ration (R1) represent the summer traditional ration containing 46.0% concentrate feed mixture (CFM) + 21.0% alfalfa hay (AH) + 33.0% rice straw (RS) while the 2nd ration (R2) fed 33.0 % CFM +43.0% berseem silage (BS) + 24.0 RS %, the 3rd (R3) fed 40.0 CFM %+ 35.0 % maize silage (MS) + 25.0 % RS and the 4th ration (R4 fed 38.0% CFM + 38.0% maize teosinte hybrid silage (MTS) + 24.0% RS as shown in Table (2).

CFM was offered twice daily at 7 a.m. and 4 p.m. for all rations. Meantime hay was offered to the 1st ration once time at 8 a.m. While RS was offered twice daily at 12 noon and 5 p.m. to the 1st ration and once at 5 p.m. to the 2nd, 3rd and 4th rations. Meantime the three kinds of tested silages were offered once time at 8 a.m. daily for the 2nd, 3rd, and

4th rations. Fifty gram of sodium bicarbonate as a buffer was mixed with CFM and offered to each animal in all rations in the 1st meal daily. Fresh water was offered to experimental animals three times daily at 7, 12 a.m. and at 4 p.m.

TABLE 2. Formulation of the experimental rations for lactating buffaloes (on DM basis)

Ingredients %	R1	R2	R3	R4
Concentrate feed mixture(CFM)	46.0	33.0	40.0	38.0
Alfalfa hay(AH)	21.0	---	---	----
Berseem silage(BS)	---	43.0	---	----
Maize silage(MS)	---	----	35.0	----
Teosinte hybrid silage(THS)	---	----	---	38.0
Rice straw(RS)	33.0	24.0	25.0	24.0

Concentrate feed mixture (CFM) consisted of yellow corn 45%, wheat bran meal 22%, soybean meal 12% sunflower 18% Limestone 1.8% ,common salt 0.8%, mineral salt 0.4

Silage quality

Samples of each kind of silage were taken for testing the silage quality. pH value was determined by using Orian 680 digital pH meter., Ammonia–nitrogen, total volatile fatty acids (TVFA's) and Lactic acids co centration were determined according to the methods of *Analytical Chemistry of foods* [8].

Chemical analysis

Chemical analysis of tested feed stuffs and the experimental ration (DM, CP, EE, CF and Ash) were carried out to determine according to the methods of AOAC [9], while NFE values were calculated by difference.

Nutritive values of tested rations

Digestible crude protein (DCP) and total digestible nutrients (TDN) were calculated according to Wardeh [10].

DCP for mixture of legumes and grasses= 4.2838 +0.9413 × (CP %)

TDN for mixture of legumes and grasses= 84.5827-0.6220 × (CF %)

Obtained feeding values of tested silages were applied to formulate the experimental rations and to assess their quantities to cover the requirements of experimental lactating buffaloes.

Milk yield and composition

Individual morning and evening milk yields were recorded daily, the 7% fat corrected milk (FCM) of each buffalo was calculated using the formula given by Raafat and Saleh [11] as follows: 7% FC M = 0.265 milk yield +10.5 fat yield.

Composite milk samples from consecutive morning and evening milk were taken once every week during the middle of collection period, samples were mixed in a proportion to yield and analyzed for fat**,** protein, lactose, solids not fat (SNF), and total solids (TS) by *Milke scan, model 133B.*

Feed conversion

Feed conversion expressed as the amount of DM, TDN and DCP required for producing 1kg of 7% FCM and were calculated according to the average daily intake of these items

Economic efficiency

Economic efficiency of using tested feedstuffs was calculated as the ratio between the prices of produced milk and the cost of feed consumed based on the following prices: Fresh milk (11000LE/ton), CFM 6000 LE/ton), RS (500 LE/ton), MS 650LE /ton) and MTS (450 LE/ton), AH (3000 LE/ton) and BS 550 LE/ton during 2019.

Statistical analysis

The data obtained from the present study were subjected to statistical analysis according to SPSS [12] and Lucas [6] Differences among treatments were tested by the Multiple Range Test of Duncan [13].

Results and Discussions

Quality characteristics of tested silages

Data in Table(3) indicated that all tested silages were high quality with suitable fermentation characteristics yellowish green color, had a firm texture with no slimness texture and a good smell were observed.. The pH values of the different tested silage were ranged from 3.83 to 4.23, which were within the normal range of good quality silage.

A good quality silage should have a pH value of 4.0 or less [14]. Lactic acid% of tested silages was varied between different silage (4.18, 5.20 and 5.80 for MTS, MS and BS, respectively). The lower pH values of MS and MTS compared with pH value BS may be attributed to the higher SNF content in MS and MTS (55.09 and 55.70%, respectively)

compared with 40.52% in BS. Which consider the main source of fermented carbohydrates. However lactic acid% of DM of all tested silages showed the same trend of pH values. Total VFA concentration in all tested silages ranged from 1.92% to 2.44%, which revealed acceptable silage fermentation. Value of NH_3-N concentration of tested silages ranged from 4.3 to 7.23% of total N (NH3-N concentration values are mainly associated to the CP content of tested silage. BS which have the higher content of CP (16.10%) achieved the highest NH3-N concentration (7.23).While MS and MTS contained the lower values of CP (8.80 and 7.83%), respectively recorded the lowest values of NH3-N (5.39 and 4.39) respectively. These results indicated good quality silage as stated by McDonald *et al.,* [15], who mentioned that the concentration of NH_3-N of good quality silage being usually less than 10% of total N.

TABLE 3. Quality characteristics of the tested silages

Item	pH	Lactic acid% of DM	Total VFAs% of DM	NH3-N% of Total-N
MS	3.83	4.18	2.14	5.39
MTS	3.95	5.20	1.92	4.30
BS	4.23	5.80	2.44	7.23

MS: Maize silage MTS: Maize teosinte hybrid silage BS: Berseem silage

Chemical composition and nutritive values of tested rations

The tested rations used in the feeding trial were formed according to the calculated chemical composition of the feedstuffs used on DM basis (Table 4).

Incorporation of MS and MTS led to decrease CP % and ash% but increased NFE % in R3 and R4. On the other hand**,** the control and 2nd (R2) rations which contained AH and BS were recorded the highest levels of CP%, ash % and low NFE%. While, EE% and CF percentage in all tested rations were some almost similar being from 2.34 to 2.49% for EE% and 24.75 to 25.69% for CF%**.** On the other hand**,** the control ration (R1) which contained AH, CFM and RS was measured the highest value of DM % (90%) compared with the other tested rations. While incorporation BS, MS and MTS led to decrease DM % in the 2nd, 3rd and 4th rations being 50.00, 47.11 and 49.03%, respectively. The present results indicated that the all tested rations contained excellent quality roughage.

TABLE 4. Chemical analysis of feedstuffs and tested rations

Ingredients	DM	Composition of DM%					
		OM	CP	EE	Ash	CF	NFE
CFM	88.3	93.19	17.33	2.89	6.81	15.60	57.37
BS	31.56	85.05	16.10	2.65	14.95	26.0	40.30
RS	92.65	83.65	3.25	1.58	16.35	38.3	40.52
MS	25.53	92.68	8.80	2.31	7.32	26.48	55.09
MTS	28.52	91.98	7.83	2.45	8.02	26.00	55.70
AH	91.09	91.37	18.94	2.23	8.63	27.58	42.62
Average composition of experimental rations during summer feeding(calculated)							
R1	90.00	89.66	12.05	2.34	10.34	25.55	49.72
R2	50.00	87.45	12.66	2.49	12.55	25.69	46.61
R3	47.11	90.67	10.06	2.40	9.33	24.75	53.46
R4	49.03	90.5	9.61	2.42	9.50	24.96	53.51

CFM: Concentrate feed mixture BS: Berseem silage RS: Rice straw
MS: Maize silage MTS: Maize teosinte hybrid silage AH: Alfalfa hay

Nutritive value of TDN and DCP in the different rations were illustrated in Table (5) The values of TDN were in general, higher, but DCP values were lower in MS and MTS containing rations (3rd and 4th rations) while the lowest TDN and highest DCP values were recorded in the 1st and 2nd rations. The present nutritive values are mainly associated with the chemical composition and proportion of the tested feedstuffs, (BS, MS, MTS and AH) (Table, 4).

TABLE 5. Calculated nutritive values of experimental rations

Item	R1	R2	R3	R4
DM%	90.0	50.0	47.11	49.03
Nutritive values as fed				
TDN%	61.82	34.3	32.60	33.86
DCP%	6.35	3.82	2.45	2.33
Nutritive values on DM basis				
TDN%	68.69	68.60	69.19	69.06
DCP%	7.06	7.63	5.19	4.76

TDN% for tested rations = 84.5827-0.6220×CF% [10]
DCP% for tested rations = -4.2838+0.9413×CP% [10]

Feed intake

Average total feed intake (kg/head/ day) on fresh basis were 19.0, 37.00, 38.00 and 38.00 for rations 1, 2, 3, 4, respectively while total feed intake on DM basis was 17.10, 18.49, 17.9 and 18.63kg/head/day for the four rations, respectively (Table 6). In concern with TDN intake was recorded the lowest value for R1 (11.75/kg/head/day) while the buffaloes fed BS, MS and MTS consumed was recorded the highest values being 12.65, 12.39 and12.87 kg/head/day for R2, R3 and R4, respectively. Regarding CP intake the values were 2.06, 2.33, 1.80 and 1. 79 kg/ head/day for R1, R2, R3 and R4, respectively. The corresponding values for DCP intake were 1.21, 1.47, 0.93 and 0.89 kg/head/day. It was noticeable that rations content AH and BS in R1and R2 were recorded the lowest value of TDN intake. While, the highest values of CP and DCP intakes, respectively. Moreover, the experimental buffalos fed MS and MTS in R3 and R4 were recorded the highest value of the TDN but the lowest value of CP and DCP. This was confirmed by the fact that the BS and AH had highest CP% while MS and MTS had higher energy content (Generally, the present values are mainly associated to the chemical composition, proportion and nutritive values of the experimental feedstuffs.

Using BS, MS and MTS in the 2nd, 3rd and 4th rations increased roughage percentage to 66.5, 60.0 and 61.9% and decreased CFM percentage to 35.0, 40.0 and 38,1%, respectively, as the result of the high nutritive of this roughage. While using AH in the 1st ration led to increase CFM to 46.4%and the roughage: concentrate ratio become 53.5**:** 46.5these results attributed to the use more CFM with feeding AH to cover expected production of the experimental animals fed R1.

TABLE 6. Average daily feed intake as fed and on DM basis from the experimental feedstuffs (kg/head/day)

Item	Experimental rations			
	R1	**R2**	**R3**	**R4**
Average daily feed intake (kg/head/day) as fed				
(FCM)	9.00	7.00	8.00	8.00
Berseem silage (BS)		25.00		
Maize silage (MS)			25.00	
Maize teosinte hybrid silage (MTS)				25.00
Alfalfa hay (AH)	4.00			
Rice straw (RS)	6.00	5.00	5.00	5.00
Total	19.00	37.00	38.00	38.00
DM% in tested ration	90.0	50.0	47.11	49.03
Average dairy feed intake (kg/head/day) on DM basis:				
Concentrate feed mixture(CFM)	7.95	6.18	7.10	7.1
BS		7.89		
MS			6.38	
MTS				7.11
AH	3.59			
RS	5.56	4.42	4.42	4.42
Total intakes DM(kg/head /day)	17.10	18.49	17.9	18.63
Total intake as TDN (kg/head/day	11.75	12.65	12.39	12.87
Total intake as CP (kg/head/day	2.06	2.33	1.80	1.79
Total intake as DCP (kg/head/day	1.21	1.47	0.93	0.89
Roughage: Concentrate ratio	53.6-46.5	66.5:33.5	60.0:40.0	61.9:38.1

Milk production and composition

No significant differences for both actual and 7% FCM yield among the different rations the values of actual milk yield was 12.78,12.47,12.32 and 12.47 kg/head/day, respectively. while 7% FCM were 12.26,11.90,11.66 and 11.48 kg/head/day for the 1st, 2nd, 3rd and 4th ration, respectively (Table 7). However**,** the three tested feeding systems compared with traditional summer ration**-**did not affect these milk parameters. Also, these results revealed that the requirements of the expected production of the experimental buffaloes were covered by given tested rations according to Paul et al., [7]. Moreover, all buffaloes, fed these tested rations, achieved and maintained their milk production as the result of feeding such high quality forages (BS, MS, MTS, along with AH) with different amounts and suitable preparation.

Chemical composition of milk did not differ significantly as the result of feeding all tested rations (Table,7) expect protein content was probably because the pattern of the rumen fermentation would remain the same with similar production in all tested rations. On other hand**,** the high quality roughages and CFM with suitable ratio used in the experimental rations lead to complementary feed. This observation concerning milk composition agree with results of other studies carried out by Mahmoud et al., [16], who indicated that the major constituents of cow's milk did not affected by fed rations contained maize silage and fresh berseem.

Generally, the average milk fat, protein, lactose, SNF, and TS percentages are similar under traditional feeding systems and these results were in harmony with those obtained by El-Aidy [17] and El-Giziry [18] with feeding lactating buffaloes different kinds of silages. Concerning protein content it was significant higher with R4 than the others tested rations may be attributed to the higher energy consumed as TDN being (12.87 kg/head/day) with feeding the 4th ration compared with other tested rations which ranged from11.75and 12.65 kg/head/day

In that concern Varga and Ishler [19] concluded that, dietary manipulation can result in milk protein concentration changing approximately 0.60 percentages also, energy is needed for maintaining milk protein production; increased energy seems to stimulate both milk and milk protein production with little effect on percentage of protein in milk. Some of this response in milk protein, may be due to the extra glucose and acetate available at the udder but added energy may be importantly cause an increase in microbial protein synthesis that increases amino acid supply at the udder.

TABLE 7. Milk production and its components of lactating buffaloes as affected by feeding tested rations

Item	Experimental rations				
	R1	R2	R3	R4	SEM
Av. Daily milk yield kg	12.78	12.47	12.32	12.47	0.26
Av. Daily 7% FCM yield kg	12.26	11.90	1190	11.66	0.51
Milk composition %					
Fat	6.61	6.57	6.49	6.25	0.20
Protein	4.34^{ab}	4.34^{ab}	4.22^{b}	4.43^{a}	0.03
Lactose	5.77	5.84	5.88	5.80	0.020
SNF	10.90	10.94	10.88	11.03	0.09
TS	17.74	17.43	17.43	17.49	0.09
Milk constituents yield (kg/head/ day)					
Fat	0.836	0.809	0.798	0.781	0.012
Protein	0.556	0.541	0.542	0.547	0.014
Lactose	0.707	0.695	0.700	0.676	0.20
SNF	1.376	1.341	1.315	1.332	0.027
TS	2.24	2.16	2.12	2.11	0.06

a and b : Means with different superscript in the same row are significantly (P<0.05) different.
SNF: Solid not fat TS: Total solid

Feed conversion and economic efficiency

Feed conversion efficiency expressed as the amount of DM, TDN and DCP intake per one kg of 7% FCM are shown in Table(8). Concerning DCP values of all tested rations had nearly similar values with insignificant differences among treatments, while, the 4th ration recorded the highest values of DM and TDN intakes compared with other tested ration. The differences were (P<0.05) between 4th and 1st ration for DMI and TDNI/1kg of 7% CM.

Meantime, there were no significant differences among 1st, 2nd and 3rd rations concerning DMI and TDNI per 1 kg of 7% FCM. The higher feed conversion efficiency of 1st, 2nd and 3rd rations may be due that incorporation of CFM with AH, BS and MS or BS lead to formulate more balanced rations. It was interesting to note that inclosing AH and other tested silages in summer feeding improve feed utilization and animal performance through feeding more balanced rations (energy-protein and Ca/p ratios). Which were in agreement with feeding lactating buffaloes rations contained berseem and maize silage along with CFM and RS [17]

Berseem silage (R2) reduced the feed cost / head /day (58.25LE) followed by R4 (61.75 LE)

without any adverse effects on milk production. While the other tested rations recorded the highest values being 68.44and 66.50 LE for the1st and 3rd rations respectively. This was attributed to the lower cost of BS and MTS silage with the lower quantity of CFM used compared with other testing feedstuffs (Table 8).

Also, the 2nd ration contained BS recorded the lowest value of feeding cost 1kg7% FCM 4.89 LE, followed by using MTS 5.38LE while other rations showed the highest values5.58 and 5.70LE in the1st, and 3rd rations, respectively with high significant differences between 2nd and another tested rations which may be attributed to the lower cost of BS and the lower quantity of CFM used in R2 compared with other tested rations These results are harmony With those recorded by [19] who indicated that the usage of maize silage with berseem decreased the feed cost per one kg of 7% FCM and increase milk revenue

Meantime 2nd ration achieved the best net revenue (72.60 LE/head /day) and the best economic efficiency (2.25) compared with other tested rations with highly significant differences (P<0.05)between R1 and other experimental rations these was mainly due to the lower daily feed cost achieved by feeding R2 contained BS.

The inclusion of such high- quality silages (BS,MS and MTS) as a basal ration for lactating buffaloes in traditional summer ration in Egypt lead to reduce the daily amount of CFM consumed from 11.11 to 22.22%, decrease the daily feed cost from 2.83 to 14.89%, along with improve fed conversion and economic efficiency.

TABLE 8. Feed conversion and economic efficiency as affected by feeding tested rations

Item	Experimental ration				SEM
	R1	R2	R3	R4	
Feed conversion					
Kg DMI/1kg 7%FCM	1.39^{b}	1.55^{ab}	1.54^{ab}	1.62^{a}	0.03
Kg TDN/1kg 7%FCM	0.96^{c}	1.06^{b}	1.06^{b}	1.12^{a}	0.02
Kg DCP/1kg7%FCM	0.10	0.118	0.08	0.08	0.002
Economic efficiency					
Feed cost(LE/day)	68.44^{a}	58.25^{b}	66.5^{a}	61.75^{b}	0.69
Output(L.E)	134.86^{ab}	130.90^{a}	128.26^{b}	126.28^{b}	2.25
feed cost / 1kg 7% FCM	5.58^{b}	4.89^{b}	5.70^{a}	5.38^{a}	0.11
Net revenue	66.42^{b}	72.6^{a}	71.76^{b}	60.53^{b}	2.39
Economic efficiency	1.97^{b}	2.25^{a}	1.93^{b}	2.05^{b}	0.04

a,b,c,: Means with different superscript in the same row are significantly (P<0.05) different

Conclusion

The use of silages of berseem, maize, and teosinte hybrid in summer season feeding leads to a reduction in the amount of concentrated ration needed to feed milking buffaloes, which reduces feeding costs and in the same time improves nutritional, economic efficiency and increasing of milk production.

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Conflict of Interest

The authors declare that no conflict of interest.

Ethical approve

All experimental procedures were approved by the ethical committee of Faculty of Agriculture, Kafrelsheikh University, Egypt.

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Author`s contributions

Nabil Mohamed Eweedah: Conceptualization, Formal analysis, Funding acquisition, Investigation, Methodology, Writing original draft. Said Ahmed Mahmoud; Conceptualization, Formal analysis, Funding acquisition, Investigation, Methodology, Writing original draft. Mahmoud Mohamed Bendary; Formal analysis, Methodology, Writing—original draft. Abdelhmeed Abdelhameed Srour; Formal analysis, Investigation, Methodology, Writing-original draft.

References

1. El-Talty, Y. I., Abd-Gawad, M.H. and Deif, A.E.M. Silage as unconventional forage in feeding lactating buffaloes. *Egyptian J. Nutrition and Feeds,* **12** (3), special issue, 45- 57 (2009).

2. Hanafy, M. A., Ali, M.A. Abd El Gawad, M. H. Farghaly, M. S. and EL-Banna, H. M. Improving productive efficiency of Lactating buffaloes fed whole corn silage. *American- Eurasian J. Agric. Environ. Sci*., **5**(6), 838-872. (2009).

3. Tamminga, S., M- Udo, H. J. Verdegem, M.C.J and Zemmelink, G. The role of domesticated farm animals in the humen food *chain.In Quantitative Approaches in systems Animals.* AB. DLO/PE Wageningen 21:67 (1999).

4. Abd El-Hady, M.A.A; Gabr, A.A. El-Ayouty, S.A and Shahin, M.A. Effect of physical and chemical treatments on berseem silage quality nutritive values rumen fermentation and blood metabolites of roms. *J. Animal and Poultry Pred. Mansoura Univ.,* **3**(6), 267-288 (2012).

5. Walaa , M. E., Mouse, Sadek, M.S. E. and Nahrawy, M.M. EL. Silage yield and quality of some maize and teosinte genotypes and their hybrid. American. *Eurasian J. Agric. of Environ. Sciences,* **1725**, 373-378 (2017).

6. Lucas, H.L. Switch - back trials for more than two treatment, *Journal of Dairy Science,* **39**, 146-154 (1956).

7. Paul, S. S., Asit. B.M. and Pathak, N. N. Feeding standards for Lactating riverine buffaloes in tropical conditions. *J. of Dairy Research*, **69**. 173-180 (2002).

8. *Analytical Chemistry of foods.* Published by Blockie Academic and professional, an imprint of Chapman and Hall, Western Cleddens Road, Bishopbriggs. Glasgow G642 NZ, UK (1995).

9. *Official Methods of Analysis*. AOAC. 19th ed, (2012).

10. Wardeh, M. F. Models for estimating energy and protein utilization for feeds. *Ph.D. Thesis Utah* State University (1981)

11. Raafat, N. A. and Saleh, M.S. Two formulas for their conversion of cows and buffaloes milk different fat percentage Proceedings of The 1st *Animal Production Conferences* (APC62), Minia, p. 203 (1962).

12. IBM SPSS *Statistics Statistical package for the social sciences,* Release 22. SPSS Since, Chicago, USA. (2014).

13. Duncan, D. B C. *Multiple range and multiple-test, Biometrics,* 11:1-42 (1955).

14. Ranjhan, S. K. *Animal nutrition in tropics.* 1st ed, viks pub. HcusePvt,Itd. Indian, Delhi. (1980).

15. McDonald., P. Edward, R.A. Greenhalgh. J. F. D. and . Morgan. C. A. *Animal Nutrition*. 5th Ed. Copyright licensing - LTD., London. (1995).

16. Mahmoud., A.M., Bendary, M.M., Harfoush, M. A. and Ramadan, G.A. Effect of feeding Lactating cows corn silage on milk production compared with traditional summer and winter rations. *J. Agric. Sci. Mansoura. Univ*., **17** (19) 2904- 2915. (1992).

17. El-Aidy, A.A. Effect of maize silage usage with berseem on the production and reproduction performance of dairy buffaloes *Msc. Thesis*, fac. Agric. Ain Shams University. (2003).

18. El-Giziry, A.A., Abd El-Hady, M.A.A. Bendary, M.M., Sadek, M.F. and Mousa, M. M. utilization of rice straw for feeding ruminants :3-Comparative studies between corn stalks and green rice straw silage during summer feeding. *J. Animal and Poultry Prod., Mansoura Univ*., **(12)**, 691-704 (2010).

19. Varga, G. A. and Ishler. V. A. Managing nutrition for optimal milk components Proceeding of. *The 8th Western Dairy Management conference,* March 7.9 Reno, NV, USA. (2007).

الاداء الانتاجي للجاموس الحلاب المغذاة علي انواع مختلفة من السيلاج اثناء فصل الصيف

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الهدف من هذه التجربة هو دراسة الاداء الانتاجي للجاموس الحلاب المغذي علي انواع مختلفة من السيلاج اثناء فصل الصيف حيث استخدمت اثني عشر جاموسة حلابة بطريقة العودة الي ذي بدء حيث قسمت العلائق المختبرة الي إلى أربعة أنواع مختلفة وهى كالتالي:

١- العليقة الأولى (المقارنة) تمثل العليقة الصيفية الشائعة في مصر تتكون من٤٦ % علف مركز ٢١% دريس برسيم حجازي + ٣٣% قش ارز.

٢- العليقة الثانية: تتكون من ٣٣% علف مركز + ٤٣ سيلاج برسيم + ٢٣% قش ارز.

٣- العليقة الثالثة: تتكون من ٤٠% علف مركز + ٣٥% سيلاج اذره + ٢٥% قش ارز.

٤- العليقة الرابعة: تتكون من ٣٨% علف مركز + ٣٨% سيلاج هجين الريانه + ٢٤% قش ارز.

واظهرت النتائج ان استخدام سيلاج الذرة وسيلاج هجين الريانة خفض نسبة البروتين والاملاح المعدنية بينما ذادت نسبة ذادت نسبه المركبات الخالية من النيتروجين في العليقة الثالثة والرابعة في حين زادت نسبة البروتين وقل محتوي ذادت نسبه المركبات الخالية من النيتروجين في العليقة الاولي والثانية كما تراوحت قيم المركبات الغذائية المهضومة والبروتين المهضوم علي اساس المادة الجافه ما بين 68.60 الي69.19% و 4.76% الي 7.63% علي التوالي.

تماثل انتاج اللبن المعدل ل ٧% دهن وكذلك التركيب الكيماوي للبن في المجاميع المختلفة دون فروق معنوية فيما عدا ارتفاع نسبة البروتين معنويا في العليقة الرابعة عنه في العليقة الثالثة.

تراوحت متوسطات كمية المادة الجافة المأكولة للرأس في اليوم ما بين ١٧,١٠ الي ١٨,٦٣ كجم، بينما المركبات الغذائية المهضومة والبروتين المهضوم كانت ٠,٨٩ الي ١,٤٧ كجم علي التوالي دون فروق معنوية. سجلت العليقة الاولي اقل كمية مادة جافة ومركبات غذائية مهضومة لكل واحد كجم لبن معدل ٧% تبعها العليقة الثانية ثم الثالثة بينما سجلت العليقة الرابعة اعلي القيم، بينما لا توجد اي فروق معنوية للبروتين المهضوم.

انخفضت تكاليف التغذية مع العليقة الثانية والرابعة ثم بعد ذلك الاولي والثالثة. سجلت التغذية علي العليقة الثانية والرابعة اعلي كفاءة اقتصادية تبعهما العليقة الرابعة ثم الاولي مع وجود فروق معنوية بين العلائق.

نستخلص من هذه الدراسة أن استخدام كل من سيلاج البرسيم والذرة وهجين الريانة في التغذية الصيفية يؤدي الي تقليل كمية العلف المركز اللازمة لتغذية الجاموس الحلاب مما يقلل من تكاليف التغذية وتحسين الكفاءة الغذائية والاقتصادية بالإضافة الي زيادة انتاج اللبن.

الكلمات المفتاحية : سيلاج الذرة ، سيلاج هجين الريانة ، سيلاج البرسيم ، الجاموس ، إنتاج اللبن