Journal of Animal and Poultry Production

Journal homepage: www.japp.mans.edu.eg
Available online at: www. jappmu.journals.ekb.eg

Utilization of Rice Straw Ensiling by Either Solution of Corn Steep Liquor or Urea to Ameliorate Productive Performance of Dairy Goats

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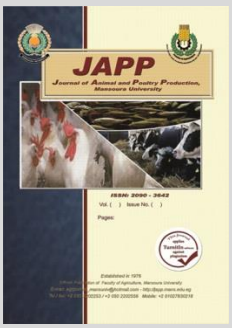

ABSTRACT

This study investigated the effect of feeding ensiling rice straw (RS) by 3% urea or 20% corn steep liquor (CSL) solutions on chemical analysis of feeds, dry matter intake, kids' numbers and weight, suckling and lactation milk yield, some blood parameters and economic efficiency in goats. Trial conducted on twenty-four dairy Zaraibi goats (N=8/ group) with live body weight up to 37.22 kg and at the third parity of lactation. They randomly allocated to receive three trial rations as the following; D1 (60% concentrated feed mixture (CFM) 40% untreated RS) used as control, D2 (40% CFM + 60 % RS ensiling by urea) and D3 (40% CFM + 60 % RS by ensiling CSL) used as tested rations. Results indicated that ensiling RS with 3% urea or 20% CSL solutions improved (P<0.05) its chemical composition (especially crude protein, hemicellulose and cellulose contains) compare with untreated rice straw. Also, D2 and D3 groups had higher (P<0.05) values of NDF, ADF, ADL, daily dry matter intake, kids number and weight, higher milk amount (as suckling and lactation) and the highest net income than D1 group. However, no-significant differences found in blood parameters among D1, D2 and D3 goats. According to the results of this study, feeding lactating goats with ensiling RS by 3% urea or 20% CSL solutions has effect on production status and reducing CFM consumption up to 33.33% which reversing economic efficiency compared to untreated RS.

Keywords: Ensilage, nutrition, rice straw, corn steep liquor, productive performance, dairy goats.

INTRODUCTION

Rice is one of the most abundant crops in Egypt; it is mainly cultivated in the northern east part of the country. The rice straw is by-product of rice, it's burning causes atmospheric pollution and nutrient loss although it is a cost-effective method for straw disposal. As fodder, Assefa *et al.* (2015) confirmed that dry rice straw is poorly fermented; it has low rates of disappearance in the rumen, low rates of passage through the rumen and reducing feed intake. Actually, Alam *et al.* (2016) reported that the use of cereal straw for ruminant feeding is constrained by its low digestibility due to high silica and lignin as well as low protein and energy contents when given as the only feed to animals. Also, the later authors defined that the high level of lignification and silicification caused the slow and limited ruminal degradation of the carbohydrates, low content of nitrogen and affecting its value as feed for ruminants. Developed technologies have been published and are available for farmers to help them enhance the utilization and improvement of the nutritive value of rice straw for animal feeding. In this context, Yusuff *et al.* (2016) defined that fermentation process of rice straw as silage could improve its quality with lower pH value, low butyric acid, low ammonia nitrogen, higher lactic acid and crude protein concentrations. On the other hand, Sheikh *et al.* (2017) found that chemical treatments are used to improve the utilization of rice straw, these processes enable the rumen microorganisms to attack more easily the structural carbohydrates, enhancing degradability and palatability of the rice straw. Also, the previous authors found that among these chemical treatments are alkaline; it is the most commonly used with urea; these can be absorbed into the cell wall and chemically break down the ester bonds among lignin, hemicellulose and cellulose making the structural fibers swollen. The enhancement of the nutritive value of dry rice straw as ensilage by corn steep liquor (CSL) has been focused by Xinxin *et al.* (2016) who noticed that rice straw ensiled with CSL can improve palatability, energy , biologically and given feeds high structural carbohydrate. Moreover, Li *et al.* (2016) revealed that dry rice straw ensiled by CSL has better fermentation, successfully applied and resulted in 30.4% higher lactic acid concentration than yeast extract. In addition, Shahzad *et al.* (2017) defined that rice straw ensiling by CSL may provide carbohydrates, peptides, essential amino acids, minerals, vitamins, organic and inorganic matters. In addition, El-Emam *et al.* (2018) reported that modification of rice straw ensiled by CSL and urea have been made to higher digestibility coefficient of crude protein (67.49%) and (65.70%) than untreated rice straw (44.53%), respectively. In general, Daniel *et al.* (2019) suggested that untreated rice straw is usually fed without supplements in spite of the fact that many methods for improved utilization of rice straw have been developed and recommended.

The aim of this contribution is to provide an overview of existing knowledge on how to treat rice straw

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DOI: 10.21608/jappmu.2020.78853

to increase its feeding value with diminishing concentrated feed mixture (CFM) consumption for dairy goats. Also, emphasis is placed on new approaches to use corn step liquor (CSL) in ensiled rice straw compared by urea solution chemical treatments.

MATERIALS AND METHODS

All dairy goats used in this experiment were provided by El-Serw Research Station belonging to Animal Production Research Institute (APRI), Agricultural Research Center, Ministry of Agriculture, Egypt, in cooperation with Animal Production, Faculty of Agriculture, Damietta University. The experimental study was performed from June 2018 to June 2019.

Ensiling methods:

Both 3% urea and 20% CSL solutions were prepared and sprinkled between rice straw layers (10 cm thick / layer) using motor to make two heaps, each heap weight 4000 and 4500 kg, respectively. After the two heaps completed were covered tightly by plastic sheath and sand which placed above the plastic sheath to prevent the aerobic respiration. After four weeks of ensiling, three random samples from urea or CSL heaps were taken to evaluate, its chemical compositions.

Chemical analysis evaluation

The chemical analysis of ingredients of CFM, RS, ensiling with urea or CSL rations were assayed for dry matter (DM), organic matter (OM), crude protein (CP), crude fibber (CF), ether extracts (EE) and ash by the methods of AOAC (2007).

Also, fiber fractions such as Neutral Detergent Fiber (NDF), Acid Detergent Fiber (ADF) and Acid Detergent Lignin (ADL) and feeding values were evaluated for essential ingredients according to the methods of Van Soest *et al*. (1991).

Also, hemicellulose was calculated as NDF – ADF, cellulose as ADF – ADL (Rinne *et al*., 1997) and feeding value of feed ingredients was calculated according to NRC (2007) as follows: total digestible nutrients (TDN) = 129.39- 0.9419 (CF+ NFE), digestible crude protein (DCP) = 0.9596 (CP) - 3.55, digestible energy (DE) = 0.04409 (TDN %), metabolizable energy (ME) =1.01(DE) - 0.45 and net energy (NE) = 0.0245 (TDN %) - 0.12.

Chemical analysis of essential ingredients, and experimental rations

The chemical analysis of concentrate feed mixture (CFM) and untreated rice straw and its fiber fraction and feeding values are presented in Tables 1 and 2, respectively.

Table 1. Chemical analysis of ingredients (% on dry matter basis).

Chemical analysis	Ingredients	
	*CFM	RS
DM	89.91	92.94
OM	87.77	80.23
CP	14.40	3.08
CF	7.09	36.88
EE	2.41	1.49
NFE	63.87	38.78
Ash	12.23	19.77

***The CFM consisted of 26 % undecortecated cotton meal, 40 % yellow corn, 27 % wheat bran, 3.5 % molasses, 2 % limestone, 1 % common salt and 0.5 % minerals mixture.**

Table 2. Chemical analysis of fiber fractions and calculated feeding values of CFM and RS (% on dry matter basis).

Chemical analysis %	Fiber fraction	
	CFM	RS
NDF	42.95	69.48
ADF	17.29	43.95
ADL	5.79	35.85
Hemicelluloses	25.66	25.53
Celluloses	11.50	8.10
Feeding values		
TDN	62.75	60.49
DCP	10.29	-1.35
DE (M cal/kg DM)	2.76	2.67
ME (M cal/kg DM)	2.34	2.25
NE (M cal/kg DM)	1.42	1.36

Chemical analysis of ensiling RS by urea or CSL

Data in Table (3) is illustrated the chemical analysis of ensiling RS by urea and CSL.

Table 3. Chemical analysis of ensiling RS with urea and CSL, (% on dry matter basis).

Chemical analysis	Ensiling heaps	
	Ensiling RS by 3% urea	Ensiling RS by 20% CSL
DM	51.55	53.76
OM	83.79	84.20
CP	5.06	6.07
CF	35.60	31.09
EE	1.18	1.42
NFE	41.95	45.62
Ash	16.21	15.80

However, fiber fraction and feeding values are explained in Table (4).

Table 4. Chemical analysis of fiber fraction and feeding values (% on dry matter basis).

Chemical analysis	Fiber fractions	
	Ensiling RS by 3% urea	Ensiling RS by 20% CSL
NDF	76.83	68.82
ADF	47.97	44.73
ADL	7.29	5.44
Hemicelluloses	28.86	24.09
Celluloses	40.68	39.29
Feeding values		
TDN	56.93	57.73
DCP	1.31	2.27
DE (M cal/kg DM)	2.51	2.55
ME (M cal/kg DM)	2.09	2.13
NE (M cal/kg DM)	1.27	1.29

Experimental design and treatments

Twenty-four dairy Zaraibi nanny goats (n=8 /treatment) at the third parity of lactation with an average weight (37 ±.220) kg were allocated to three dietary treatments. The basal control dietary treatment (D1) included 60% concentrated feed mixture (CFM) 40 % untreated dry rice straw (RS). However, the either two dietary treatments D2 or D3 consisted of 40 % CFM + 60 % ensiling RS by urea solution or 40 % CFM + 60 % ensiling RS by CSL solution, respectively. Formulations of all experimental rations were calculated to be in isonitrogenous and isocaloric. Otherwise, daily dietary requirements were divided into two portions, one being fed in the morning and the second in the afternoon. All goats

had free access to fresh water and salt blocks with minerals and trace elements available all the experimental work.

Measurements of the experimental work

Chemical analysis of experimental feeds

Dietary samples were replicated six times to assay chemical composition, fiber fractions and feeding values of D1, D2 and D3 according to the methods of Van Soest *et al*. (1991), Rinne *et al*. (1997), AOAC (2007) and NRC (2007).

Determination of total dry matter intake during transition times

The average of daily feed consumption (throughout 24 hours) was recorded individually for D1, D2 and D3 groups by offered a known quantity of ration and recorded the refusal of ration from the previous day in the morning. The feed consumption was replicated three times (at early, middle and late) during all transition times. Then, transition times included flushing (up to 25 days pre-mating), trimester (up to 50 days pre-parturition), suckling (up to 90 days post-parturition) and lactation periods (up to 120 days post-weaning).

Determination of kids' numbers and weight

At kidding, the number of kids in D1, D2 and D3 groups was counted and goats were categorized into goats giving birth over singleton. Also, birth and weaning weight of kids were recorded.

Determination of suckling and lactation milk yield

The total quantities of either suckling or lactation milk were measured by method that described by Khalifa *et al*. (2016).

Determination of blood metabolites

At the end of trial, the blood samples were taken at from the jugular vein of all D1, D2 and D3 animals (10 ml) in clean tubes, left in a standing position for about 20-30 minutes, thereafter centrifuged at 3500 rpm for 10 minutes. Then, blood serum of all experimental animals was removed from centrifuge tubes by micropipette into clean dried Eppendorf tubes very quickly and frozen in a deep freezer at -20°C until analysis. Blood serum samples were analyzed calorimetrically using kits to assay the concentrations of glucose, total protein, triglycerides, cholesterol, albumin, urea, creatinine, and uric acid as well as activity of aspartate aminotransferase (AST) and alanine aminotransferase (ALT).

Determination of economical efficiency

The economic efficiency was calculated according to the local market price of diet ingredients and milk up to 15 weeks of lactation as following:

Money output (price of selling milk) ÷ input (total price of feed consumed) ×100.

In addition, the relative economic efficiency % relative to control for D2 or D3 was calculated as following:

The economical efficiency amount of (D2 or D3− economical efficiency amount of D1÷economical efficiency amount of D1) ×100+100 (considering economic efficiency of D1 is attained 100%).

Statistical Analysis

All values were expressed as mean ± SEM. Statistical evaluation of significant difference among means was performed by one-way analysis of variance (ANOVA) followed by the Duncan post hoc test to determine significant differences in all the parameters among all treatment rations using the SPSS/PC computer program (version 25 SPSS, 2018). Differences among means with $P<0.05$ were accepted as statistically significant differences.

RESULTS AND DISCUSSION

Chemical analysis of experimental rations

The chemical composition and fiber fraction of different experimental rations as D1, D2 and D3 are listed in Tables 5 and 6, respectively. The OM and CP contents were greater ($P>0.05$) in D2 and D3 than that in D1 rations. However, DM content was increased ($P<0.05$) in D1ration than those in D2 and D3 rations. Then, the current experiments DM agrees with that reported by Thaintip *et al*. (2013).The modification of rice straw by ensiling by urea or CSL solutions increased CP content.

Table 5. The chemical composition of experimental rations (D1, D2 and D3) % on dry matter basis.

Chemical analysis	Experimental rations		
	D1	D2	D3
DM	90.09	78.39	79.13
OM	86.22	86.67	86.58
CP	13.33	13.40	13.43
CF	40.17	39.51	37.45
EE	3.02	2.55	2.58
NFE	30.36	30.55	33.12
Ash	13.78	13.33	13.42

Table 6. Chemical analysis of fiber fractions and calculated (% on dry matter basis).

Chemical analysis	Fiber fraction		
	D1	D2	D3
NDF	55.91±4.84 [b]	58.56±6.24 [a]	58.12±4.27 [a]
ADF	35.11±5.56 [b]	39.59±6.04 [a]	39.86±5.64 [a]
ADL	16.16±6.47 [b]	24.41±6.41 [a]	23.59±6.60 [a]
Hemicelluloses	20.80	18.97	18.26
Celluloses	18.92	15.18	16.27
Feeding values % of DM			
TDN	62.92	62.78	63.58
DCP	9.24	9.31	9.34
DE (M cal/kg DM)	2.77	2.82	2.80
ME (M cal/kg DM)	2.35	2.40	2.38
NE (M cal/kg DM)	1.41	1.42	1.44

a, b means with different superscripts in a row are significantly different (P<0.05).

These results were in agreement with Wanapat *et al*. (2013) who reported that treated rice straw could improve CP compared with untreated rice straw. In the present study, D2 and D3 rations had higher ($P<0.05$) in NDF, ADF and ADL contents than D1 ration. This result is consistent with some previous studies (Mapato *et al.*, 2010 and Wanapat *et al*., 2012), they revealed that treated rice straw increased NDF, ADF and ADL levels which are beneficial to overall dry intake, nutrient digestibility, volatile fatty acids (VFA) production and increased passage rate of particles in the rumen. In this context, Gunun *et al*. (2013) indicated that NDF and ADF were 55.8 and 51.3% in untreated rice straw, but 65.7 and 60.2% in treated long form rice straw and 64.7 and 60.0% in treated chopped (4 cm) rice straw, respectively. In addition, Paudel *et al*. (2015) reported that rice straw ensilage could maintain the nutritive value, that has been associated with fiber digestibility (NDF and ADF %) and optimal pH for cellulolytic microorganisms.

Moreover, the present results could be assured that D2 and D3 had lower hemicellulose (18.97 and 18.26%) and cellulose (15.18 and16.27%) than that in D1 (20.80 and 18.92%), respectively. In harmonious of these results, Zayed (2018) confirmed that rice straw ensilage could increase the protein content, decrease either hemicellulose or cellulose during the fermentation and can be a complete safety for ruminant's nutrition. The current result also seems that increasing in CP from 13.33 to 13.40 and 13.43% and decreasing in CF from 40.17 to 39.51 and 37.45% in D1, D2 and D3 rations, respectively. These results are similar to those found by El-Emam *et al*. (2018) who reported an increase in crude protein from 3.08 to 5.06 and 6.07% and decrease in crude fiber from 36.088 to 35.60and 31.60% in untreated rice straw, urea ensilage and CSL ensilage, respectively. In general, Daniel *et al*. (2019) explained that ensilage of rice straw could produce a swelling of the hemicelluloses-lignin complexin rice straw which resulting in an increased surface area available for attack by rumen microorganisms and thus increasing the rate of breakdown and the rate of passage of treated straw through the digestive tract. With this in mind, calculation of feeding values as TDN, DCP% DE (Mcal \ kg DM) ME (Mcal\ kg DM) and NE(Mcal \ kgDM) in Table (6) were increased in both of D2 and D3 (treated RS) compared to D1 (untreated RS).

Total dry matter intake during transition times

The total dry matter intake (TDMI) of goats received D1, D2 and D3 rations during different transition periods is presented in Table 7. The daily basal TDMI was significantly (P<0.05) higher for D2 and D3 rations than that in D1 ration during different transition periods. In this context, Gunun *et al*. (2013) found that increasing of TDMI was due to the combined effect of the higher OM, CP, NDF, ADF and ADL in ensiling of rice straw.

Table 7. Total dry matter intake (TDMI) of D1, D2 and D3 rations during transition times.

Transition times	TDMI g/h/d		
	D1	D2	D3
During flushing	1283.31±18.85[b]	1487.30±22.39[a]	1464.31±50.11 [a]
During trimester	2075.23±38.94 [b]	2267.33±27.18 [a]	2285.69±37.04 [a]
During suckling	2302.61±35.69 [b]	2469.33±62.04 [a]	2564.69±21.28 [a]
During lactation	2196.67 ±15.03 [b]	2276.00±20.60 [a]	2306.01±12.42 [a]

a, b means with different superscripts in a row are significantly different (P<0.05).

Also, the previous authors defined that ensiling RS supplied more moisture than untreated rice straw; then the greatest palatability of ensilage might be due to the less fibrous which increased TDMI. Calomeni *et al*. (2015) found theoretically that the use of urea could improve the pattern of ammonia release and utilization, causing a reduction in the levels of ruminal ammonia, an increase microbial protein synthesis thus, an increase in nitrogen efficiency leading to higher TDMI. Also, Gulilat and Walelign (2017) who indicated that ensilage might create a favorable rumen environment resulting in enhanced fermentation of the basal roughage and thus increased rate of microbial protein synthesis and extent of digestion which resulted in better TDMI. On the other hand, Tekliye *et al*. (2018) noted that ensilage can increase the dietary protein which increased protein availability to rumen microorganisms to speed up the digestion process; however the control was grouped under low digestibility which could be due to lower CP and higher fiber content of untreated rice straw. In addition, Daniel *et al*. (2019) observed that TDMI increased by reducing particle size of ensilage rice straw when compared with untreated rice straw.

Kids performance

Weights of birth and weaning and average daily gain (ADG) of kids of lactating goats fed D1, D2 and D3 rations are presented in Table 8. The weights of birth and weaning and ADG of lactating goats fed either D2 or D3 were significantly (P<0.05) heavier than goats received D1diet. Feed intake quality and quantity is a very important factor that determines the reproduction performance of lactating goats (Gulilat and Walelign, 2017). The better effect on reproductive performance (as kidding rate) may be attributed to available protein in D2 and D3 than D1 rations. Similarly Härter *et al*. (2016) showed that diet enriched in protein can be associated with a substantially lower risk of ovulatory infertility, increases ovarian activity by LH-mediated pathways, enhancing the sensitivity of follicles toward FSH and regulating oocyte quality and affect the circulating levels of progesterone (P4). According to Härter *et al*. (2017) ,they found that the major changes in maternal body weight and consumed DM have been observed only after 80 days of pregnancy (i.e., midterm pregnancy) then, physiological changes during pregnancy may increase the efficiencies of energy and protein use for maintenance as well as for pregnancy. On the other hand, El- Emam *et al*. (2018) found that available protein in ensilage can activate sexual hormones which caused rapidly sexual puberty phases especially testicular volume in rice straw ensiling by urea (190.31Cm^3) or CSL (249.38 Cm^3) than kids fed untreated rice straw (133.56 Cm^3).

Table 8. kids' numbers, birth and weaning live body and average daily gain of kids as affected by feeding D1, D2 and D3 rations.

Items	Experimental rations		
	D1	D2	D3
No. of trial nanny goats	8	8	8
No. of birth kids	16	19	20
No. of nanny goats kidding single	2	1	-
No. of nanny goats kidding twins	4	3	4
No. of nanny goats kidding triple	2	4	4
Birth weight of kids, kg	1.75±0.08[b]	2.11±0.09[a]	2.08±0.08[a]
Weaning weight of kids, kg	10.00±0.46[b]	12.53±0.44[a]	13.15±0.32[a]
Average daily gain of kids, g	91.67±5.41[b]	115.78±4.23[a]	123.05±3.69[a]

a, b means with different superscripts in a row are significantly different (P<0.05).

Suckling and lactation milk yield

The average milk production included suckling and lactation milk of experimental goats fed D1, D2 and D3 is designed in Figure 1. Significant difference (P<0.05) in milk yield among D1, D2 and D3 treatments was found. However, non-significantly increase in milk yield was found between D2 and D3 treatments. The highest suckling and lactating milk yield was recorded (128.74 and 85.29 kg) in D3 goats followed by D2 goats (123.83 and 81.42kg) compared with (105.22 and 61.54 kg) in D1 goats, respectively. Different experiments indicated that daily milk yield was higher with treated rice straw compared to untreated rice straw (Wanapat *et al*., 2013). Also, the milk production depends on the feed intake (Paudel *et al*. (2015). On the other hand, Calomeni *et al*. (2015) found that the decrease in milk yield may be

explained by lower volatile fatty acid production, mainly due to decreased propionate production (which is the mainly gluconeogenic precursor in ruminants). Therefore, this experiment also indicated that the milk yield increased with the increment in dry matter intake (Gulilat and Walelign, 2017). Furthermore, Omidi-Mirzaee *et al.* (2017) confirmed that the fibre fractions of the diets containing ensilage rice straw is more extensively degraded in the gastrointestinal tract than the fibre sources in the untreated rice straw diet which increased fibre digestibility, TDMI and milk yield. Also, this is in line with the plan in the present study; a positive relationship between effects of different feeding and nutrient levels on milk production (Cakra *et al.*, 2018 and Kang *et al.*, 2018). Generally, Mor *et al.* (2018) observed that given lower protein content in diet due to, lower digestibility and lower DMI; thus, decreased milk yield.

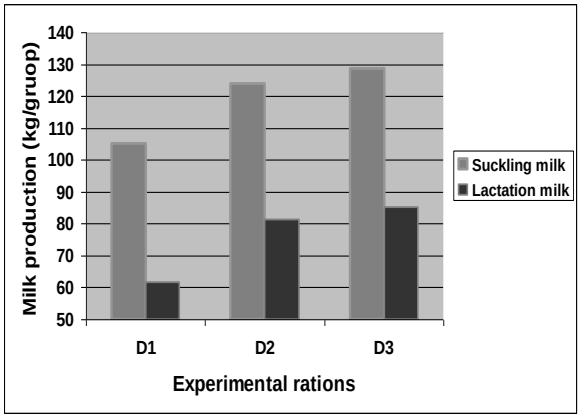

Figure 1. Average milk yield (kg) of dairy goats fed different experimental rations

Blood metabolites parameters

No significant differences were found in blood serum parameters among different groups when experimental goats fed D1, D2 and D3 rations. However, both glucose and total protein of blood slightly increased when goats fed D2 and D3 compared with D1 rations (Table 9).

Table 9. Blood metabolites as affected by D1, D2 and D3 experimental rations

Serum metabolites	Experimental rations		
	D1	D2	D3
Glucose, mg/dI	64.31±6.56	66.54±5.36	67.44±6.58
Total protein, g/dI	5.45±0.19	6.56±0.43	6.67±0.54
Albumin, g/dI	3.67±0.51	3.85±0.44	3.78±0.55
Cholesterol, mg/dI	68.05±14.71	58.85±5.27	64.68±7.46
Triglyceride, mg/dI	14.65±4.12	15.13±4.51	16.64±2.61
Urea, mg/dI	76.13±9.87	78.28±3.73	77.44±5.54
Uric Acid, mg/dI	3.25±0.34	3.32±0.17	3.32±0.35
Creatinine, mg/dI	1.54±0.44	1.58±0.56	1.46±0.59
AST, U/I	30.35±4.74	31.01±3.53	31.79±5.23
ALT, U/I	18.34±1.25	18.49±2.68	18.44±2.11

Our results were in accordance with previous report suggesting that ensiling of rice straw with urea or CSL solutions improved blood metabolism than untreated rice straw in dairy cows (Calomeni *et al.*,2015), in lambs (Azizi-Shotorkhoft *et al.*, 2016), in sheep (Alam *al.*, 2016) and in kids (El-Emam *et al.*, 2018).

Economical efficiency

The results based on market price of selling milk in experimental goats received D1, D2 and D3 rations (Table 10). The current results reported that higher milk production up to 574.9 and 594.58 kg during 112 days of milking in D2 and D3 rations than 492.3 kg in goats fed D1 ration, respectively. The total feed consumption as fed during milking up to 112 days was lower in D1 rations (1,968 ton) than both D2 (2,039 ton) and D3 (2,066 ton) rations. The feed cost of three dietary groups was absolutely different. The costs were highest in D2 and D3 rations followed by D1 ration; it reached to5148, 5241 and 4914 L.E, respectively. The economic efficiency (%) was goodness in D2 (67.00%) and D3 (68.07%) compared to D1 (60.11%) this related to the highest of milk production in goats fed D2 and D3 rations than those fed D1 ration. In addition, the difference of the EE (%) relative to control among the groups was higher in D3 (113.25%) following by D2 (111.46%) than D1 (100%) goats. In this context, El- Emam *et al.* (2018) revealed that using ensiling rice straw by urea and CSL in fattening kids have the greater economic efficiency in growth weight than kids fed untreated rice straw.

Table 10. Economical efficiency of dairy Zaraibi goats fed D1, D2 and D3 rations during112 days of lactation.

Attributes	Treatment goat groups		
	D1	D2	D3
Total milk yield /group, kg	492.30	574.90	594.58
Price of milk selling, L.E [A]	2953.8	3449.4	3567.48
Feed consumption (k, h/d)	2.197	2.276	2.306
Total feed consumption (ton group / 112days of milking	1,968	2,039	2,066
Dry matter cost, L.E [B]	4914	5148	5241
Economic efficiency (EE) amount, $^{A/B}$	0.60	0.67	0.68
Economic efficiency (EE)%, $^{A/B\times100}$	6o.11	67.00	68.07
EE (%) relative to control	100%	111.46	113.24

The price of selling kg of goat milk at merchant is 6.00 L.E. The price of dry matter consumption in the 2018 for D1, D2 and D3 were 2497, 2525 and 2537 LE / ton, respectively.

CONCLUSION

The results of this study indicated that rice straw ensiling either 3% urea or 20% CSL solutions in dairy goat rations can be considered as a potential diet for dairy goats tended to improve feed consumption, milk yield, increase the values of economic efficiency and suckled kids performance compared with those fed untreated RS. Also, ensiling RS ensiling by 20% CSL solutions was superior in milk yield of dairy goat kids growth performance and economic efficiency compared to ensiling RS by 3% urea.

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الإستفادة من قش الأرز المسيلج بمحلول مركز مياه نقع الذرة أواليوريا لتحسين الأداء الإنتاجى للماعز الحلابة

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تهدف هذه الدراسة لمعرفة تأثير التغذية على قش الأرز المسيلج (٣% محلول يوريا أو ٢٠%محلول مياه مركز نقع الذرة) على التركيب الكيماوى للقش المسيلج, المأكول الكلى من المادة الجافه, أعداد الجديان المولودة وأوزانها الى الفطام , محصول اللبن الكلى (رضاعه وحليب), بعض القياسات البيوكيميائيه وكذلك الكفاءة الاقتصادية على الماعز الزرايبي الحلابه. تمت هذه الدراسة على ٢٤ عنزة فى موسم الحليب الثالث بمتوسط وزن٣٧ ±٠,٢٢ كجم ، تم تقسيمها الى ثلاث مجموعات متساوية (٨ عنزات بكل مجموعه) وتم تغذيتها فى مجاميع وقدمت لها ثلاثة معاملات عذائيه كالتالى :-مج١ تتغذى على ٦٠% مخلوط علف مصنع +٤٠ % قش ارز. مج٢ تتغذى على ٤٠% مخلوط علف مصنع +٦٠ % قش ارز مسيلج بمحلول ٣% يوريا . مج٣ تتغذى على ٤٠% مخلوط علف مصنع +٤٠ % قش ارز مسيلج بمحلول مركز نقع الأذره . وكانت أهم النتائج مايلى :- كلا المجموعتين مج٢ ,مج٣ حدث بهم تفوق معنوى فى التحليلات الكيميائيه للقش المسيلج خصوصا المحتوى من البروتين الخام وإنخفاض كلا من الهيموسليلوز والسيليلوزفى قش الأرز المعامل بكلا من محلول اليوريا ٣% ومحلول مركز نقع الأذره ٢٠%. ADF , NDF ,ADL تحسنت فى القش المسيلج فى كلا من المجموعتين الثانية والثالثة عن المجموعة الضابطة. أما عن المأكول اليومى من المادة الجافة وعددالمواليد وأوزانها من الميلاد إلى الفطام فقد لوحظت لهما زياده معنويه للمجموعتين مج٢,مج٣ بالمقارنة بالمجموعة الاولى مج١ . ولقد لوحظ عدم وجود اختلافات فى تحليل الدم بين المجاميع الثلاثه مج١, مج٢ ,مج٣. وبالنظر الى الكفاءه الاقتصادية وجد أنه هناك تفوق معنوى لمج٢, مج٣ عن مجموعه مج١ . وعموما يمكن القول بأن تغذية الماعز الزرايبي الحلابه على القش المسيلج (٣% يوريا أو ٢٠% مركز نقع مياه الذرة) كان لها مردود ايجابى من الناحيه الإنتاجية وتخفيض إستهلاك العلف المركز حتى ٣٣و٣٣% مما ينعكس على الكفاءة الإقتصادية مقارنة بالقش الغير معامل، وأنه على الجانب الأخر يمكن القول بأن المردود الإنتاجى والصحى للماعز المغذاه على سيلاج قش الأرز بمركز نقع مياه الذرة كان أفضل من سيلاج قش الأرز المسيلج باليوريا.