Scientific Journal of Agricultural Sciences 3 (2): 284-291, 2021
Print (ISSN 2535-1796) / Online (ISSN 2535-180X) DOI: 10.21608/sjas.2021.81339.1117

In-vitro and *in-vivo* studies on most common straws in Egypt after differed treatments to improve its nutritive value fed to Ossimi rams

Aied, A. S.; S.T.M. Fahmy ; M.A.A. El-Barody and E.M. Ibrahim

Department of Animal Production, Faculty of Agriculture, Minia University, Egypt.

Received on: 19-6-2021 **Accepted on: 24-7-2021**

ABSTRACT

The aim of this study was to determine the *in-vitro* dry matter disappearance (*IN-VDMD* %) of wheat straw (WS), rice straw (RS) and soy bean straw (SBS) before and after treatment with urea (U), molasses (M), yeast(Y) and combinations of these ingredients. Five treatments nominated as T1 (Control), T2 (T1+U), T3 (T1+U+M), T4 (T1+U+ Y) and T5 (T1+U+M+Y) were conducted on each straw type. The *IN-VDMD*% was significantly (P<0.01) higher for SBS than other roughage sources in all treatments. Treatment T5 showed significantly (P<0.01) higher *IN-VDMD*% value than other treatments. The values being 47.49, 46.60 and 49.97% for WS, RS and SBS treated with U+M+Y respectively. As the *IN-VDMD* % of SBS had the highest values, it was used in *in–vivo* digestibility experiment on Ossimi rams. Results of the *SBS* digestibility cleared that treatment with urea (U), molasses (M), yeast (Y) and supplemented with fat (F) were significantly higher (P<0.01) than other treatments in digestibility coefficients and feeding value (TDN). The TDN values were 37.96, 42.67, 43.84 and 49.92% for SBS untreated, treated with U and M, treated with U, M , Y and treated with U, M ,Y and supplemented with fat respectively. The figures were significantly different (P<0.01). In conclusion, each treatment tested increased the *IN-VDMD* % of all roughages used. Treatment of WS , RS and SBS with U, M and Y was the most effective treatment. Digestibility coefficients and TDN of SBS treated with U, M, Y and supplemented with fat were Promising for future application.

KEYWORDS: INVDMD, Roughages, Digestibility, Feeding value, Ossimi sheep

1. INTRODUCTION

The high prices of animal products are results of its shortage and limited production in comparable with the exponential increase in human consumption. The farm animal production industry depends on several elements. The available feeds, feed nutrients and their prices are of the most effective items in this respect. The priority of feed sources consumption is of no doubt for human consumers.

Farm animals, ruminants in particular, can utilize plant crop wastes. Soya bean straw (SBS), wheat straw (WS) and rice straw (RS) are of these resources available for feeding ruminants. The annual production of these straws according to recent Agricultural records are 0.15 million tones for SBS, 7.9 million tones for W.S and 5.24 million tones for R.S /year (Egyptian Ministry of Environment – Environmental Affairs Agency EME, (2010). The feeding value of these straws is limited due to its high content of cell wall components (cellulose , hemicellulose and lignin) and low content of crude protein and cell soluble. The fiber content of these straws is greater than 30%, while the crude protein is below 4.5 % in most cases (kraidees., 2005 ; Naheri *et al.*, 2011 and Ma *et al* ., 2020). Increasing the feeding value of these crop wastes through urea treatment is a documented way as it is a nitrogen source that can be used by rumen microflora to synthesize microbial protein. Moreover, it is an alkali substance that helps cell fiber dissociation (Trach *et al.*, 2001 and Paengkoum *et al.*, 2006). Molasses is a by–product of sugar extracting industry containing some soluble feed nutrients and sweet taste that help feeding value and palatability (Hinton, 2007). Yeast (saccharomyces services) is an aerobic microbiota that benefit microbial rumen fermentation ecology (Soren *et al.*, 2012). Fat is a pure source of high energy density ingredient. It has several positive effects on digestibility, reduce ration dustiness, sticky agent and a source of fat soluble vitamins (Mcdonald *et al.*, 2010). Sharma *et al.* (1978) fed cows rations contained up to 15% protected tallow, (Palm quist and Conrad .,1978) , fed cows on rations contained up to 10.8% hydrolyzed fat. Behan *et al.* (2019), fed sheep on diets supplement with different sources of fat, the ether extract content of these diet ranged from 4.98 to 8.38%. The objective of this work is to study the effect of urea, molasses, yeast and their combinations on the *in-vitro* dry matter digestibility of SBS, WS and RS. The most effective one of these 15 treatments (3 straw types ×5 treatment of each) would be examined in *in vivo* experiment as the comparison between *in-vitro* and *in-vivo* results was of our interest. It is a fact that the *in-vivo* study is the most accurate to know the effect of each treatment and the real changes occurred. However in case of several treatments on several feed stuffs and in a way to squeeze the treatments number an *in-vitro* work may help to choose the most effective treatments that should be studied *in–vivo*. According to results obtained from *in-vitro* study the treatment of SBS with urea alone and SBS with urea and yeast were discarded as both the treatment of SBS with urea and molasses was better than SBS with urea alone and treatment of SBS with urea , molasses and yeast was better than SBS with urea and yeast only (Table 2). This giving chance to add fat (pure source of energy) to the treatments that could not be used in *in-vitro* study due to its negative effect on microbial fermentation.

2. MATERIAL AND METHODS

Soya bean straw (SBS), wheat straw (WS) and rice straw (RS) were available in the faculty of Agriculture , Minia university farm .They were grinded to pass through 1mm sieve then treated with urea , urea plus molasses , urea plus yeast and urea plus molasses and yeast.

2.1. Treatments

Dietary treatments of each roughage type in *in-vitro* experiment were; Control (T1) two hundred grams were moistened with 100 ml water, carefully mixed and kept in tightly tied nylon bag for15days. Second treatment (T2): urea 5%(w/w) of each straw was dissolved in 100 ml water and carefully mixed with 200 gm of each straw and kept in tightly tied nylon bag for 15 days .Third treatment (T3): urea 5% plus molasses 10% (w/w) of each straw were diluted with 100 ml water and carefully mixed with 200 gm of each straw and kept in tightly tied nylon bag for 15 days . Fourth treatment (T4): urea 5% plus yeast 8%(w/w) of each straw were diluted with 100 ml water, carefully mixed with 200 gm of each straw and kept in tightly tied nylon bag for 15 days. Fifth treatment (T5): urea 5%, molasses 10% and yeast 8% were diluted with 100 ml water and carefully mixed with 200 gm of each straw, and kept in tightly tied nylon bag for 15 days.

After the incubation period (15 days) each treatment was aerated, air dried and subjected to laboratory nutritional analysis according to (A.O.A.C, 2006).

2.2. *IN-VITRO* PROCDURE

In-vitro technique was used to determine the dry matter disappearance of the studied treatments, according to Tilley and Terry, (1963) technique after modification of laboratory manual techniques, university of Nebraska, Animal Production Department, (Nebraska, 1986).

2.3. *IN-VIVO* EXPERIMENT

Twenty adult Ossimi rams of 53± 2.4 Kg body weight were used in this experiment. Rams were kept in groups each of five animals, in separate yards, each group was fed together *ad-libitum* on one of the SBS treatments. Treatments were, control (untreated SBS, G1), treatment of SBS with 5%(w/w) urea and 10%(w/w) molasses (G2), treatment (G3) was G2 plus 8%(w/w) yeast and treatment (G4) was T3 supplemented with 8% (w/w) fat (soya bean oil). Fat was added daily and thoroughly mixed with SBS just before feeding.

After twenty one days of feeding these treatments as a preliminary period, grasp fecal samples were withdrawn from rectum of three animals of each group after two hours from feeding (7:00 am) in two successive days. Accordingly, six fecal samples were available for each treatment to be laboratory analyzed and digestibility coefficients were calculated using acid insoluble ash as internal marker (Van Keulen and Yong., 1977). They reported that internal natural markers (Acid Insoluble Ash, AIA) offers some distinct advantages over the total fecal collection method for digestibility studies. Quantitative measurements of feed intake and fecal output are not required. Measurements can be made on single feed and fecal samples. Representative feeds and fecal samples were subjected to laboratory analysis (A.O.A.C,2006). to determine the digestibility coefficients and feeding value. Animals were subjected to the ordinary veterinary inspection. Fresh and clean water was available in each yard along the experiment. Minerals salt blocks were available for animals separately. Rams were weighed before feeding in the beginning and at the end of the experiment to calculate the body weight change during the digestibility experiment.

2.4. STATISTICAL ANALYSIS

Data were statistically analyzed by one way ANOVA method (SAS, 2006). The model used to analyze the *IN-VDMD* parameter, in addition to feeding value, feed conversion and weight change in *in-vivo* study was

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

Where; Yij is the observation of *IN-VDMD*, nutrients digestibility, feeding value, feed intake , feed conversion and weight change of rams used. μ= is the overall mean Ti = is the treatment effect, where i = T1, T2, T3, T4 and T5 (*In-vitro*). While for *in-vivo* experiment, i = G1, G2, G3, and G4, eij = Random error. Factors under investigation were assumed to be fixed except the error term eij which was assumed to be random and randomly distributed (0 and σ^2). Significant differences among means were tested using Duncan's multiple. Ranges test (Duncan's 1955).

3. RESULTS AND DISCUTION

3.1. *In-vitro* experiment:

The nutritional analysis of the tested roughages is presented in Table 1. The results revealed that each treatment increased CP, EE, NFE and decreased the crude CF content of each straw . Urea treatment increased the CP content of WS from 2.81% to 5.22% this increase was propagated to be 5.85, 6.19 and 7.18 as WS was treated with urea (U) + molasses (M), U+ yeast (Y) and U+ M and yeast (Y) respectively. These improvement represents 185.8 – 255.5% above the untreated WS. On the same way NFE of WS was increased from 41.78 to 47.11% as it was treated with U+ M +Y. This enhancement represents 11.08% of the untreated WS. On the contrary, CF content was reduced from 38.35 to 31.02% due to its treatment with U+ M +Y. This decrease was calculated as 19.11%. The same trend was observed when RS was treated with U, U+M, U+Y and U+M+Y. The concentrations of CP were in the order 4.38, 5.55, 5.79 and 7.04% compared with 2.54% for untreated RS. The highest Concentration (7.04%) was 277.2 % above the untreated RS. On the other side, the CF% of untreated RS was reduced from 40.17 to 38.13 , 36.02 , 35.88 and 33.58% as it was treated with U , U+ M ,U+Y, U+ M+Y respectively . The greatest reduction represent 16.41% when RS was treated with U+M+Y. Considering SBS untreated or treated with the respective treatments, the figures for CP were 4.41, 5.48, 5.96, 6.34 and 7.76% (Table 1). The highest concentration (7.76%) was for SBS treated with U+M+Y. The increment attained was calculated as 176.0% above the untreated SBS. At the same time, the CF of SBS was diminished from 34.62 to 28.56 % due to its treatment with U+ M +Y. The reduction was calculated as 17.50% of the untreated SBS. Also, it is clear that SBS has higher concentration of CP (4.41%) than both WS (2.81%) or RS (2.54%). Moreover, SBS showed greater concentration of NFE (47.82%) than WS (41.78%) or RS (40.56%). On the diverse direction SBS contains lower concentration of CF (34.62 %) than WS (38.35) or RS (40.17%).

Table 1. Nutritional analysis of different treatments studied in *in-vitro* experiment.

Treatments		% On DM basis						
		DM	OM	CP	E.E	CF	NFE	ASH
T1	WS	90.75	84.87	2.81	1.93	38.35	41.78	15.13
	RS	91.66	84.72	2.54	1.36	40.17	40.56	15.27
	SBS	90.19	88.76	4.41	1.90	34.62	47.82	11.25
T2	W.S	89.44	86.28	5.22	2.02	36.42	42.60	13.90
	RS	90.44	85.31	4.38	1.73	38.13	41.06	15.07
	SBS	89.65	90.06	5.48	2.06	33.76	48.75	10.36
T3	WS	89.21	86.61	5.85	2.03	31.61	47.11	13.31
	RS	90.11	85.73	5.55	1.83	36.02	42.31	14.67
	SBS	89.21	89.82	5.96	2.33	30.52	51.11	10.08
T4	WS	89.10	86.55	6.19	2.04	31.74	46.01	13.24
	RS	90.21	85.55	5.79	1.71	35.88	42.15	14.59
	SBS	89.15	89.63	6.34	2.15	29.43	51.69	10.21
T5	WS	88.87	87.41	7.18	2.08	31.02	46.41	13.01
	RS	89.74	85.44	7.04	1.93	33.58	43.27	14.17
	SBS	88.62	90.50	7.76	2.27	28.56	51.90	9.63

DM=Dry matter, OM=Organic matter, CP=Crude protein, EE=Ether extract, CF=Crude fiber, NFE=Nitrogen free extract. WS= Wheat straw, RS=Rice straw, SBS =Soya bean straw. U=Urea , M= Molasses, Y= Yeast T1=control , T2= Urea treatment , T3= Urea Plus molasses **,** T4**=** Urea plus yeast ,T5= Urea plus molasses and yeast.

These alterations brought-about in nutrients content of roughage used could be elucidated in view of urea, molasses and yeast treatments . Urea is a nitrogen source (46.6 N%) readily dissolved in water and hydrolyzed to ammonium hydroxide. It has the advantage of being N source to raise the nitrogen content accompanied by the alkaline effect of ammonium hydroxide. This alkaline agent has a break down effect on lignin, cellulose and hemicellulose linkages, being easily attached and attacked by ruminal microbes (Sheikh *et al.* , 2017). Moreover, as water was added through treatment the treated material tissues swollen and become greater in surface area that enable rumen microbes to attaché, attack and fermentation process were enhanced (Zhang *et.al* . , 2019). Molasses is a source of soluble sugars (NFE 77.49 - 80.77% , NRC, 2001). It exerts its effect on all treated roughages as NFE content were clearly get up. It provides energy and carbon chain required for microbial protein synthesis (Abera *et al*., 2018). Yeast is an aerobic microorganism that helps reducing oxygen in the ensiled materials and the environment being more un aerobic that suites microbial fermentation. Moreover, yeast represents a source of nitrogen and vitamins Maamouri *et al*., (2014).

Results of *IN-VDMD*% of the tested straws before and after the several treatments are displayed in Table (2). Considering the values of WS, it is clear that treatment 5 showed the highest value in this regard (47.49%) and was significantly (P<0.01) higher than other treatments (3, 2 and 1). It should be mentioned that T3 had significantly (P<0.01) higher value than T2 and T1 (Table 2). The benefit obtained in T5 represents 173.57% above the untreated WS (T1). The same trend was observed for *IN-VDMD*% of RS. The significantly (P<0.01) highest value was for T5 (46.60%), while the significantly (P<0.01) lowest value (22.80%) was for T1. Treatments 2, 3 and 4 showed significantly (P<0.01) gradual improvement in *IN-VDMD%* value. These figures were in the order 31.29, 37.98 and 41.17%. Differences among treatments were significant (P<0.01). Results of SBS *IN-VDMD %* were parallel to WS and RS. Treatment 5 of SBS significantly (P<0.01) improved the *IN-VDMD %* value above T1, T2 and T3. The values were in the order 29.31, 38.28 and 42.16% compared with 49.97% for T5 (Table 2). Treatment 4 even it is greater than T3 by7.67 percentage unites, but the difference was not significant (46.16%T4 vs. 42.87%T3). The *IN-VDMD %* of T5 was greater by 8.25 percentage unites than T4 but the difference was not significant.

Results given out of *IN-VDMD*% experiment could be explained on the shadow of changes occurred in nutrients content of the tested roughages. Crude protein, energy sources as NFE and EE percentages were increased while CF content was dramatically decreased. These results are in agreement with all alterations that made the environment of *In-vitro* incubation more convenient for microbial degradation of the treated and supplemented roughages. Accordingly T5 realized the highest *IN-VDMD%* than other treatments as it is characterized by the highest CP, EE and lowest CF contents. The present results are in agreement with Wanapat *et al*.(2013)and Abera *et al*.(2018) findings.

Table 2. *In-vitro* dry matter disappearance (*IN-VDMD* %) of different treatments studied.

Roughages	Treatments						
	(T1)	**(T2)**	**(T3)**	**(T4)**	**(T5)**	**±SE**	**Sig**
Wheat straw (WS)	27.26^{d}	32.01^{c}	38.61^{b}	44.32^{a}	47.49^{a}	1.10	**
Rice straw (RS)	22.80^{e}	31.29^{d}	37.98^{c}	41.17^{b}	46.60^{a}	0.67	**
Soya bean straw (SBS)	29.31^{d}	38.28^{c}	42.87^{b}	46.16^{ab}	49.97^{a}	1.53	**

** Highly significant (P≤ 0.01) -Averages in the same raw with different super scripts are significantly different (P‹0.01) . T1=control, T2= Urea treatment , T3= urea Plus molasses , T4= Urea plus yeast ,T5= Urea plus molasses and yeast.

3.2. *IN-VIVO* EXPERIMENT

In this experiment rams were fed untreated or treated soy bean straw (SBS) *ad-libitum* to study the digestibility coefficients and their feeding value. The nutritional analysis of SBS used in the digestibility experiment are tabulated in Table (3). It is obvious that each treatment increased the CP content. The highest increment was 8.00% for (G4), compared with 4.20% for untreated SBS (G1). The improvement achieved was 190.47%. Treatments 2 and 3 raised the CP content from 4.20 up to 6.99 and 7.86 % respectively. Considering the ether extract (EE) content, the values were 1.98, 2.04, 2.20 and 7.88% on dry matter basis for G1 , G2, G3 and G4, respectively. The small changes in EE% for 2 or 3 treatments could be explained as mathematical artifact as CF% was decreased, while the obvious increase in this respect in T4 is due to fat supplementation that increased EE content from 1.98 to 7.88% which represent 397.97% increment. It should be cleared that the supplemented fat was 8% (w/w) of the SBS, while after mixing the supplemented fat with SBS treated with 5%urea, 10% molasses and 8% (w/w) yeast the fat concentration of the whole mixture is expected to be less. Zinn and Plascencia, (2007) concluded that to optimize the feeding value of supplemented diet, total lipid intake in finishing diet should not exceed 1 gm/kg body weight or 7% of the dietary dry matter .In the present experiment the EE content in G4 was not too far (7.88%) from the previous recommendation. On the contrary, the CF content was decreased due to each treatment. The highest reduction was in G4. Small changes were observed in NFE content among the several treatments of SBS (Table, 3). Changes in ash content in the different treatments could be explained in view of urea, molasses, yeast treatments and fat supplements as they increased and add to the organic substances.

Table 3. Nutritional analysis of different treatments studied fed to Ossimi rams.

Treatments	DM %	ON DM basis %					
		OM	CP	EE	CF	NFE	ASH
(G1)	90.87	85.44	4.20	1.98	34.37	44.89	14.56
(G2)	90.22	88.41	6.99	2.04	33.80	45.58	11.59
(G3)	89.65	88.44	7.86	2.20	31.74	46.64	11.56
(G4)	88.77	90.95	8.00	7.88	27.89	47.18	9.05

SBS =Soya bean straw, U=Urea , M=Molasses, Y=Yeast, F=fat , DM=Dry matter , EE=Ether extract, OM=Organic matter, CF=Crude fiber , CP=Crude protein , NFE=Nitrogen free extract. (G1) = soya bean straw un treated, (G2) = G1 plus urea plus molasses, (G3) = G1 plus urea plus molasses and yeast, (G4) = G1 plus urea plus molasses plus yeast and fat

Results of SBS intake, body weight changes and feed conversion ratio during the digestibility experiment are presented in Table (4). It is clear that initial body weight ranged from 53.38 to 53.97 kg, while after 21 days of feeding the tested SBS treatments the final body weight ranged from 54.70 to 56.77 kg. The average metabolic body weight ($W^{0.75}$) at the beginning of experiment ranged from 19.47 to 19.91 kg, while the average final metabolic body weight ($W^{0.75}$), were 20.29, 20.11, 20.53 and 20.68 for rams fed G1,G2,G3 and G4, respectively.

No significant difference was detected in this respect. Significant daily body weight change ($P< 0.01$) was observed among treatments. The highest figure was for rams fed (G4, 133.6 g/d), while the lowest value was 94.0 g/d for rams feed (G1). The SBS consumed ranged from 0.760 to 1.020 (kg/h/d). The highest value was for rams fed (G4), while the lowest value was for rams fed the untreated straw (G1). The SBS intake expressed as (g/kg $w^{0.75}$) was 38.48, 45.51, 48.46 and 51.23 for G1, G2, G3 and G4, respectively. The feed conversion ratio (kg feed/ kg body weight change) ranged from 8.08 to 7.63. The best conversion efficiency was for rams fed (G4), while the worst conversion efficiency was for rams fed the control treatment (G1, Table 4).

Table 4. Feed intake of SBS, weight change and feed conversion ratio (kg feed /kg weight change) of Ossimi rams fed different treatments studied

Items	Treatments				±SE	Sig
	G1	G2 T2	G3	G4		
No. of animal	5	5	5	5		
Feeding period (d)	21	21	21	21		
Initial, weight(kg /h)	53.38	52.39	53.60	53.97	2.411	NS
Final weight (kg/h)	55.35	54.70	56.21	56.77	2.413	NS
Initial weight (kg $w^{0.75}$)	19.75	19.47	19.81	19.91	0.832	NS
Final weight (kg $w^{0.75}$)	20.29	20.11	20.53	20.68	0.536	NS
Body weight change (kg)	1.97^{d}	2.31^{c}	2.61^{b}	2.80^{a}	.0335	**
Weight change (g/h/d)	94^{d}	110^{c}	124.6^{b}	133.6^{a}	.0026	**
Average SBS intake(g/kg $w^{0.75}$))	38.48	45.51	48.46	51.23		
Average SBS (consumed kg/h/ d)	0.760	.886	.960	1.02		
Feed conversion ratio , (kg Feed /kg weight change)	8.08	8.05	7.70	7.63		

**significant at ($P< 0.01$), NS= not significant. (G1) = soya bean straw un treated, (G2) = G1 plus urea plus molasses, (G3) = G1 plus urea plus molasses and yeast, (G4) = G1 plus urea plus molasses plus yeast and fat

The digestibility coefficient and feeding value results of the tested treatments were outlined in Table (5). All treatment significantly ($P<0.01$) improved digestibility coefficients of all feed nutrients tested. Treatment G4 was significantly ($P<0.01$) superior than other treatments. The DM, OM, CP, EE, CF and NFE digestibility coefficients were in the order 42.24, 50.95, 69.73, 72.63, 46.41 and 47.15% for rams fed G4, while the respective values for the control SBS G1 were 34.40, 41.72, 46.20, 61.51, 39.74 and 41.95%, consecutively (Table 5). The digestibility coefficients of G2 and G3 showed intermediate values. Accordingly the feeding value of SBS expressed as TDN was significantly ($P<0.01$) higher for G4 (49.92%) than other treatments G1 (37.96 %), G2 (42.67%) and G3 (43.84%) consecutively.

Table 5. Digestibility coefficients and feeding value of different treatments studied.

Items	Treatments (G1)	(G2)	(G3)	(G4)	±SE	Sig
DM	34.40^{c}	39.51^{b}	40.33^{b}	42.24^{a}	0.423	**
OM	41.72^{c}	47.04^{b}	47.90^{b}	50.95^{a}	0.326	**
C P	46.20^{c}	63.60^{b}	67.91^{a}	69.73^{a}	0.724	**
EE	61.51^{d}	63.78^{c}	66.32^{b}	72.63^{a}	0.525	**
C F	39.74^{d}	44.23^{c}	45.29^{b}	46.41^{a}	0.303	**
NFE	41.95^{c}	45.62^{b}	45.84^{b}	47.15^{a}	0.405	**
TDN	37.96^{d}	42.67^{c}	43.84^{b}	49.92^{a}	0.298	**
D.P	1.94^{d}	4.45^{c}	5.33^{b}	5.60^{a}	0.121	**

**significant at (P‹0.01) , Averages in the same raw having different super scripts are significantly different (p‹0.01). S.B.S=soya bean straw, (G1) = soya bean straw un treated, (G2) = G1 plus urea plus molasses, (G3) = G1 plus urea plus molasses and yeast, (G4)= G1 plus urea plus molasses plus yeast and fat DM=Dry matter , OM=Organic matter, CP=Crude protein. EE=Ether extract, CF=Crude fiber, NFE=Nitrogen free extract, TDN=Total digestible nutrients. D.P= Digestible protein.

Improvements brought out from digestibility experiment (Tables 3 , 4 and 5) ascertain the positive effects of urea, molasses, yeast treatments and fat supplementation on laboratory nutritional analysis, digestibility coefficients that resulted in significantly (P<0.01) greater feeding value, TDN. According to the obvious increase in SBS intake as (g/kgw$^{0.75}$) or as kg/h/d (Table 4), the improvement in body weight could be cleared up. Even the feeding period is 21 days and it is a digestibility experiment, but the body weight change shown-up which means that the maintenance requirements of these rams were covered. Moreover, it is broadly known that the relative low nutritive value of roughages in terms of low crude protein content (2-5%), high cell wall contents (NDF > 50%) and low digestibility, feeding roughage only does not provide enough nutrients for optimum production requirements .

In addition poor fermentation and low disappearance rate and passage through the rumen, feed intake was reduced (Wanapat *et al* . , 2013). On the contrary as a result of urea treatment and its alkali effect on the out- flow rate of straw cell walls into the abomasum was increased (Males , 1987). Fat (soya bean oil 8%) supplementation is a high density energy source (35 MJ metabolizable energy, CSIRO, 2007) and its accelerating effect on rate of digest passage across the alimentary tract may lead to reduced ruminal residence time and limit methane production (Zhang *et al* ., 2019). These positive effects may explain the significant (P<0.01) increase in body weight change and gives reliable evidence on improvement of the nutritional value of urea , molasses and yeast treatments and fat supplemented straws and an expression that the maintenance requirement is covered.

In-vivo studies on wheat and rice straws are in role.

4. CONCLUSION.

The nutritional content, *IN-VDMD*, digestibility coefficients, fed intake and the feeding value of wheat, rice and soya bean straws are improved by urea , molasses and yeast treatments and fat supplementation.

5. REFERENCES

Abera F, Urge M, Animut G (2018). Feeding Value of Maize Stover Treated with Urea or Urea Molasses for Hararghe Highland Sheep. The open Agriculture Journal., V.12- 85.

AOAC (2006). Official Methods of Analysis of AOAC International, (18th ed). AOAC International, Arlington, VA, USA.

Behan AA, loh TC, Fakurazi S, Kaka U, Kaka A, Samsudin AA (2019). Effectsof Supplementation of Rumen Protected Fats on Rumen Ecology and Digestibility of Nutrients in Sheep. J. Animal (Basel) 2019 Jul; 9(7): 400.

CSIRO (2007). Nutrient Requirements of Domesticated Ruminants. Collingwood , vic., Australia, CSIRO Publishing. Commonwealth Scientific and Industrial Research organization (CSIRO).

Duncan DB (1955). Multiple ranges and multiple F-test. Biometric., 11: 1042.

EME (2010) . Egyptian Ministry of Environment, Environmental Affairs Agency .The dry quantities of agricultural waste produced annually in Egypt .

Fitsum A, Mengistu U, Getachew A (2018). Feeding Value of Maize Stover Treated with Urea or Urea Molasses for Hararghe Highland Sheep .The Open Agriculture Journal., V.12 - 85.

Hinton DG (2007). Supplementary feeding of sheep and beef cattle .Second edition ,Land links press is an imprint of CSIRO Publishing .,National Library of Australia.

Kraidees MS (2005). Influence of urea treatment and soya bean meal (Urease) Addition on the Utilization of Wheat Straw by Sheep. Asian-Australasian Journal of Animal Sciences ., 18(7): 957-965.

Ma Y, Chen X, Khan MZ, Xiao J, Wang JH, Cao Z (2020). The Impact of Ammoniation Treatment on the Chemical Composition and In Vitro Digestibility of Rice Straw in Chinese Holsteins MDPI , journal of animals. Animals ., 10, 1854.

Maamouri O, Jemmali B, Badri I, Selmi H, Roussi H (2014). Effects of yeast (Saccharomyces cerevisiae) feed supplement on growth performances in "Queue Fine de l'Ouest" lamb. Journal of New Sciences. , Vol., 8.(1).

Maheri NS, Ziveh BA, Salamatdoustnobar R, Ahmadzadeh A, Golshani AA, Mohebbizadeh M (2011). Determining Nutritive Value of Soybean Straw for Ruminants Using Nylon Bags Technique Pakistan. Journal of Nutrition., 10 (9): 838-841.

Males JR (1987). Optimizing the utilization of cereal crop residues for beef cattle. J. Anim. Sci., 65:1124-1130.

McDonald RE, Greenhalgh JFD, Morgan CA, Sinclair LA, Wilkinson RG (2010). Animal Nutrition. (7 th ed.) Pearson Education Limited. Uk.

Naser MS, Bayaz AZ, Ramin S, Alireza A, Mehdi M (2011). Determining Nutritive Value of Soybean Straw for Ruminants Using Nylon Bags Technique Pakistan. Journal of Nutrition., 10 (9): 838-841.

Nebraska (1986). Manual of laboratory techniques. Rumimant nutrition laboratory dep. Of animal. Science. University of Nebraska.

Nguyen XT, Magne M, Xuan DCU (2001). Effects of treatment of rice straw with lime and/or urea on responses of growing cattle. Livestock Research for Rural Development (13) 5.

Nira MS, Manoj TK, Randhir SB, Shaikh AK (2012). Effect of yeast supplementation on the growth performance of Malpura lambs. Trop Anim Health Prod ., 10.1007.

NRC (2001). National Research Council. Nutrient requirement in dairy cattle .7th Ed ., Nat . Acad . press , Washington, D. C. USA.

Palmaquist DL, Conrad HR (1978). Highest rations for dairy cows:Effect on feed intake , milk and fat Production and plasma Metabolites .J. Dairy Sci ., 61:890.

Paengkoum P, Liang JB, Jelan ZA, Basery M (2006). Utilization of Steam-treated Oil Palm Fronds in Growing Saanen Goats: Supplementation with Energy and Urea. Asian-Aust. J. Anim. Sci., Vol (19), No, 11 1623 – 1631.

SAS (2006). Statistical analysis system, Users Guide. Statistical Analysis Institute, Inc, Raleigh, North Carolina, USA.

Sharma llR, Ingalls JR, Mckirdy JA (1978). Replacing barley with protected tallow in ration of lactating Holstein cows. J. Dairy Sci., 61:574.

Sheikh Ganai AM, Sheikh FA, Bhat SA, Mudasir (2017). Effect of feeding urea molasses treated rice straw along with fibrolytic enzymes on the performance of corriedale sheep. Journal of Entomology and Zoology Studies ., 5(6):2626-2630.

Soren NM, Tripathi MK, Bhatt RS, Karim SA (2012). Effect of yeast supplementation on the growth performance of Malpura lambs. Trop Anim Health Prod ., 10.1007.

Trach NX, Mo M, Dan CX (2001). Effects of treatment of rice straw with lime and/or urea on responses of growing cattle. Livestock Research for Rural Development (13) 5.

Tilley JMA, Terry RA (1963). A Two –Stage Technique for the In-vitro digestion of forage crops .J. Brit. Grassland Soc.18:104.

Van JK, Young BA (1977). Evaluation of –acid – insoluble Ash as a natural marker in ruminant digestibility studies. J. Anim. sci. Vol 44(2).282-287.

Wanapat M, Kang S, Hankla N, Phesatcha K (2013). Effect of rice straw treatment on feed intake, rumen fermentation and milk production in lactating dairy cows. African Journal of Agricultural Research Vol., 8(17), pp. 1677-1687 .

Zhang X, Rodolfo FM, Min W, Karen AB, Rong W, Zhiyuan M, Lukuyu AB, Zhiliang T (2019). Effects of urea plus nitrate pretreated rice straw and corn oil supplementation on fiber digestibility, nitrogen balance, rumen fermentation, microbiota and methane emissions in goats. Journal of Animal Science and Biotechnology., v.10 (6).1186.

Yulin M, Chen X, Khan MZ, Xiao J, Wang JH, Zhijun C (2020). The Impact of Ammoniation Treatment on the Chemical Composition and In Vitro Digestibility of Rice Straw in Chinese Holsteins MDPI , journal of animals. Animals ., 10, 1854.

Zinn RA, Plascencia AJ (2007). Feed value of supplemental fats used in feedlot cattle diets .vet clin food Anim 23:247-268 .

الملخص العربي

الدراسات المعملية والمزرعية علي تبن القمح وقش الأرز وتبن فول الصويا الغير معامل أو المعامل باليوريا والمولاس والخميره و وبإضافة الدهن

*علي سليم عايد محمد، سمير توفيق محمد فهمي، محمد عبد الفتاح البارودي وعمادالدين محمد إبراهيم

قسم الإنتاج الحيواني ، كلية الزراعة ، جامعة المنيا ، مصر

أجريت تجربة *in-vitro* في معمل قسم الإنتاج الحيواني بكلية الزراعة جامعة المنيا. الهدف منها تقييم اختفاء المادة الجافة في المعمل (*(IN-VDMD%* لبعض المواد المالئه (تبن القمح وقش الأرز وتبن فول الصويا . تمت دراسة *IN-VDMD%* لهذه المواد قبل وبعد معاملتها باليوريا و المولاس و الخميرة وتم عمل توليفات من هذه المواد منها في خمسة معاملات تم دراستها وهي T1 و T2 و T3 و T4 و T5.وكانت القيم المتحصل عليها من معاملات تبن فول الصويا افضل القيم معنويا باحتمال (٠١, %) عن كل من تبن القمح وقش الارز فتم تطبيق تلك المعاملات في تجربه هضم علي ذكور الاغنام الاوسيمي البالغه (كباش) *in-vivo* ودراسة معاملات الهضم وحساب القيمة الغذائيه وأضيف اليها معاملة تبن فول الصويا معامل باليوريا والمولاس والخميره مضاف عليهم ٨ % زيت فول الصويا (كمصدر غني بالطاقه الممثله) حيث هذه المعامله لم تستخدم في التجارب المعمليه(*in-vitro*) لتاثير الدهن السلبي علي نشاط الميكروبات وهي لا تستفيد منه وان التجارب المعمليه توضح تاثير المعاملات المختلفه علي النشاط والهضم الميكروبي علي المواد المختبره بينما تستفيد ويتم هضمه وامتصاصه بأنسجة جسم الحيوان . أوضحت نتائج تجربة هضم *in-vivo* أن (SBS) المعامله باليوريا (U) و المولاس (M) والخميرة (Y) والدهون (F) ،كانت اكبر معنويا عند (P <0.01) من المعاملات الأخرى في جميع معاملات الهضم للعناصر الغذائيه وكانت القيمة الغذائيه ل (TDN) ٣٧.٩٦ ، ٤٢.٦٧ ، ٤٣.٨٤ و ٤٩.٩٢٪ لـ SBS غير المعاملة (G1) والمعامل باليوريا والمولاس (G2) ، والمعامل باليوريا و المولاس والخميرة (G3) ، والمعامل باليوريا و المولاس والخميرة والمضاف اليه الدهن (G4) على التوالي وكانت الاختلافات معنويه باحتمال (P<0.01). **ونستخلص من هذه الدراسه** ان معاملات الهضم لكل من تبن القمح ،وقش الارز ، تبن فول الصويا يمكن تحسينها معنويا بتلك المعاملات المختلفه ، كانت معاملة (SBS) مع (U) مع المولاس والخميرة وباضافه الدهون فعالة وواعدة في تحسين معاملات هضم العناصر الغذائية والقيمة الغذائية في كل من التجارب المعملية والمزرعية.