# NUTRITIONAL EFFECTS OF FEEDING DATE PITS TO BARKI LAMBS ON THEIR GROWTH PERFORMANCE, RUMEN AND BLOOD PARAMETERS, AND ECONOMIC EFFICIENCY

**M.H. Bakr, R. A. Ali, A.E. M. Mahmoud and H. A.F. Rahmy**

***Animal Production Department, Faculty of Agriculture, Cairo University, 12613, Giza, Egypt.***

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## SUMMARY

Twenty-four Barki male lambs (average LBW 25±2.1 kg) were randomly allocated into four similar groups (six lambs of each) to study the effect of partial replacement of yellow corn grains and wheat bran by mixture of date pits and soybean meal (DPSBM; DP 88.64%: SBM 11.6%) and decrease the feed cost. The Lambs were fed four iso-caloric iso-nitrogenous rations; G1 (control), G2. G3 and G4 were included 10, 20 and 30% of DPSBM respectively) for 90 days to investigate the effect of this replacements on growth performance, digestibility, rumen, and blood measurements, and on economic efficiency. The results showed that partial substitution of yellow corn grains and wheat bran by DPSBM (G2, G3 and G4) insignificantly ($P > 0.05$) affected nutrients digestibility of CF, EE, NDF, ADF, NFE and nutritive value as a TDN compared to control (G1). However, digestibility of DM, OM, CP, and nutritive value as DCP were highest in G1 than other groups and the difference between the other groups (G2, 3 and 4) were not significant ($P>0.05$). The values of pH and TVFA´s among groups were insignificantly ($P>0.05$) affected, however the effect on $NH_3$-N was significantly ($P \leq 0.05$) decreased by increasing the replacement levels of DPSBM and G1 had the highest value compared to other groups. All blood parameters were in normal range for sheep. The values of total protein, albumin and the AST were not significantly ($P>0.05$) affected. The urea level of the G1 was significantly ($P \leq 0.05$) lower compared to all groups. The creatinine values of G2, G3 and G4 were significantly ($P<0.05$) higher than control group. The ALT level of the control group was significantly ($P \leq 0.05$) lower than the other groups. Average daily live body weight gain (g/h/d) in G1, 2 and 3 was approximately equals but G4 (30% DPSBM) showed the lowest value (162 g/h/d) compared to other groups. Feed intake (kg/h/d) as fed, DM, OM and CP decrease by increasing the replacement levels of DPSBM compared to control group. Feed conversion ratio (kg DMI/ kg gain) at G2 (20% DPSBM) was superior to the other experimental rations and it was 6.62 compared to 6.78 (control) and 6.72 (G1, 10% DPSBM) wherever G4 achieved the lower value (7.72). The cost of one ton of CFM was lower by 3.9%, 7.8% and 11.7 % in G2, G3 and G4 respectively than cost of CFM of (G1). TMR price (LE/kg) and total feed cost (LE/h/d) also decreased by increasing the replacement levels. The result showed that feed cost (LE) for producing 1Kg of gain in G2 and 3 were better than the cost in control group and G4 showed the highest cost compared to other groups and this reflect in the value of REE (%) / 1kg gain, daily gain income (LE/h) and REE (%) /h/d. **It** can be concluded that DPSBM can be utilized effectively in the ration at replacement percentage of 10-20% of yellow corn grains and wheat bran without adversely effecting growth performance, digestibility blood metabolites and rumen parameters of Barki lambs. Whereas substitution of DPSMB by 30% reduced animal performance and profitability. The low price of DP or the mix of DPSBM compared with yellow corn grains and wheat bran make the partial substitution economically advantageous.

***Keywords**: Date Pit, soybean meal, yellow corn, wheat bran, digestibility, rumen parameters, blood, Economic efficiency and sheep.*

## INTRODUCTION

In 2021, wheat exports by the Russian Federation and Ukraine accounted for about 30% of the global market. Russia's global maize export market share is comparatively limited, standing at 3% between 2016/17 and 2020/21. Ukraine's maize export share over the same period was more significant, averaging 16% and placing it as the world's 4th largest maize exporter (FAO, 2022). Also, in 2021, both the Russian Federation and Ukraine ranked amongst the top three global exporters of wheat and maize321 (FAO 2022). The crisis between Russian and Ukraine has sent shockwaves through global markets when food markets are already struggling with soaring prices and the challenges that the world has been facing because of the COVID-19 pandemic.

Egypt ranking as a highest global wheat importer, on average (2016/17 – 2020/21), 60 % or more of their wheat imports from Ukraine and the Russian Federation. Based on 2021/22 import forecasts and actual imports in the first half of the marketing year, Egypt, have outstanding imports of approximately 6.6 million tons. Egypt imports approximately one third of maize from Ukraine. FAO estimates that Egypt have approximately 4.6 million tons of outstanding imports for the second half of 2021/22.

According to USDA (2022), Egypt's grains imports from Russian-Ukrainian were affected by the last crisis. Accordingly, FAS Cairo forecasts Egypt's wheat imports in May 2022/23 (July – June) at 11 MMT, down by 8.3 % from May 2021/22 Post's import estimate figure of 12 MMT. Wheat production in May 2022/23 is up by 8.9 % from the previous marketing year. Corn and rice production in May 2022/23 (Oct – Sept) are forecast to be like the previous marketing year. May 2021/22 (Oct – Sept) corn imports are expected to decline by 5.1 percent.

As a result of Russian-Ukrainian crisis, with challenges that Egypt has been facing because of the COVID-19 pandemic and problem of international transportation etc.; all these factors increasing the price of yellow corn grains and wheat bran as a byproduct from wheat grains; these two feed ingredients represent more than 65% of concentrate feed mixture (CFM) of ruminants in Egypt.

So, the increase in feed price encouraged the specialists in ruminants' nutrition to search for cheaper feed ingredients. Nutritionists searched for alternative local feedstuffs, or agro-industrial by-products, that may partially replace corn grains and/ or wheat bran in animal rations. Especially those that animals do not compete with humans to consume. Date pits (DP) may have a good source in solve this issue.

Dates are not suitable for human consumption; palm fronds and DP are considered the wastes as a good alternative feed which can be high utilized efficacy by ruminants (Sundus, 2021). The DPs are considered a waste byproduct of date during use of date for various purposes such as confectionery, prepare date syrup and so on. At present, seeds are used mainly as animal feeds in the cattle, sheep, camel, and poultry diets.

Date palms is the major tree crop in Egypt and industry produced large quantities of dates by-products which may be used for ruminants feeding including low quality dates, DPs and fronds or date palm leaves (Galab *et al*., 2021). Egypt ranked number one in the world in the date production and produced 1,603,762 metric ton (FAO, 2019). Egypt's produces 21% of world's dates (1.7 MT) according to last available data by FAO 2020 (Egypt today 2020). Low quality dates can used in rations of livestock, and several studies showed that possibility using it in producing feed for feeding livestock (Ahmed *et al.,* 2014).

The DP (known also as date stones, kernels, or seeds) represents about 13-15% of the total weight date fruits (Hussein *et al.* 1998). The DP contains about 10-20% crude fiber (CF) and 55-70% nitrogen free extract (NFE) depending on date species and varieties (FAO 1999). About 55-73% of NFE in the DP is mainly starch (Ali *et al.* 1999). The DP characterized by high carbohydrate as an energy source and cellulose, hemicelluloses and lignin which are essential for ruminant diet (Sundus, 2021) but it has a low nitrogen content, so it needs nitrogen additives or treatments (Selmi *et al*., 2011) or enrichment to improve CP value by mix with meal.

Therefore, the present study was carried out to investigate the effect of partial substitution of yellow corn grains and wheat bran (1:1) by mix of date pits and soybean meal (DPSBM) in Barki lamb's rations, on average daily gain, nutrients digestibility, blood parameters, rumen parameters and economic efficiency.

## MATERIALS AND METHODS

***Experimental rations:***

The experimental lambs were fed four different rations (G1, G2, G3 and G4). Mixture of DP and soybean meal (DPSBM; DP 88.64%: SBM 11.6%) was prepared to partially replace with yellow corn grains and wheat bran (1:1) to formulate iso-caloric iso-nitrogenous rations and decrease the cost. The control group (G1) received CFM without DPSBM. Lambs in the second, third and fourth groups were fed CFM contained respectively, 10%, 20% and 30% of DPSBM as presented in Table (1). The alfalfa hay was used as roughages in formulation of experimental total mixed rations (TMR) as showed in Table (2). The extended ratio of concentrate to roughage in all rations was approximately 60:40 on DM basis.

**Table (1): Formulation of the experimental concentrate feed mixtures (CFM).**

| Feed ingredient | Inclusion of DP % | | | |
|---|---|---|---|---|
| | G1 (C) | G2 (10% DPSBM) | G3 (20% DPSBM) | G4 (30% DPSBM) |
| Yellow corn | 58.5 | 53.5 | 48.5 | 43.5 |
| Wheat bran | 22 | 17 | 12 | 7 |
| Soya bean meal | 15.0 | 16.1 | 17.3 | 18.4 |
| Date Pits | 0 | 8.9 | 17.7 | 26.6 |
| Salt | 1 | 1 | 1 | 1 |
| Limestone | 2.1 | 2.1 | 2.1 | 2.1 |
| Mineral mix* | 0.3 | 0.3 | 0.3 | 0.3 |
| Na2HCo3 | 1 | 1 | 1 | 1 |
| Toxin binder | 0.1 | 0.1 | 0.1 | 0.1 |
| Total | 100 | 100 | 100 | 100 |

** Each 1 Kg of vitamin contains of vit A $8^6$ IU, vit $D_3$ $4^5$ IU, vit E $3^4$ mg, carbonate calcium up to 1 Kg, and each 2 Kg of minerals contains of Zinc $5^4$ mg, Iron $5^4$ mg, Iodine 500 mg, cobalt 100 mg, manganese $5^4$ mg, cupper $1^4$ mg. DPSBM: Mixture of date pits and soybean meal.*

**Table (2): Formulation of the experimental total mixed rations (TMR).**

| Feed ingredient % of DM | Inclusion of DPSBM % | | | |
|---|---|---|---|---|
| | G1 (C) | G2 (10% DPSBM) | G3 (20% DPSBM) | G4 (30% DPSBM) |
| Alfalfa hay | 40 | 40 | 40 | 40 |
| Yellow corn | 35.1 | 32.1 | 29.1 | 26.1 |
| Wheat bran | 13.2 | 10.2 | 7.2 | 4.2 |
| Soya bean meal | 9.0 | 9.7 | 10.4 | 11.0 |
| Date Pits | 0.0 | 5.3 | 10.6 | 16.0 |
| Salt | 0.6 | 0.6 | 0.6 | 0.6 |
| Limestone | 1.3 | 1.3 | 1.3 | 1.3 |
| Mineral mix* | 0.2 | 0.2 | 0.2 | 0.2 |
| Na2Co3 | 0.6 | 0.6 | 0.6 | 0.6 |
| Toxin binder | 0.1 | 0.1 | 0.1 | 0.1 |
| Total | 100 | 100 | 100 | 100 |

*DPSBM: Mixture of date pits and soybean meal.*

***Experimental animals:***

Performance trail was conducted on Barki lamb breed. The Twenty-four Barki male lambs (with an average life BW of 25±2.1 kg and an average age of 120±14 days) were randomly allocated into Four similar groups (six lambs of each). Animals were housed during the experimental period in open house system. The experimental CFM and alfalfa hay (TMR) were offered together for lambs 2 times per day at 8:00 am and 5:00 pm and animals were fed ad libitum. The study lasted 90 days and the first week was considered to adaptation of the animals to experimental conditions. The animals had free access to water. Animal's weights were recorded each 21 days and the feeding rates were adjusted. Feed conversion ratio (FCR) was calculated by dividing of BW changes to average DM feed intake of animal.

***Digestibility trials:***

Digestibility trials were carried out using five mature Barki rams in complete randomized design to evaluate the experimental ration by bag technique. Their average body weight was 45±5 Kg. All animals were kept in pens individual.

In this trial rams were fed CFM and Alfalfa hay twice daily at 8 am and 5 pm. Each trail was divided into two stages: a preliminary period of 21 days to allow animals to adapt to each ration. This was followed by 7 days collection period during which ad lib feed intake was measured, and total collection of feces was done. Representative samples of one tenth of the voided feces was taken daily just after collection. Feces samples were weighed and dried at 60 C for 24 hrs. in a hot air oven. The dried samples of feces and feeds were ground to pass through 1 mm sieve and stored in clean bottles for chemical analysis.

***Sampling and analysis:***

***Feeds and feces sampling and it's chemical analysis:***

Feeds and feces were analyzed for proximate analyses According to (AOAC, 2000) and nitrogen free extract (NFE) was calculated by the difference.

***Feces Collection:***

For seven consecutive days, individual feces samples were collected in the morning before feeding. A ten percent sample of the total collected feces of everyone were sprayed with 10% formaldehyde and 10% sulfuric acid, respectively. Then the sample were dried at 70 C for 24 hours. Total digestible nutrients (TDN) were calculated according to the classic formula of McDonald *et al.* (1995) as follows: TDN, % = digestible CP % + digestible CF % + digestible NFE % + (digestible EE % * 2.25).

***Blood sampling:***

At the final day of the trial, blood samples were individually taken from the jugular veins of individual animals. Blood samples were directly collected into clean dried heparinized glass tubes and centrifuged at 4000 rpm for 20 minutes. Blood plasma was then transferred into a clean dried glass vial then stored at -18 C until the chemical analysis. Blood plasma constituents were determined using commercial kits. Total protein and creatinine as described by Tietz (1986 and 1990), albumin was determined according to Doumas *et al.* (1971), urea was determined according to Patton and Grouch (1977). Alanin amino transferase (ALT) and activities of Aspartate transferase (AST) were determined according to Young (1990).

***Rumen liquor sampling:***

At the end of each collection period, rumen liquor samples were taken before the morning feeding. Rumen liquor samples were collected through rubber stomach tube attached to electric suction pump. Samples of rumen liquor were strained through two layers of cheese cloth. The pH value of rumen liquor sample was directly determined using a pH meter. Strained rumen liquor (SRL) samples were acidified with 0.1 N hydrochloric acid and concentrated orthophosphoric acid and stored by freezing for the determination of total volatile fatty acids (TVFA´s). Concentration of ammonia-N in rumen liquor was determined according to Conway (1957). The concentration of total VFA´s was determined in rumen liquor by the stream distillation method (Warner, 1964) using Markham micro distillation apparatus.

***Simple economic efficiency:***

The economic efficiency of the experimental rations was expressed as the cost of feed consumption for producing one kg of daily gain of growing lambs.

***Statistical analysis:***

The experimental data obtained from the present study were statistically analyzed using one-way analysis of variance according to the following model: -

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

Where: $Y_{ij}$= experimental observation, μ = general mean of treatments, $T_i$ = effect of treatment, $e_{ij}$ = experimental error

## RESULTS AND DISCUSSION

***Chemical composition of experimental feed ingredients and total mixed rations:***

Data of chemical composition on DM basis of the experimental feed ingredients and total mixed rations (40% alfalfa hay and 60% CFM) are presented in Table (3).

**Table (3): Chemical composition of the experimental feed ingredients and experimental rations (on DM basis).**

| Ingredient | Chemical composition % (DM) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | DM | OM | CP | CF | EE | NDF | ADF | NFE | Ash |
| Alfalfa hay | 90.76 | 88.68 | 16.8 | 19.42 | 4.25 | 41.27 | 37.63 | 48.21 | 11.32 |
| Yellow corn grains | 90.00 | 97.35 | 8.01 | 3.21 | 1.92 | 21.61 | 4.09 | 84.21 | 2.65 |
| Wheat bran | 87.21 | 95.79 | 14.11 | 6.37 | 2.21 | 33.41 | 8.65 | 73.1 | 4.21 |
| Soya bean meal | 87.77 | 93.88 | 43.21 | 8.21 | 2.31 | 15.75 | 9.32 | 40.15 | 6.12 |
| Date Pits | 93.2 | 96.48 | 6.94 | 22.91 | 4.17 | 43.71 | 28.85 | 62.46 | 3.52 |
| Experimental TMR (40% hay+60% CFM) | | | | | | | | | |
| G1 (C) | 90.01 | 90.74 | 15.28 | 10.47 | 2.87 | 29.92 | 18.47 | 62.10 | 9.26 |
| G2 (10% DPSBM) | 90.24 | 90.71 | 15.28 | 11.46 | 2.99 | 30.70 | 19.68 | 60.98 | 9.29 |
| G3 (20% DPSBM) | 90.48 | 90.69 | 15.28 | 12.45 | 3.10 | 31.48 | 20.90 | 59.86 | 9.31 |
| G4 (30% DPSBM) | 90.72 | 90.67 | 15.28 | 13.44 | 3.21 | 32.27 | 22.12 | 58.73 | 9.33 |

*DPSBM: Mixture of date pits and soybean meal.*

Chemical composition of date pit varied according to the type of crop. Dates through several studies were conducted in the following proportions approximation: DM 90-95%; 5-7 % CP; 2.5-5 EE; ash 1-10 and carbohydrates 55-65% (Youssef and Fayed 2001, Galab *et al.,* 2021). The results of chemical composition of date pits in this study agree with this range. Date pits have 96.48 % of OM and 3.52 of ash and this result are very near to that found by youssef and Fayed (2001) they found that date pits have 95.99% OM and 4.01 Ash.

The results showed that DM, OM, CP, and ash values between TMR groups are approximately equals and the values of CF, EE, NDF, and ADF are increasing by increase the replacement level of DPSBM and the contrast with NFE values.

***Digestibility and nutritive value of the experimental rations:***

Effect of partial substitution of yellow corn and wheat bran by DPSBM on Digestibility and nutritive value of the experimental groups are showed in Table (4).

**Table (4): Effect of partial substitution of yellow corn and wheat bran by mixture of date pits and soybean meal (DPSBM) in Barki lambs' rations on nutrients digestibility and nutritive value of the experimental rations.**

| Experimental ration | Digestibility % | | | | | | | | Nutritive values% | |
|---|---|---|---|---|---|---|---|---|---|---|
| | DM | OM | CP | CF | NDF | ADF | EE | NFE | TDN | DCP |
| G1 (C) | 65.77[a] | 71.69[a] | 73.16[a] | 56.13 | 48.5 | 29.8 | 78.15 | 74.34 | 68.28 | 11.18[a] |
| G2 (10% DPSBM) | 61.84[ab] | 68.36[ab] | 70.78[ab] | 51.14 | 42.6 | 27.9 | 76.02 | 71.75 | 65.54 | 10.81[ab] |
| G3 (20% DPSBM) | 61.21[b] | 66.92[bc] | 67.82[bc] | 57.74 | 43.8 | 30.4 | 76.82 | 71.48 | 65.70 | 10.6[bc] |
| G4 (30% DPSBM) | 61.67[ab] | 68.96[ab] | 67.25[bc] | 58.93 | 46.1 | 32.6 | 77.35 | 72.34 | 66.28 | 10.28cd |
| P value | 0.0271 | 0.0208 | 0.0071 | 0.1186 | 0.1256 | 0.2567 | 0.3167 | 0.0298 | 0.0156 | 0.0016 |
| SEM | 1.0161 | 1.0265 | 0.9439 | 1.5276 | 1.2896 | 1.0563 | 1.00689 | 0.9762 | 0.7938 | 0.1333 |

Partial substitution of yellow corn grains and wheat bran by different levels of DPSBM (G2, G3 and G4) insignificantly ($P<0.05$) affected nutrients digestibility of CF, EE, NDF, ADF, NFE and nutritive value as a TDN compared to control group (G1). These results agree with those of Galab *et al.* (2021) who found insignificant difference between control and discarded dates groups 2 and 3 (7.5% and 15%) on digestion coefficient% of CF, EE, NDF, ADF, NFE.

Also, Hmeidan *et al*. (1993) found that, it is possible to add dates of poor quality as part of the mixture of dates and hay component to sheep fattening diets and the percentage of 33% did not leads to any negative results on the factors of digestion of nutrients.

In another species, Abd El-Rahman *et al*. (2012) found that digestibility DM, CP, CF, EE and NFE in goats fed on diets containing different levels of cull Dates (0, 10, 20 and 40%) are not significantly different among all treatments.

The result showed that digestibility of DM, OM, CP, and nutritive value as DCP were highest in G1 than other groups and the difference between the other groups (G2, 3 and 4) were not significant ($P>0.05$). The results agree with Alhomidy *et al*. (2011) they studied the effect of suitability of discarded dates as an alternative feed for sheep, by 0 (control), 15 and 30% of the concentrates in the diets of Najdi lambs and found that OM digestibility significantly decrease by increase the replacement level.

The study of Ahmed *et al*. (2014) show that, the percentage of whole dates and crushed added dates by 0, 10 and 20 instead of barley showed no significant differences in the digestion coefficient of DM, OM and CP. In contrast results were found by Al-Suwaiegh (2015) appeared that fed the Saudi goats had four progressive ratios of date nuclei and was (0, 10.15 and 20) % significant increase ($P <0.05$) in the digestibility coefficient of DM, OM, CP.

***Rumen liquor parameters of the experimental rations:***

The Effect of partial substitution of yellow corn grains and wheat bran by DPSBM in Barki lambs' rations on rumen liquor parameters are presented in Table (5).

Results showed that, partial substitution of yellow corn grains and wheat bran by different levels of DPSBM (G2, G3 and G4) insignificantly ($P>0.05$) affected on pH and TVFA´s among groups whoever the effect on $NH_3$-N was significantly ($P \leq 0.05$) decreased by increasing the replacement levels of DPSBM and G1 had the highest value compared to other groups.

**Table (5): Effect of partial substitution of yellow corn and wheat bran by mixture of date pits and soybean meal (DPSBM) in Barki lambs' rations on rumen liquor parameters.**

| Item | pH (%) | | | | $NH_3$-N (mg/dL) | | | | TVFA´s (mmol/L) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 3 | 6 | Mean | 0 | 3 | 6 | Mean | 0 | 3 | 6 | Mean |
| G1 (C) | 7.15 | 6.45 | 6.45 | 6.68 | 49ab | 61.6a | 50.4a | 53.67a | 13.2 | 15.8 | 18.5 | 15.83 |
| G2 (10% DPSBM) | 7.25 | 6.45 | 6.4 | 6.70 | 56a | 46.2ab | 45.2ab | 49.13a | 13.2 | 15.3 | 18.2 | 15.57 |
| G3 (20% DPSBM) | 7.05 | 6.3 | 6.45 | 6.60 | 46.2ab | 43.8c | 43.4abc | 44.47b | 14.2 | 14.3 | 16.1 | 14.87 |
| G4 (30% DPSBM) | 7.05 | 6.3 | 6.45 | 6.60 | 32.2c | 47.6ab | 32.2c | 37.33b | 14.8 | 16.3 | 15.1 | 15.40 |
| P value | 0.146 | 0.214 | 0.578 | 0.087 | 0.022 | 0.007 | 0.038 | 0.003 | 0.354 | 0.831 | 0.353 | 0.8403 |
| SEM | 0.259 | 0.057 | 0.063 | 0.17 | 2.101 | 3.071 | 6.676 | 2.39 | 0.889 | 1.697 | 2.228 | 0.958 |

***Blood parameters of the experimental rations:***

The effects of feeding lambs on the experimental rations on some of blood parameters are represented in Table (6).

**Table (6): Effect of partial substitution of yellow corn and wheat bran by mixture of date pits and soybean meal (DPSBM) in Barki lambs' rations on some of blood parameters.**

| Experimental ration | Item | | | | | |
|---|---|---|---|---|---|---|
| | Total protein, g/dI | Albumin, g/dI | Urea, mg/ dI | Creatinine, mg/ dI | GPT (AST), IU/L | GOT(ALT), IU/L |
| G1 (C) | 5.40 | 1.675 | $21.5^{b}$ | $0.99^{c}$ | 17.00 | $15.00^{b}$ |
| G2 (10% DPSBM) | 5.500 | 1.745 | $28.50^{a}$ | $1.09^{ab}$ | 16.5 | $18.5^{a}$ |
| G3 (20% DPSBM) | 5.200 | 1.640 | $23.0^{ab}$ | $1.10^{a}$ | 17.00 | $19.00^{a}$ |
| G4 (30% DPSBM) | 5.950 | 1.705 | $28.0^{a}$ | $1.0^{bc}$ | 19.50 | $19.00^{a}$ |
| P value | 0.1859 | 0.398 | 0.05 | 0.044 | 0.0723 | 0.0326 |
| SEM | 0.1616 | 0.0294 | 1.501 | 0.0184 | 0.692 | 0.866 |

The average values of total protein were not significantly (P>0.05) affected by any of the treatments and ranged from 5.2 to 5.95 g/dI. The values of Plasma albumin were also not significantly (P>0.05) affected by any of the tested rations and being, 1.675, 1.745, 1.640 and 1.705 g/dI in G1, G2, G3 and G4 respectively. The urea level of the control group was significantly ($P \leq 0.05$) lower than all groups.

Blood plasma creatinine of experimental groups ranged from 0.99 to 1.10 mg/dI, these results are within the normal range of blood plasma creatinine, 1-2 mg/dI (Koncko, 1989). However, G2, G3 and G4 had significantly (P <0.05) higher creatinine levels than control group (Table 6)

The GPT (AST) values ranged from 16.5 to 19.5 IU/L. These were not significantly (P>0.05) different among groups. However, the G4 had the highest value 19.5 IU/L. The GOT (ALT) levels were significantly different. The ALT level of the control group was significantly ($P \leq 0.05$) lower than the other groups.

***Productive performance and economic efficiency:***

Data in Table (7) showed the effect of partial substitution of yellow corn and wheat bran by DPSBM in Barki lambs rations on average live body weight, feed intake, feed conversion ratio and economic efficiency.

**Table (7): Effect of partial substitution of yellow corn and wheat bran by mixture of date pits and soybean meal (DPSBM) in Barki lambs rations on average live body weight, feed intake, feed conversion ratio and economic efficiency.**

| Item | Experimental ration | | | | Pvalue | SEM |
|---|---|---|---|---|---|---|
| | G1 (C) | G2 (10% DPSBM) | G2 (20% DPSBM) | G3 (30% DPSBM) | | |
| Body weight change | | | | | | |
| Initial live body weight, Kg | 25.6 | 25.5 | 26 | 25.4 | | |
| Final live body weight, Kg | 44 | 43.5 | 43.75 | 40 | 0.578 | 0.2354 |
| Total live body weight gain, Kg | 18.4 | 18.00 | 17.75 | 14.60 | 0.452 | 0.132 |
| Average daily live body weight gain (g/h/d) | 204.4 | 200 | 197 | 162 | 0.654 | 0.0261 |
| Feed intake: | | | | | | |
| Feed intake, As fed (Kg/h/d). | 1.54 | 1.49 | 1.44 | 1.38 | | |
| Total DMI (kg/h/d) | 1.39 | 1.34 | 1.30 | 1.25 | | |
| Feed conversion ratio (kg DMI/ kg gain)[1] | 6.78 | 6.72 | 6.62 | 7.72 | | |
| OM intake (kg/h/d) | 1.26 | 1.22 | 1.18 | 1.14 | | |
| CP intake (kg/h/d) | 0.21 | 0.21 | 0.20 | 0.19 | | |
| Economic efficiency | | | | | | |
| Concentrate price (LE/kg) | 7.86 | 7.55 | 7.24 | 6.94 | | |
| Alfalfa hay Price (LE/kg) | 3.5 | 3.5 | 3.5 | 3.5 | | |
| TMR Price ((LE/kg) | 6.11 | 5.93 | 5.75 | 5.56 | | |
| Total daily Feed cost (LE/h/d)[2] | 9.42 | 8.84 | 8.29 | 7.68 | | |
| Feed cost (LE/1Kg gain)[3] | 46.05 | 44.18 | 42.01 | 47.31 | | |
| REE(%) / 1kg gain [4] | 100% | 96% | 91% | 103% | | |
| Daily gain income (LE/h)5 | 18.40 | 18.00 | 17.75 | 14.60 | | |
| Income (LE/h/d)[6] | 8.98 | 9.16 | 9.46 | 6.92 | | |
| REE (%) /h/d[7] | 100.00 | 0.98 | 0.95 | 1.30 | | |

*DMI: Dry matter intake; kg: Kilo gram; d: day. REE: Relative Economic efficiency.[1]Feed conversion ratio= quantity of DMI (kg) divided by quantity of gain (kg). [2]Total Feed cost (LE/h/d): TMR price (LE/kg)* Feed intake, As fed (Kg/h/d). Feed cost (LE/1Kg gain)[3] : cost of feed for producing one kg gain. [4]REE(%) / 1kg gain: The cost of feed intake for produce one kg gain per lamb in each group relative to the control group cost *100. [5]Daily gain income (LE/h): Average daily gain * market price of one kg life weight (90LE). [6]Income (LE/h/d): Daily gain income (LE/h) - Total Feed cost (LE/h/d). [7]REE (%) h/d: Income (LE/h/d) in each group relative to the control group *100.*

Average daily live body weight gain (g/h/d) in G1, 2 and 3 was approximately equals but G4 (30% DPSBM) showed the lowest value (162 g/h/d) compared to another groups. The decrease in average daily gain may be related to the decrease in OM digestibility of date pits groups (G2, 3 and 4) compared to control group. This result in agreement with this found by Galab *et al*. (2021) when used discarded dates in rations of Ossimi lambs by 7.5 and 15% replaced from yellow corn grains and found insignificant differences between the discarded dates groups and control group in average daily gain. EL-Hag *et al*., (1993) found that control group had the highest daily increase rates in Awassi sheep and the best nutritional efficiency compared to the other experimental groups (40 and 80%) this research appeared that date kernel may not be equal to barley when used as a primary source of energy in sheep's diets.

Feed intake (kg/h/d) as fed, DM, OM and CP decrease by increasing the replacement levels of date pits in rations compared to control group as shown in Table (7). These results agree with Mansour *et al*., (2019) they studied the effect of replacement 50 and 100% of yellow corn grains (YCG) by date seeds (DS) and found that total DMI was decreased from 213.5kg in G1 (control), 192.2 kg in G2 (50% DS) to 197 kg in G3 (100% DS) per head from weaning to marketing.

These results not in agreement with that found by Ibrahim (2012); showed that the use of feed cubes containing dates and various nitrogenous sources affected significantly ($P < 0.05$) in the amount of feed

consumed in the daily intake of DM, OM, CP and dissolved carbohydrates. Also, Abbes (2013) in an experiment conducted on Awassi lambs that feeding different percentages of dates (0, 10 and 20% ) were substituted with two nitrogen sources either soybean or urea showed an increase in the amount of intake at the level of 10% of dates, possibly due to an increase in the palatability of the diet. In other species, Al-Suwaiegh (2016) also found increased DMI and feed efficiency of goats fed ration containing 10 and 20% of date nuclei compared to control or 30% date nuclei group.

Feed conversion ratio (kg DMI/ kg gain) at G2 (20% DPSBM) was superior to the other experimental rations and it was 6.62 compared to 6.78 (control) and 6.72 (G1, 10% DPSBM) wherever G4 achieved the lower value (7.72).

Concentrate price (LE/kg): The CFM cost (LE/ ton) was decreased by increasing replacement levels of DPSBM in the experimental groups. The market price of one ton of yellow corn grains was 8000 LE, wheat bran 6000 LE, soyabean meal 11200 LE and date pits 3000 LE and the DPSBM 3932 LE. So, the cost of one ton of CFM was decreased by 307, 614 and 921 LE in G2, G3 and G4 respectively, lower than CFM of control group (G1). In other words, the cost of one ton of CFM was lower by 3.9%, 7.8% and 11.7 % in G2, G3 and G4 respectively than CFM of control group (G1). These results agree with Mansour *et al*., (2019) they found that date supplementations by 50% and 100% from yellow corn grains decrease the cost of CFM by 20.8 and 37.5% respectively.

TMR price ((LE/kg) and total feed cost (LE/h/d) also decreased by increasing the replacement levels of DPSBM in the experimental group as showed in Table (7).

The result showed that feed cost (LE) for producing 1Kg of gain in G2 and 3 were better than the cost in control group and G4 showed the highest cost compared to other groups and this reflect in the value of REE (%) / 1kg gain, daily gain income (LE/h) and REE (%) /h/d. So, it is recommended to replace 20% of yellow corn grains and wheat bran (1:1) by DPSBM (DP 88.64%: SBM 11.6%) as a good application in beef sheep farms and concentrate feed manufacturing factories.

These results agree with Galab *et al*. (2021), who found that feeding lambs discarded dates in different levels (7.5 and 15%) increases profitability. Also, Abd El-Rahman *et al*. (2012) who found increasing in net feed revenue and economic feed efficiency when fed kids cull dates in different levels (0, 50, 75 and 100%).

## CONCLUSION

It can be concluded that DPSBM can be replaced effectively in the ration from 10-20% of yellow corn grains and wheat bran without adverse effect on growth performance, digestibility blood metabolites and rumen parameters of Barki lambs. whereas substitution of DPSMB by 30% reduced animal performance and profitability. The low price of DP or the mix of DPSBM compared with yellow corn grains and wheat bran make the partial substitution economically advantageous.

## REFERENCES

Abbes, I. R. (2013). Effect of substituting date by barley with two sources of nitrogen on Awassi lambs performance. Master Thesis in Agricultural Science - Animal Resources. University of Baghdad

Abdel-Rahman, H.H.; A.A Abedo; Y.A.A El-Nomeary; M.M. Shoukry; M.I. Mahamed and Mona S. Zaki. (2012) Response of replacement of yellow corn with cull dates as a source of energy on productive performance of goats kids. Life Sciences Journal Vol. 9 (4):2250-2255.

Ahmed, A.A.; M.J. Hassan and Al-Jadoui (2014) Effect of substitution low quality Zahdi date in rations instead of barley on Awassi sheep performance. The Iraqi Journal Agricultural Sciences. 45(4):359-367

Alhomidy, S.N.; S. Basmaeil; A.N. Al-Owaimer; E A.M. l-Waziry and M. Koohmaraie (2011) Effect of feeding different amounts of discarded dates on growth and efficiency of digestion in sheep. Australian Journal of Basic and Applied Sciences Vol. 5(3): 636-640.

Al-Suwaiegh , S. B. (2015). Effect of substitution of date pits in concentrate feed on growth performance and nutrients digestibility of Ardi goats . Asian J. Anim. Sci., 9: 110-118.

Al-Suwaiegh, S.B (2016) Effect of substituting different levels of date pits and urea treated palm leaves on growth performance and nutrients digestibility of Ardi goats. Research Journal of Veterinary Sciences. Vol. 10:1-8.

AOAC (2000). Association of Official Analytical Chemists. Official methods of analysis 14th Ed. Published by the A. O. A. C. Washington, DC, USA. 684p.

AOAC (1995). Methods of Analysis. Vol. 1: Agriculture chemicals, Contaminants, Drugs. 16th ed. Association of official Analytical chemists, Washingon, DC, USA.

Conway, E.F. (1957). Modification analysis and volumetric error. Rev. Ed. Lockwood, London.

Doumas, B.; W. Wabson and H.Biggs (1971). Albumin standards and measurements of serum with bromocgresol green. Clin. Chem. Acto., 75, 31-87.

EL-Hag, G.,Y.M.Al-Yousef and F.N AL-Mul- him (1993). Astudy of different proportions of date in the ration of sheep. The third Symposium on the Date palm in king faisl University – ALHassa-Saudia Arabia , 17-20 January-Vol.2-pp343-350.

FAO (1999) Date Palm Cultivation. FAO Plant Production and Protection Papers, Rome, 312pp.

FAO (2022). Impact of the Ukraine-Russia conflict on global food security and related matters under the mandate of the Food and Agriculture Organization of the United Nations (FAO). Council 13-17 June 2022. Session 170. PP1-17.

FAO 2020 (Egypt today 2020). Egypt's produces 21% of world's dates: FAO. Available at: https://www.egypttoday.com/Article/3/90848/Egypt-s-produces-21-of-world-s-dates-FAO#:~:text=CAIRO%20%E2%80%93%2015%20August%202020%3A%20A,million%20tons%20by%2021%20percent.

Galab H. O.H.; G. El- Sayaad; A.S.M.Soliman; H. M. A.El-Sayed; T. M.M. Hassan (2021). Effect of Feeding Discarded Dates, Palm Leaves and Its Combination on Growth Performance, Diet Digestibility, Blood Metabolites and Profitability of Ossimi Lambs. Animal Biotechnology, Pp: 153-160.

Hammad W, Abo Omar J, Othman R, AlShanti H. (2002). Comparison and evaluation of Awassi lambs fattening system in Palestine. Egyptian J. Nutr. and Feeds. 5(1):23-29.

Hmeidan , M.C.,G. A.ELag ,M. AL-Dosary , Y . AL-Yosif and I. AL-Turki (1993). Use of date as an alter – Fattening rations The Third Symposium on Thr Date Palm in king Faisal Universisty – Alhassa- Saudia Arabia , 19-20 January Vol . 2- pp 359-366.

Hussein A.S., G.A. Alhadrami and Y.H. Khalil (1998). The use of dates and date pits in broiler starter and finisher diets. Bioresource Technology. 66 (3):219-223.

Ibrahim S. S. (2012). Effect of using feed blocks containing different nitrogen sources and with or without peaker yeast on performance of Awassi sheep. Master Thesis - Department of Animal Production, College of Agriculture - University of Baghdad.

Koncko, J . J. (1989). Clinical Biochemistry of Domestic animals, 4th Ed. Academic press, Inc., New york.

Mansour, Sh. F.; F. Moharram; M.F. El-Bassiony; and A.S. El-Hawy (2019). Technical and Economic efficiency of the ruminants feed on Date Seed in Matrouh Governorate. JEAB. 4(4): 892-898.

McDonald, P.; R.A. Edwards; J.F.D. Green halagh and C.A. Morgan (1995). Animal nutrition 5th Ed., Copyright licensing LTD., London. (C.F. El-shinnawy,2003).

MOA (2010). Ministry of Agriculture, Records on various branches of plants and crops Palestinian National Authority;.

Patton, F.G. and S. R. Grouch (1977). Colorimetric determination of urea, Anal. Chem. 49, 468-475.

Selmi, H.; Z. Khaldi; G. Tibaoui; A. Ben Gara; B. Rekik and H. Rouissi (2011). Nutritional preliminary characterization of some varieties of dates and palm down graded as ruminant feed. J. Anim. and Feed Res., 1(2):73-76.

Sundus, F.M (2021) Review: The Effect of Using Discarded And By-Product of Dates Palm In Ruminant's Performance. International Journal of Aquatic Science. Vol 12,(2): 5221- 5228.

Tietz, N.W. (1986). Text Book of Clinical Chemistry. W.B. Saunders, Philadelphia, 1271.

Tietz, N.W. (1990). Clinical Guide to laboratory Tests 2nd Ed. Philadelphia

USDA (2022). Import Challenges and High Prices Reduces Egypt's Wheat and Corn Imports. Report Number: EG2022-0009. PP1-16.

Warner, A.C.I. (1964). Production of volatile fatty acids in the rumen, methods of measurements. Nutr. Abst. And Rev., 34:39.

Young, D. S. (1990). Effects of drugs on clinical laboratory tests, 3rd Ed. 3-6.

Youssef, K.M. and Afaf M. Fayed (2001). Utilization of some organic wastes as feed supplement for growing goats under desert conditions Egyptian J. Nutrition and Feeds Vol. 4 (2): 91-99.

# التأثيرات الغذائية لتغذية الحملان البرقي على نوى البلح على أداء نموها وقياسات الكرش والدم وعلى الكفاءة الإقتصادية

**محمد حسن بكر ، رضا على ، عادل عيد محمود و حسن عوني رحمي**

***قسم الانتاج الحيواني – كلية الزراعة – جامعه القاهرة - 12613 – جيزة – مصر.***

وزعت عشوائياً أربعه وعشرون من ذكور الحملان البرقي ( متوسط وزن حي 25± 2.1 كجم) إلى أربعة مجموعات متشابهه (ستة حملان في كل مجموعة) لدارسة تأثير الإستبدال الجزئي لحبوب الذرة الصفراء ونخالة القمح بمزيج من نوى البلح (88.64%) وكسب فول الصويا 44% ( 11.6%) ولتخفيض تكلفة العلف المركز. تم تغذية الحملان على أربعة علائق متساوية في محتواها من البروتين والطاقه (م1، م2، م3، م4) والتي تضمنت على مزيج نوى البلح وكسب فول الصويا بنسب 0 و 10%و 20%و 30% على التوالي ولمدة 90 يوم لدارسة تأثير هذا الإستبدال على أداء النمو، معاملات الهضم، قياسات الكرش، قياسات الدم ، وعلى الكفاءة الاقتصادية.

أظهرت النتائج أن الإستبدال الجزئي لحبوب الذرة الصفراء ونخالة القمح بمزيج نوى البلح وكسب فول الصويا (م 2 و 3 و 4) لم تأثر بشكل معنوي على معامل هضم الألياف الخام، الدهن الخام ، NDF و ADF والمستخلص الخالي من الأزوت والقيمة الغذائية في صورة مركبات كلية مهضومة مقارنة بالكنترول (م1) ولكن معامل هضم المادة الجافة والمادة العضوية والبروتين الخام والقيمة الغذائية في صورة بروتين خام مهضوم كانت أعلى في مجموعة الكنترول (م1) مقارنة بالمجموعات الأخرى ولم تكن الاختلافات بين المجموعات الأخرى اختلافات معنويه. لم تتأثر معنوياً قيم الاس الهيدروجيني والاحماض الدهنية الكلية الطيارة بين المجموعات. ولكن التأثير علي نيتروجين أمونيا الكرش إنخفض معنوياً مع زيادة مستوى الإستبدال وسجلت المجموعة الأولى القيم الأعلى مقارنة بباقي المجموعات. كانت جميع قياسات الدم في المعدل الطبيعي للاغنام . ولم تتأثر معنوياً قيم البروتين الكلي والألبيومين، و AST. وكانت قياسات اليوريا أقل بشكل معنوي في الكنترول (م1) مقارنة بالمجموعات الأخرى. كانت قيم الكرياتينين في المجاميع 2 و 3 و 4 أعلى معنوياً من مجموعة الكنترول. وكان مستوى الـ ALT في مجموعة الكنترول اقل معنوياً من باقي المجاميع.

متوسط معدل النمو اليومي (جرام /رأس/ يوم) في المجاميع 1 و2و3 كانت تقريباً متساوية ولكن المجموعة الرابعة أظهرت أقل قيمة ( 162 جرام/راس/ يوم) مقارنة بقيم المجاميع الاخرى. كمية العلف المأكول (كجم/رأس/يوم) في صورة طازجه أو مادة جافة او مادة عضوية ، أو بروتين خام مأكول إنخفضت بزيادة مستوى الإستبدال مقارنة بالكنترول. كفاءة التحويل الغذائي (كجم مادة جافة/ كجم نمو) في المجموعة الثانيه سجلت النتيجة الأفضل مقارنة بالمجاميع التجريبيه الأخرى وكانت 6.62 مقارنة بـ 6.78 (الكنترول) و 6.72 ( م2) بينما سجلت المجموعه الرابعة القيم الأقل (7.72).

سجلت تكلفة طن العلف المركز إنخفاضاً مقدارة 3.9%، 7.8% ، 11.7% في المجاميع 2 و 3 و4 على التوالي مقارنه بالكنترول.سجلت تكلفة العليقه الكلية المخلوطة (جنية/كجم) وتكلفة التغذية الكلية ( جنية /راس/ يوم ) أيضا انخفاضاً مع زيادة مستوى الاستبدال. أظهرت النتائج ان تكلفة التغذية (جنية) لإنتاج 1 كجم نمو في المجاميع 2 و 3 أفضل من الكنترول، وأظهرت المجموعة الرابعة القيم الأعلى مقارنة بالمجموعات الأخرى وهذا انعكس على قيم لكفاءة الاقتصادية النبسيه لكل كجم نمو و لكل راس/ يوم و العائد من النمو اليومي ( جنية/راس/ يوم).

يمكن الاستنتاج **أنه** يمكن استخدام مزيج نوى البلح كسب فول الصويا بشكل فعال في العليقة لإستبدالة بنسبة 10 و 20% من حبوب الذرة الصفراء ونخالة القمح دون أن تأثر سلباً على أداء النمو ، معاملات الهضم، قياسات الدم، قياسات الكرش للحملان البرقي. في حين أن إستبدال هذا المزيج بنسبة 30% أدى إلى تخفيض أداء الحيوانات وربحيتها. إن السعر المنخفض لنوى البلح او لمزيج نوى البلح وكسب فول الصويا مقارنة بسعر حبوب الذره الصفراء ونخالة القمح يجعل الاستبدال الجزئي لهما مفيداً إقتصادياً.