How to Cite:
Al-Abbassi, M. S. A. A., Lazim, J. S., & Hussein, M. K. (2022). Response of Awassi lambs feeding to fattening on rations of Alfalfa hay stalks treatment with urea or addition of molasses. *International Journal of Health Sciences*, *6*(S10), 710–721.
https://doi.org/10.53730/ijhs.v6nS10.13598

Response of Awassi lambs feeding to fattening on rations of Alfalfa hay stalks treatment with urea or addition of molasses

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Abstract---The experiment was conducted in the animal field belonging to the Department of Animal Production Techniques at the Technical College / Al-Mussaib for a period of more than eight months, starting on 08/08/2021 and ending on 21/5/2022.The period included the purchase of Alfalfa hay stalks, their treatment with urea and their beam with plastic, the purchase of molasses, composition, mixing and pressing of the concentrated ration, and the preparation of individual sheds from cutting and welding until the completion of laboratory chemical analyzes, during which it included actual and practical experiments to respond for the period from 29/10/2021 to 28/1/2022 to study usage of Alfalfa hay stalks treated with urea and molasses in the productive performance of Awassi lambs, which had initial weight of 21.5 ± 0.5 kg and at the age of 4-5 months, at a rate of 91 days, preceded by a preparatory phase for two weeks, and the lambs were randomly divided into four equal groups of 5 lambs for each group, and the individual feeding method was followed, as concentrated feed was provided at a rate of 2.5% of the live weight for each animal and fed on the four experimental rations,that the roughage feed Alfalfa hay stalks was given free, the first group T1was considered as a control without addition, and the other groups were treated with urea at a concentration of 4% T2 or

added to their diets molasses at 9% T3 or both T4 respectively, and the results were as follows: Lambs of the fourth group responded to fattening with a high significant increase (P<0.01) and by 54.57% in weight gain and by 77.81% in consumption of concentrated and roughage feed compared with the control group T1, followed by T2 and then T3 in preference and in order than in the control group as well, which may indicate the efficiency of digestion and benefit of the diet treatment with 4% urea with 9% molasses added to free-fed Alfalfa hay stalks of Awassi fattening lambs.

Keywords---Awassi lambs, Alfalfa hay stalks, urea, molasses.

Introduction

Awassi sheep is distinguished as the main breed in the Middle East countries, including Iraq, which has the ability to withstand harsh environmental conditions, and its productivity and reproductive characteristics vary depending on the environment and the region in which it lives (Salman and Abdallah, 2014), and it is one of the most important farm animals, as it constitutes more than half the number of sheep in Iraq (Al-Brazing and Othman, 2013; FAO, 2017), which is one of the main sources of red meat production and a secondary source for milk and wool production, its meat produced is of high quality and desirable quality for its palatability and preference by consumers around the world compared to other types of meat(Hermiz and Alkass, 2018), but most of sheep breeders in Iraq depend on feeding them from roughage feed resulting from harvest residues and residues of some field crops as a large part of their diet, and therefore it may affect on the production performance because of the low nutritional value of its high content of crude fiber and lignin, as well as its low energy and protein (Tufail et al., 2018; Al-Dulaimi et al., 2021), and concentrated feed was added only in limited quantities due to its high costs, so there was a decrease in the productivity of Awassi sheep of meat and milk compared to the specialized purebred breeds. Therefore, it became necessary to use modern methods in feeding and breeding to increase the productivity of these sheep (Al-Rawi, 2006; Al-Dobaib and Mousa, 2009; Taha, 2015), including some additives and chemical, physical and biological treatments to improve the nutritional value of roughage feed (Giraldo et al., 2007; Salem et al., 2015; López-Aguirre et al., 2016; Al-Taie and Altayeb, 2020),and the roughage feed was treated with urea as a non-protein nitrogen compound that analyzes the bond between lignin and both cellulose and hemicellulose, making them available for microscopic digestion in the rumen, the addition of molasses was also used, which is an accidental product of the sugar industry from sugar beets or sugar cane to increase palatability and is rich in soluble carbohydrate and it has a nourishing and stimulating effect in the cycle of food compounds in the animal's body and as an energy source that supplies microorganisms in the rumen and activates their growth, as well as binds feed grains and limits dust that accompanies ground feed (Al-Hawarin et al., 2017).

Wedah et al. (2020) showed in their study that there is a significant superiority (P<0.05) in the body weight of four-month-old Awassi lambs, whose urea level was 2% over the rest of the treatments that included levels 1.5, 1, and 0%, and the

results indicated Abera et al. (2018) study showed that urea or a mixture of urea and molasses improved the amount of feed intake and increased the final weight of highland harage lambs. The current study aimed to know the effect of treatment Alfalfa hay stalks as poor quality roughage feed with a concentration of 4% urea or adding molasses at 9% or both on the productive performance and feed consumption of Awassi male lambs.

Materials and Methods

The experiment was conducted in the animal field belonging to the Department of Animal Production Techniques at the Technical College / Al-Mussaib for a period of more than eight months, starting on 08/08/2021 and ending on 21/5/2022.The period included the purchase of Alfalfa hay stalks, their treatment with urea and their beam with plastic, the purchase of molasses, composition, mixing and pressing of the concentrated ration, and the preparation of individual sheds from cutting and welding until the completion of chemical analyzes, during which it included actual and practical experiments to respond for the period from 29/10/2021 to 28/1/2022 to study usage of Alfalfa hay stalks treated with urea or added molasses in the productive performance of Awassi lambs, The animals occupied a half-shaded barn to shelter the lambs, and it was divided into 20 cages(Pen), each cage having an area of 1.75 x 1.25 m, and they followed the method of individual feeding.Each cage was equipped with two feeders, one for placing concentrated feed and the other for roughage feed, and clean drinking water was provided in a third container. Also mineral salt molds were placed inside the roughage feed troughs, and the lambs were randomly divided into the four treatments after numbering them in a sequence of 1-20,

Before that, 20 Awassi lambs were selected from a herd of more than 500 heads and were free of diseases and deformities, which were chosen according to their phenotypic characteristics, breed and homogeneity of weights from the city of Mosul. At the age of 4-5 months, with an average weight of 21.5 ± 0.5 kg, it was randomly divided into four equal groups with 5 lambs for each group and weighed for three consecutive days in the morning after cutting off the fodder for 12 hours, for the purpose of stabilizing the initial weight, and then they were fed on the four experimental diets for two weeks as a preparatory period to familiarize them with the experiment diets and before taking and recording the data, the barns were cleaned of excreta every morning and the lambs received veterinary health care under the supervision of veterinarians. They were fed for 91 days on chopped Alfalfa hay stalks (roughage feed) and provided Freely (ad. Lib.), which was treated with urea 4% and added to it percentages of molasses 9%, and it was considered as follows:

- The first treatment (T1) = control diet, chopped Alfalfa hay stalks without treatment with urea or the addition of molasses.
- The second treatment (T2) chopped Alfalfa hay stalks treated with a concentration of 4% of urea.
- The third treatment (T3) = chopped Alfalfa hay stalks with added 9% molasses.
- Fourth treatment (T4) = chopped Alfalfa hay stalks treated with 4% urea and added to it 9% Molasses.

While concentrated feed was provided on two daily meals, the first at seven in the morning and the second at four in the afternoon, at a rate of 2.5% of the live body weight and the quantities provided are adjusted weekly based on the new weight for each animal, and the weights of the consumed quantities of feed (concentrated and roughage) are recorded daily after weighing the residual of the previous day on the morning of the second day and before providing the new feed meal, to calculate the daily consumer from it,and the animals were weighed weekly at six o'clock in the morning after preventing feed from her for 12 hours, the concentrated feed consisted of 20% yellow corn, 30% fodder flour, 32% wheat bran, 10% soybean meal, 5% oil, and 1% of each of limestone and salt and supplements (vitamins and minerals \ ruminants) and the table (1) shows the chemical analysis of the roughage feed and complete concentrated ration and the main raw materials included in its composition.

Table 1
Chemical analysis* of the roughage feed and concentrated ration and the main feed materials included in its composition (% dry matter) in lamb feeding and the calculated metabolic energy (MJ/Kg dry matter).

Feedstuffs	Dry matter	Crude Protie n	Crude Fiber	Ether extract	Nitrogen Free Extract N.F.E	Ash	Organic matter	Metabolized Energy*** MJ/ Kg dry matter
Soyabean meal	90.18	49.90	6.39	2.04	34.65	7.02	92.98	11.79
Yellow corn	89.20	10.12	2.25	4.87	80.15	2.61	97.39	14.06
Wheat bran	90.42	17.54	11.76	4.47	60.71	5.52	94.48	12.58
fodder flour	91.14	14.04	2.46	1.79	79.57	2.14	97.86	13.50
**concent-rated Ration	89.42	17.89	6.37	2.46	68.54	4.74	95.26	12.82
**Alfalfa hay stalks	90.95	6.45	31.67	1.43	48.91	11.54	88.46	9.65

* Chemical analysis of feed materials based on Al-Khawaja et al. (1978).
** Their analyzes were carried out in a nutrition laboratory affiliated to the Department of Animal Production / Technical College - Al-Mussaib.
*** Metabolizable energy MJ/ Kg dry matter =0.012 × Crude protien + 0.005 × Crude fiber + 0.031 × Ether extract +0.014×Soluble carbohydrate materials.(MAFF ، 1975).

The concentrated ration and the four experimental roughage rations (Alfalfa hay stalks or treatment with a concentration of 4% of urea or an addition of 9% of

molasses or both) were analyzed in the laboratories of the Al-Mussaib Technical College / Food and Feed Analysis Laboratory (Table 2), and the dry matter (DM) was estimated, crude protein (CP), Ether extract (EE), Ash and crude fiber (CF) according to the A.O.A.C. (2005) method and the metabolic energy was extracted for the four diets according to MAFF (1975) which states that the following:- ME (MJ/kg DM) = %CP×0.012+%CF×0.005+%EE×0.031+NFE×0.014 .

Table 2
Chemical composition of the four experimental rations (% of dry matter) from rough forage after treatment and addition and its metabolized energy content (MJ/Kg D.M)

Rations	Dry matter	Crude Protien	Crude Fiber	Ether extract	Nitrogen Free Extract N.F.E	Ash	Organic matter	Metabolized energy*MJ / Kg dry matter
T1	90.95	6.45	31.67	1.43	48.91	11.54	88.46	9.65
T2	92.33	13.86	22.58	1.49	49.13	12.94	87.06	9.15
T3	90.93	7.22	28.34	1.54	48.38	14.52	85.48	9.45
T4	90.61	12.80	29.38	1.96	40.52	15.34	84.66	8.48

And some production characteristics were studied, and the amount of feed consumed from concentrated,roughage and total feed, total and daily weight gain, and feed conversion ratio.

Results and Discussion

Significant increases ($P<0.05$) and high ($P<0.01$) were observed for the effect of treatment with urea or the addition of molasses compared with or without them to the Alfalfa hay stalks (Table 3) in the traits of roughage and concentrated feed and their total consumed by groups of lambs in the experiment, as well as on feed conversion ratio and in favor of The three groups treated with either urea or the addition of molasses or both (15 lambs) compared with the control treatment without treatment or addition (5 lambs), the details of which are clarified by Table 4, which shows the total consumption of dry matter from roughage, concentrated and total feed and feed conversion ratio.

Table 3
Effect of treatment Alfalfa hay stalks with urea and adding molasses or without them to Awassi lambs fattening rations in the rates of dry matter consumption from roughage, concentrated and total feed (kg/lamb) and feed conversion ratio (mean ± standard error)

Traits	Alfalfa hay stalks without treatment or addition (5 lambs)	Alfalfa hay stalks with treatment or addition (15 lambs)	Significant level
roughage feed consumed(Kg)	B 19.935 ± 2.237	A 34.039 ± 3.737	*
Concentrated feed consumed(Kg)	B 48.045 ± 3.301	A 68.760 ± 1.649	**
Total feed consumed(Kg)	B 67.980 ± 3.907	A 102.800 ± 5.073	**
Feed conversion ratio (Kg feed/Kg weight gain)	B 6.568 ± 0.422	A 4.634 ± 0.116	**

The averages with different letters within the same column differ significantly between them* ($P < 0.05$), ** ($P < 0.01$).

The results showed that there were highly significant differences ($P<0.01$) between the averages of the four treatments for the effect of urea treatment or the addition of molasses to the diets for fattening Awassi lambs in all the studied traits,the lambs of the fourth treatment (T4: treated with urea and with the addition of molasses) were significantly superior in their consumption rate of roughage feed (47.137 kg \ lamb), which was from chopped Alfalfa hay stalks treated with urea at a concentration of 4% with the addition of molasses (9%), which was provided freely (Ad libitum) on all other treatments (T1: control and T2: urea treatment and T3: addition of molasses), which were significantly similar to each other and their values were: 19.935, 28.166, 25.009 kg\lamb, respectively, the reason for this may be due to the effect of the chemical treatment with urea and the addition of molasses together in T4 improved from quantities consumption of roughage feed, since urea was a source of nitrogen and helped break the bonds between cellulose and hemicellulose (Wanapat et al., 2016; Bakuri, 2015), and molasses with a sweet taste as a source of carbohydrates and works to increase the palatability, which consequently leads to balance (Synchronization) between the source of nitrogen and energy (Senthilkumar et al., 2016), as well there was a similarity in the nature of high consumption with a high significance ($P<0.01$) which was characterized by the lambs of the fourth group of concentrated feed (73,741 kg / lamb) compared with the rest of the other three groups T1, T2 and T3 and they were 48,045, 67.845 and 63,678 kg \ lamb, respectively, The reason for this may be due to the correlation of quantities supplied by it, which change weekly based on the new weights of the lambs, and which change the quantities of concentrated

feed provided to them weekly, based on their new weights, with the same percentage (2.5%).

Table 4
Effect of treatment Alfalfa hay stalks with urea and adding molasses to the diets of the four treatments for fattening Awassi lambs in the rates of dry matter consumption from roughage, concentrated and total feed (kg/lamb) and feed conversion ratio (mean ± standard error)

Traits	Groups				Significant level
	T1	T2	T3	T4	
Roughage feed consumed(Kg)	B 19.935 2.237±	B 28.166 ± 4.145	B 25.009 ± 7.325	A 47.137 ±3.147	**
Concentrated feed consumed(Kg)	C 48.045 ± 3.301	AB 67.845 ± 1.747	B 63.678 ± 3.252	A 73.741 ± 1.945	**
Total feed consumed(Kg)	C 67.980 ± 3.907	B 96.011 ± 5.228	B 88.687 ± 9.069	A 120.878 ±4.947	**
Feed conversion ratio (Kg feed/Kg weight gain)	B 6.568 ± 0.422	A 4.715 ± 0.176	A 4.921 ± 0.179	A 4.323 ± 0.173	**

The averages with different letters within the same column differ significantly from each other** ($P < 0.01$).

Whereas, both the second (T2) and the third (T3) treatments were statistically similar on one side and the second (T2) and the fourth (T4) on the other hand, but they recorded a highly significant ($P<0.01$) compared with the lambs of the first group (T1: control), and this was applied to the average of total feed consumption (roughage + concentrate) with the same nature of high significant effect on the traits of roughage and concentrated feed consumption in terms of comparison between the groups of the four lambs, it can also be observed that the arithmetic increases in lambs of the second group (T2: urea treatment) in the above studied traits compared with the third treatment (T3: adding molasses), and this means that treatment only with urea is mathematically better than adding molasses only, it may be because urea chemically breaks the ester bonds between hemicellulose and cellulose with lignin and makes the structural fibers swollen and enables the rumen microbes to attack the structural carbohydrates more easily and thus eat more quantities (Wanapat et al., 2009).

As for the traits of feed conversion ratio in lambs, table 4 showed that there were highly significant differences ($P<0.01$) in the feed conversion ratio between the averages among the lambs of the experimental treatments. The lambs of the T4, T3 and T2 treatments, whose treated roughage feed was treated with either 4% urea or the addition of molasses 9% or both together, and it was 4.323 and 4. 921 and 4.715 kg of dry matter from the total feed to obtain one kg increase in live weight, respectively compared to lambs of the control group (T1: free of treatment and addition) and its value was 6.568 kg of dry matter\ kg weight gain, These

results may indicate the efficiency of nutrition and its additives because their values ranged between 4.323 - 6.568, and it is known that the best for the feed conversion ratio, which ranges in Awassi sheep between 5.5 -10.5 (Juma and Alkass, 1996),that it be at its lowest level in terms of value, which means in the production process of fattening lambs with little expenditure and a lot of revenue, these results are similar to what Abera et al. (2018) reported that there are highly significant differences (P< 0.01) in the total intake of dry matter and feed conversion ratio when treament corn stover (corn residue) with urea 4% or urea 4% with the addition of molasses 10% in feeding Hararg highland sheep, it seems that the improvement in the feed conversion ratio is related to the balanced concentration of nutrients in these treatments and the consequent increase in live weight and thus better feed conversion ratio, as the high levels of energy and protein in these rations led to an improvement Daily weight gain and feed conversion ratio (Ebrahimi et al., 2007). Also, these results were in agreement with the findings of Can et al. (2004), when they added urea and molasses to wheat straw, it led to a significant increase (P<0.05) in dry matter and organic matter intake compared to the control diet when feeding Awassi rams, while these results did not agree with what was found by Resol et al. (2020) when they found that treatment of straw with urea was better than treatment urea with molasses in Karada sheep, and these results did not agree with the results of Alshefea and Hassan (2021) when using low levels of urea (0, 0.5, 1, and 1.5%) with the addition of 3 g of nitrogen-carbamyl glutamate or without and replaced with soybeans for feeding 32 female Awassi lambs. The results of Table 5 show highly significant differences (P<0.01) for the effect of treatment with urea or the addition of molasses or without it to the Alfalfa hay stalks in the traits of the final weight and the total and daily weight gain (kg) for groups of lambs in the experiment and in favor of the three groups treated with urea or the addition of molasses or both compared with the control group (without treatment or addition).

Table 5
Effect of treatment Alfalfa hay stalks with urea and adding molasses or without them to Awassi lambs fattening rations in the final weight (kg) and the total and daily weight gains (mean ± standard error)

Traits	Alfalfa hay stalks without treatment or addition (5 lambs)	Alfalfa hay stalks with treatment or addition (15 lambs)	Significant level
Initial weight(kg)	21.2 ± 0.917	21.2 ± 0.366	N.S
Final weight(kg)	B 31.7 ± 1.654	A 43.7 ± 1.382	**
Total weight gain(kg)	B 10.5 ± 0.861	A 22.5 ± 1.388	**
Daily weight gain(kg)	B 0.115 ± 0.010	A 0.243 ± 0.014	**

The averages with different letters within the same column differ significantly between them,
**(P<0.01), N.S: Not significant.

As for Table 6, it showed the details of this, as it showed the initial weight of the lambs and the effect of the four experimental diets on the final weight and the

total and daily weight gain (kg), and we note the convergence of the rates of the initial weights of the groups of lambs, as no significant differences appeared between the four groups, and this indicates the homogeneity in the initial weights among the groups of lambs under study at the beginning of the experiment, which led to reducing the differences in the initial weight to the lowest among between the experimental treatments, also the table showed the effect of treatment Alfalfa hay stalks with treated urea and adding molasses or both in the rate of final body weight and the rate of total and daily gains (kg), as the results showed highly significant differences (P<0.01) in the final weight and total and daily increases in favor of the fourth group lambs (T4) which were roughage feed treated with 4% urea and 9% molasses and they were 49.0 kg, 28.0 kg and 0.297 kg, respectively, compared with lambs of the control group (T1) without treatment and addition, which recorded the lowest values and were 31.7 kg, 10.5 kg and 0.115 kg respectively, the lambs of the second (T2) and third (T3) groups were statistically similar, but arithmetical differences were observed in all traits in favor of the lambs of the second group (T2) treated with urea, amounting to 41.7 kg, 20.5 kg and 0.226 kg, respectively, compared with the third group (T3), which They were 39.6 kg, 18.1 kg, and 0.198 kg, respectively, and this may be attributed to a response to the consumption of roughage and concentrated feed when treated with urea or adding molasses or both to the roughage feed and caused increases in consumption (Table 3, 4), which may have resulted in providing a balance of nutritional compounds and a suitable environment for microorganisms in the rumen (Hassan and Hassan, 2005) and thus perfect digestion, which was positively reflected on the weight increases, especially in the fourth group lambs, whose quantities of concentrated feed (2.5% of live weight) change according to the new weights weekly.

Table 6
Effect of treatment Alfalfa hay stalks with urea and adding molasses to the diets of the four treatments for fattening Awassi lambs in the final weight (kg) and the total and daily weight gains (mean ± standard error)

Traits	Groups				Significant level
	T1	T2	T3	T4	
Initial weight (kg)	21.2 ± 0.917	21.2 ± 0.374	21.5 ±1.190	21.0 0.447 ±	N.S
Final weight (kg)	C 31.7 ± 1.654	B 41.7 ± 1.554	B 39.6 ± 2.158	A 49.0 ± 0.856	**
Total weight gain (kg)	C 10.5 ± 0.861	B 20.5 ±1.609	B 18.1 ± 1.734	A 28.0 ± 0.802	**
Daily weight gain (kg)	C 0.115 ± 0.010	B 0.226 ± 0.018	B 0.198 ± 0.019	A 0.297 ± 0.010	**

The averages with different letters within the same column differ significantly between them,
**(P<0.01), N.S: Not significant.

The results of our study agreed with what Alshefea and Hassan (2021) obtained from a highly significant increase (P<0.01) in the daily weight gain and final weight, our results also agreed with what was found by Al-Mamouri (2022) that there is a highly significant (P<0.01) in the daily and total weight gain in favor of urea treatment (7.17%) compared with the untreated when replacing treated and untreated yellow corn impurities instead of wheat bran in feeding of Awassi lambs, it also agreed with what was found by Osman et al. (2020) that there was a highly significant increase (P< 0.0001) in final weight and daily gain in a group fed with addition of 40% molasses compared to other groups when feeding young Nubian goats due to increased palatability of molasses, and also agreed with the results of Abera et al. (2016), while our results did not agree with what Saro et al. (2019) found, there are no significant differences in the daily weight gain and final weight when replacing soybean with urea in fattening Assaf lambs.

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