Impact of dietary supplementation of date palm (*Phoenix dactylifera* L.) pollen on hemato-biochemical parameters, antioxidant status, follicular dynamics, and litter size of Rahmani ewes during breeding season

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ABSTRACT:

The current study aims to estimate the efficacy of dietary date palm pollen (DPP) on reproductive performance of Rahmani ewes during the breeding season. The experimental ewes were assigned into four equal groups including a control (fed a basal diet; G1) and other three treatments with that had dietary supplementation of DPP in a dose of 100 (G2), 150 (G3), or 200 (G4) mg/kg of Live body weight, before 4weeks of the breeding season. The results indicated that the higher values of red blood cell count were observed in G3 compared to the other groups (p<0.05). The higher basophil percentage was observed in G2 compared to the other groups (p<0.05). All treatments had lower AST values compared to the control group (p<0.05). Furthermore, the activity of ALP enzyme was increased in a DDP dose dependent manner (p<0.05). The treatments of G2 and G3 had the highest values of catalase enzyme. The highest follicular diameter (mm) during the first week of the breeding season was observed in G4, along with the highest progesterone concentration during the same period. In conclusion, dietary supplementation with 150 and 200 mg/kg DPP/ body weight during the pre-breeding season could significantly improve both reproductive performance and the general well-being of Rahmani ewes.

Keywords: Rahmani ewes; follicular dynamics; antioxidant status; reproductive performance.

INTRODUCTION

Date palm (*Phoenix dactylifera* L) represents one of the oldest cultivated fruit trees. Such trees are widely common in Middle Eastern countries and other western areas (Sabah et al., 2010; Elberry et al., 2011). The pollen is the male reproductive cell of palm flowers (Dokkar) and was used by both the ancient Egyptian and the ancient Chinese people to heal many diseases (Bishr and Desouky, 2012; Amich, 2018).

The date palm pollen (DPP) comprises x-amirin, triterpenoids, saponins, a crude gonadotropic compound, a-D glucan, heteroxylon, galactomannans, estrone and cholesterol. Additionally, compounds such as ß-amirin, ß-sitosterol, rutin, and quercetin, along with triterpenes and saponins, were also found in DPP (Al-Shagrawi, 1998). In Egyptian DPP, the predominant constituents are amino acids, other macro nutrients, and alongside vitamins (B_1, B_2, B_{12}, A, E, and C). Moreover, the pollen contained approximately 1.47% oil, predominantly made up of 68.04% oleic acid (Hassan, 2011; Mokhtar and Samar, 2012; Basuny et al., 2013; Mohamadi et al., 2014). Beside the former benefits of DPP antioxidants that are related to its phytoestrogenic flavonoid content (Al-Farsi et al., 2005), These flavonoids can functionally and structurally interact as an estrogen hormone (Breithofer et al., 1998). The DPP contains estrone, estradiol and estriol (Hassan et al., 2011). Such compounds existing in DDP can improve the animal performance and well-being in many aspects including antioxidant (El-Desoky et al., 1995; Elberry et al., 2011; Hassan et al., 2012), anticancer, and antimutagenic (Barzin et al. 2011), blood hematological, biochemical variables, immunological and other physiological functions (Shahba and Mansour 2022). The administration of DPP capsules for a duration of 1 month can enhance the aspects of sexual function in both infertile male and female. (Jahromi et al., 2022). The application of DPP suspension throughout the stages of gestation and lactation significantly enhances oogenesis in mice (Moshfegh et al., 2015).

From a hormonal perspective, elevated levels of sex hormones can positively influence sexual function. The significance of androgens in female sexual function, particularly concerning sexual desire, has also been highlighted (Garcia-Robledo et al., 2019; Davison and Davis 2011). In this context, administering date palm to adult female rats increases levels of estrogen and progesterone, suggesting a potential role for date palm in enhancing sexual function and addressing infertility in females (Moshtaghi et al., 2010).

Limited Studies are conducted to determine the optimal dietary DPP dose to improve reproductive performance especially in Rahmani ewes as a popular native breed. In this respect, this study aims to evaluate the effects of dietary supplementation of three levels of DPP (100, 150, or 200 mg/kg LBW) on reproductive performance traits of adult Rahmani ewes during the breeding season in Egypt.

MATERIAL AND METHODS

The empirical research was conducted at the Animal Production Department, Faculty of Agriculture, Al-Azhar University, located in Cairo, Egypt, in collaboration with the Animal Production Research Institute (APRI) affiliated with the Agricultural Research Center (ARC), Ministry of Agriculture, during the timeframe spanning from August 2022 to March 2023.

Animals:

We used a total of 32 Rahmani adult ewes, averaging 40.25 kg LBW kept in Sakha Animal Production Research Station, Kafr El-Shikh Governorate, belonging to APRI. All animals were maintained in semi-exposed enclosures, which were partially covered with asbestos, adhering to uniform management protocols. Animals had no signs of illness and displayed a robust and vigorous appearance.

Feeding system:

Ewes were fed according to the recommendations of NRC (2007) for the allowances of DM, TDN and DCP. All animals were fed a basal ration consisting of 40% concentrate feed mixture and 60% fresh berssem (2-3 cut) in winter or berseem hay in summer plus rice straw, while fresh water and mineral salts were available all the days.

The utilized feed concentrate comprised of 40% wheat bran, 30% ground yellow corn, 24% undecorticated cotton seed meal, 3% cane molasses, 2% limestone, and 1% sodium chloride. The amounts of feed were adjusted according to the physiological and productive stages of ewes and rams.

The feeding period started one month before the September mating season up to March. The chemical composition of feedstuffs which fed to ewes is presented in Table 1.

Experimental groups:

The experimental female sheep were stratified into four equivalent cohorts (n=8 each), based on their live body weight (LBW) and age. The dietary groups included ewes which had only a basal diet (control group, G1), basal diet + 100 mg/kg LBW (G2), basal diet + 150 mg/kg LBW (G3), the basal diet + 200 mg/kg LBW (G4). All treated groups received a 3 time/week (wk) oral dose of DPP. The experiment started 4 wk before breeding season (September).

Preparation of date palm pollen:

The utilized DPP in this investigation was acquired from date palm plantations situated within ecologically conserved regions of Kafr El-Shikh Governorate, Egypt during the month of March in the year 2022, subsequently dehydrated and finely ground in its original form, and then preserved at a temperature of -16°C until its application.

Experimental procedures:

Live body weight:

The live body weight (LBW) of the ewes was recorded at the starting (initial) and end (final) of the experiment, and then their body gain was calculated.

Estrus and mating of ewes:

A teaser ram was employed bi-daily at 6-8 am and 3-4 pm to ascertain ewes in estrus. Ewes demonstrating indicators of estrus during the morning interval were subsequently mated with a fertile ram chosen from the identical experimental cohort. A mating session occurred in the evening (3-4 p.m.) of that particular day, followed by an additional mating on the subsequent morning (6-8 a.m.). Ewes that exhibited estrus in the evening were subjected to two mating events: the initial in the morning (6-8 a.m.) of the following day, and the second in the evening (3-4 p.m.) of the same day.

Pregnancy diagnosis:

The ewes were adequately nourished and hydrated prior to the ultrasonography procedure. During the execution of the procedure, each ewe was positioned in a state of dorsal recumbence. A portable scanning device (480 Vet, Pie Medical, Maastricht, Netherlands) featuring a 5 MHz rectal transducer was employed for the imaging. The transducer was affixed to a rectal rod (3 × 64 cm), and a contact gel was applied to the surfaces of both the transducer and the rod to optimize contact and lubrication. The rod was inserted into the rectum to a depth ranging from 15 to 20 cm to facilitate the imaging of the uterine horns. Initially, the transducer's surface was oriented towards the right ileum to visualize the bladder, after which it was

rotated between 120° to 180° in either a clockwise or counterclockwise direction to comprehensively scan the entire pelvic region in each group.

Follicular characteristics:

The dominant follicle's diagonal (mm) on each ovarian was diagnosed using ultrasonography at 2-week pre-season, 1-week pre-season and First week of the breeding season.

Reproductive data:

The following parameters were recorded for the reproductive performance using the following formula:

$$\text{Mating \%} = \frac{\text{Number of mated ewes}}{\text{Number of exposed ewes}} \times 100.$$

$$\text{Conception rate} = \frac{\text{Number of lambed ewes}}{\text{Number of mated ewes}} \times 100.$$

$$\text{Lambed \%} = \frac{\text{Number of lambed ewes}}{\text{Number of bred ewes}} \times 100.$$

$$\text{Prolificacy} = \frac{\text{Number of lambs at birth}}{\text{Number of lambed ewes}} \times 100.$$

$$\text{Fecundity} = \frac{\text{Number of lambs at birth}}{\text{Number of bred ewes}} \times 100$$

Blood samples:

Blood samples were collected from all ewes in each group at mid-breeding season. The blood samples were taken from the jugular vein of each ewe using a sterile needle in a clean dry glass tub containing EDTA for the hematological parameters. However, the blood sample was left in another clean dry glass tub without coagulants at room temperature until coagulating to obtain blood serum by centrifugation at 3000 rpm/15 min, and then the serum was stored at -20 °C until the subsequent biochemical analysis.

***Progesterone (P4) analysis*:**

Progesterone hormone concentration (ng/dL) was determined for samples collected at 2-week pre-season, 1-week pre-season and the first week of the breeding season according to Cobas® (Roche, Germany).

Hematological parameters:

We evaluated hematological parameters which including quantification of red blood cells (RBCs), concentration of hemoglobin (Hb), percentage of packed cell volume (PCV%), count of white blood cells (WBC), as well as the proportions of neutrophils, lymphocytes, monocytes, and eosinophils, using an automated blood cell counter equipped with an Auto Hematology Analyzer (Sysmex F-800, Japan) according to Buttarello (2004).

Blood biochemicals:

Chemical kits were purchased from Diamond Diagnostic Company Kits-Egypt and were utilized to measure total protein and albumin levels in serum in accordance with the methodology outlined by Henry et al. (1974). The globulin concentration was determined by deducting the albumin concentration from the total proteins.

The activities of serum enzymes alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP) and lactate dehydrogenase LDH measurements were performed based on Kinetic method according to the International Federation of Clinical Chemistry (IFCC), utilizing kits acquired from Spectrum Egyptian Biotechnology Company for the enzyme activity assays.

Oxidative stress and antioxidant biomarkers:

We determined the levels of catalase (CAT), and glutathione peroxidase (GPx), malondialdehyde (MDA) in the stored blood serum that was taken at mid-breeding season using chemical kits (Biodiagnostics, Cairo, Egypt). All assays were performed by using a spectrophotometer (Spectro UV-VIS Auto, UV-2602, Labomed, Los Angeles, CA, USA).

Statistical analysis:

The collected data was statistically analyzed by one-way analysis of variance using the SPSS ® statistical software package for Windows version v23.

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

Where: Y_{ij} represents the parameter being examined, m denotes the overall average, T_i indicates the treatment effect, and e_{ij} refers to the experimental error. The significant differences among means were statistically assessed for significance at (p<0.05) based on Duncan's Multiple Range Test (Duncan, 1955).

RESULTS AND DISCUSSION

Hematological parameters:

The data presented in Table 2 elucidates the impact of dietary DDP on the haematological parameters. The higher value of red blood cell count was observed in G3 compared to the control and other treated groups (p<0.05). While the higher value of basophil percentage was observed in G2 compared to control and other treatments (p<0.05). On the other hand,

Hb concentration, PCV value, count of WBCs, and percentages of lymphocytes, neutrophils, monocytes, and eosinophils were not affected significantly by DPP treatment (p>0.05). This finding means that DPP at the level of 150mg/kg showed a partial improvement in the health status of ewes.

The erythrocyte values and its measurements provide important information about various types of anemia. A similar trend was observed by Shahba and Mansour (2022) who indicated that the overall RBC count was significantly higher in rabbit bucks receiving treatments with DPP compared to the control group. The same report points to the fact that mixed bee pollen (BP) and DPP possesses higher PCV levels compared to the control. Furthermore, treatment with both 250 and 500 mg bee pollen /rabbit buck under a hot-humid environment, can improve RBC count, and the percentages of lymphocytes and neutrophils (Abuoghaba et al., 2017). Both BP and DPP positively influence hematological parameters, which related to the presence of numerous nutrients such as antioxidants, vitamins, minerals, essential fatty acids, amino acids, and enzyme components in DPP. Such compounds improve nutritional value, nutrient digestibility, and nutrient absorption (Leja et al., 2007; Šarić et al., 2009; Taghian, et al., 2017).

Blood biochemical:

The findings of the biochemical constituents present in the blood serum of ewes are depicted in Table 3. Results indicated that total protein, albumin, globulin, and LDH values exhibit a high degree of similarity across all groups, with no statistically significant differences observed (p>0.05). Whereas the activity of AST reveals notable reduction in all treatment groups compared to the control group (p<0.05). The former result indicated that DPP possesses a positive impact on hepatic function. Furthermore, ALT activity indicated a significant decrease, especially in G3 and G4 compared to G1 and G2, suggesting that the high DPP dose induces normality in hepatic enzyme activity.

In addition, ALP activity was increased in a DPP dose dependent manner (p<0.05). This result indicated a potential influence of DPP on energy metabolism, phosphorylation process, hepatic activity and the general health.

Similar findings were reported in rabbit bucks by Shahba and Mansour (2022) who claimed that the blood protein profile (concentration of total protein and globulin) exhibited no significant differences between the rabbit groups that were fed DPP and BP. Similarly, the same researchers found a decrease in liver enzymes (ALT and AST) in the treated groups compared to the control. Also, Hedia et al. (2007) and Abuoghaba et al. (2017) found that bucks treated with BP had markedly reduced ALT activity compared to the control bucks.

Oxidative stress and antioxidant biomarkers:

The results related to the assessment of antioxidant levels are presented in Table 4. Results revealed that G2 and G3 had the highest values of catalase (CAT). However, all treatments exhibited higher values compared to the control group (p<0.05). The control group had the higher MDA levels, while lower levels were observed in G3 and G4 treatments than the other groups (p<0.05).

In this regard, Saber et al. (2022) noted a significant increase (p<0.05) in the concentration of catalase (CAT) in the treated groups, especially in the BP group, when compared to the control rabbits. Additionally, the seminal plasma GPx had the highest values in the DPP groups compared to a control group. Moreover, the concentration of MDA had risen (p<0.05) in the treated rabbits as opposed to the control.

The body's antioxidant defense mechanism is insufficient to counteract oxidative damage, leading to oxidative stress, particularly during critical life stages such as the breeding season (Mutinati et al., 2013). This requires supporting animals with natural antioxidants. In the same context, Elberry et al. (2011) and Hassan et al. (2012) have shown that DPP serves as an excellent source of natural antioxidants and attributed this effect to its phytoestrogenic flavonoid content.

Follicular characteristics:

The metrics of follicular diameter (mm) in ewes are outlined in Table 5. The analysis indicated no statistically significant differences among all groups in the weeks preceding the breeding season. Conversely, G4 showed the highest and statistically significant values during the initial week of the breeding season.

The current findings, in conjunction with earlier research, indicate that the date products significantly enhance oogenesis. For instance, Baagar et al. (2022) demonstrated that the increases in the quantity of ovarian follicles and ovulation rate are related to the increasing DPP levels in rabbits. Moreover, Saryono and

Rahmawati (2016) reported a noteworthy enhancement in hormonal regulation, the reinforcement of oocytes, and the success of pregnancies with female fed date fruit.

Progesterone profile:

The concentrations of progesterone within the blood serum of ewes are depicted in Table 6 elucidated. Results indicated an elevation in progesterone levels across all experimental treatments during the week preceding the onset of the mating season and throughout the initial week of the breeding season compared to the control group. Notably, serum progesterone concentration was increased in a DPP dose dependent manner at the first week of the mating season ($p<0.05$).

Note: means with different superscript letters within the same row are significantly different ($p<0.05$).

Parallel with other studies (Bahmanpour et al., 2006; Hassan et al., 2011; Abbas and Ateya, 2011), sex hormones of DPP such as estradiol and the presence of flavonoids increase sexual performance (including sexual function, desire, and intercourse in both males and females) by influencing the central nervous system, promoting dopamine release, and activating the mesolimbic system. Karimi et al., (2016) studied the effect of palm pollen extract on polycystic ovarian syndrome-induced rats and indicated that the group receiving 400 mg/kg of palm pollen extract showed a significant increase in FSH and progesterone levels. A clinical trial was performed on 50 women that were diagnosed with polycystic ovarian syndrome. The findings indicated significant enhancements in sex hormone levels, which included reductions in estrogen and LH levels, alongside increases in progesterone and FSH levels. Interestingly, 6% of the participants became pregnant throughout the study duration (El-Wahed et al., 2022).

Reproductive performance:

The reproductive efficacy of the ewes is presented in Table 7. The results indicated an overall improvement across all experimental groups compared to G1, although these differences were not statistically significant. However, groups 2 and 3 exhibited substantial improvement in several reproductive metrics compared to the other experimental groups. The treatment with DPP led to an increase in the lambing rate, number of lambs born, and other related parameters. In this context, Abd El-Salam et al. (2014) reported that ewes fed dates alone possess higher value of litter weight and reproductive traits.

CONCLUSION

This research sought to evaluate the effect of DPP on the hematological parameters, antioxidant levels, and reproductive efficiency of Rahmani ewes. The findings indicated that many parameters exhibited an improvement in the treatments when compared to the control group. Particularly, the groups administered 150 and 200 mg/kg of DPP (G3 and G4) displayed markedly better results than the other treatments. In light of these results, DPP seems to serve as a beneficial dietary supplement for Rahmani ewes during the breeding season, positively influencing both health and reproductive patterns.

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Table 1. Chemical composition of feed stuffs (% on DM basis).

Item	CFM	FB	BH	RS
DM (%)	89.95	17.06	86.19	89.85
	Chemical composition (%)			
OM	87.76	88.59	89.19	83.85
CP	14.40	16.65	12.65	2.52
CF	15.08	20.98	27.85	30.47
EE	2.40	2.35	3.41	2.10
NFE	55.88	48.61	45.28	48.76
Ash	12.24	11.41	10.81	16.15

CFM: concentrate feed mixture; FB: fresh berseem; RS: rice straw; BH: Berseem hay.

Table 2. Effects of dietary DPP on hematological parameters among experimental groups at the mid-breeding season.

Item	Control	Dietary DPP treatments (mg/kg LBW)			*p*-value
	G1	G2 (100)	G3 (150)	G4 (200)	
RBCs ($x10^6/mm^3$)	6.94 ± 0.39^{b}	7.23 ± 0.11^{b}	8.97 ± 0.18^{a}	7.36 ± 0.42^{b}	<0.01
Hb (g/dl)	9.95±0.54	9.86±0.55	11.31±0.70	9.87±0.06	0.21
PCV (%)	30.33±1.20	30.33±1.20	34.0±1.53	31±0.58	0.16
WBCs ($x10^3/mm^3$)	12.39±0.62	11.5±0.44	11.27±0.51	12.15±0.90	0.59
Lymphocytes (%)	62.67±1.20	61.0±2.19	65.0±1.73	64.0±0.58	0.48
Neutrophils (%)	26.33±2.03	25.67±1.86	25.67±2.60	25.67±0.88	0.99
Monocytes (%)	8.0 ±1.0	7.33±1.20	7.00±0.0	8.33±0.67	0.78
Eosinophils (%)	1.67±0.33	3.0±1.00	1.67±0.67	1.0±0.33	0.33
Basophil (%)	1.33 ± 0.33^{ab}	2.33 ± 0.33^{a}	0.67 ± 0.33^{b}	1.0 ± 0.33^{ab}	0.04

Note: means with different superscript letters within the same row are significantly different ($p<0.05$).

Table 3. Effects of dietary DPP on serum biochemical constituents at mating season.

Item	Control	Dietary DPP treatments (mg/kg LBW)			*p*-value
	G1	G2 (100)	G3 (150)	G4 (200)	
Total protein (g/dL)	6.17±0.32	6.30±0.23	6.23±0.22	6.40±0.10	0.902
Albumin (g/dL)	3.00±0.17	3.10±0.12	3.10±0.10	3.20±0.06	0.711
Globulin (g/dL)	3.17±0.15	3.20±0.12	3.13±0.12	3.20±0.12	0.977
AST (U/L)	79.33 ± 0.88^{a}	68.00 ± 1.16^{c}	66.00 ± 1.73^{c}	72.33 ± 1.20^{b}	>0.01
ALT (U/L)	79.33 ± 2.03^{a}	76.67 ± 2.60^{a}	63.67 ± 0.33^{b}	66.67 ± 1.33^{b}	>0.01
ALP (mg/dL)	124.00 ± 2.517^{c}	140.0 ± 4.16^{b}	143.67 ± 1.45^{ab}	152.67 ± 4.37^{a}	>0.01
LDH (U/L)	544.33±24.31	508.67±40.54	570.33±19.23	581.33±7.84	0.272

Note: alanine aminotransferase: ALT; aspartate aminotransferase: AST; alkaline phosphatase: ALP; lactate dehydrogenase: LDH. Means with different superscript letters within the same row are significantly different ($p<0.05$).

Table 4. Effects of dietary DPP on antioxidant enzymes in ewes during the mating season.

Item	Control	Dietary DPP treatments (mg/kg) LBW			*p*-value
	G1	G2 (100	G3 (150)	G4 (200)	
CAT (U/L)	52.79±0.14^{b}	59.89±0.12^{a}	59.02±1.44^{a}	55.92±1.94^{ab}	0.01
GPx (pg/mL)	10.16±0.09^{b}	12.18±0.50^{a}	12.45±0.77^{a}	12.24±0.50^{a}	0.04
MDA (nmol/mL)	24.80±0.82^{a}	22.43±1.23^{a}	14.63±0.44^{b}	17.76±1.14^{b}	>0.01

Note: catalase: CAT; glutathione peroxidase: GPx; malondialdehyde: MDA. Means with different superscript letters within the same row are significantly different ($p<0.05$).

Table 5. Effects of dietary DPP on the follicle diameter (mm) of ewes during the experimental period.

Item	Control	Dietary DPP treatments (mg/kg LBW)			*p*-value
	G1	G2 (100)	G3 (150)	G4 (200)	
		2-wk pre-season			
Follicular No.	2	2	2	2	-
Follicle diameter	3.98±0.47	4.11±0.51	3.83±0.29	3.94±0.21	0.96
		[1]One-week pre-season			
Follicular No.	2.20±0.20	2.80±0.37	2.20±0.20	2.60±0.40	0.44
Follicle diameter	3.99±0.48	4.29±0.27	3.33±0.16	3.59±0.32	0.20
		The first week of the breeding season			
Follicular No.	2	2	2	2	-
Follicle diameter	4.56±0.21^{b}	5.05±0.21^{ab}	5.02±0.14^{ab}	5.53±0.29^{a}	0.05

Note: means with different superscript letters within the same row are significantly different ($p<0.05$).
[1]At this week there is more than one follicle observed for each ovary

Table 6. Effects of dietary DPP on serum progesterone level (ng/mL) before mating season.

Item	Control	Dietary DPP treatments (mg/kg LBW)			*p*-value
	G1	G2 (100)	G1	G2 (100)	
2-wk pre-season	3.19±0.11	3.22±0.05	3.14±0.07	3.11±0.08	0.78
1-wk pre-season	3.09±0.07	3.27±0.03	3.15±0.03	3.18±0.02	0.07
1st week of mating season	3.11±0.11^{c}	3.17±0.03^{bc}	3.56±0.13^{ab}	3.65±0.18^{a}	0.03*

Note: means with different superscript letters within the same row are significantly different ($p<0.05$).

Table 7. Effects of dietary DPP on the reproductive performance of ewes during the mating period (September season).

Item	Control	Dietary DPP treatments (mg/kg LBW)		
	G1	G2 (100)	G3 (150)	G4 (200)
Number of ewes	8	8	8	8
Initial body weight (kg)	40.25±2.53	40.38±1.80	40.25±1.65	40.38±1.99
Final body weight (kg)	43.00±1.77	43.62±1.53	44.12±1.27	43.88±1.64
Change (kg)	2.75±0.92	3.25±0.45	3.88±0.44	3.50±0.46
Number of ewes in estrus	6	7	6	7
Pregnancy rate	62.5	75	75	75
Number of lambed ewes	5	6	6	6
Lambing rate	83.33	85.71	100	85.71
Total number of lambs at birth	5	7	7	6
Prolificacy rate (litter size per ewe)	100 (1.0)	116 (1.16)	116 (1.16)	100 (1.0)
Fertility rate	62.5	75	75	75
Fecundity	62.5	87.5	87.5	75
Sex ratio (M/F)	40/60 2/5	42. 86/57.14 3/7	57.14/42.86 4/7	50/50 3/6

تأثير إضافة حبوب لقاح نخيل التمر (*Phoenix Dactylifera* L) ككمل غذائي على الخصائص الدموية والكيميائية الحيوية وحالة مضادات الأكسدة وديناميكية الجريبات وحجم المواليد للنعاج الرحمانية خلال موسم التكاثر

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الملخص العربي:

تهدف الدراسة الحالية إلى تقدير فعالية حبوب لقاح نخيل التمر الغذائية (DPP) على الأداء التناسلي لنعاج الرحماني خلال موسم التناسل. تم توزيع النعاج بالتجربة على أربع مجموعات متساوية بما في ذلك مجموعة التحكم (التي تغذت على نظام غذائي أساسي؛ G1) وثلاث معاملات أخرى مع مكملات غذائية من حبوب لقاح نخيل التمر بجرعة 100 (G2) أو 150 (G3) أو 200 (G4) ملغم / كغم من وزن الجسم الحي، قبل 4 أسابيع من موسم التناسل. أشارت النتائج إلى أن أعلى قيم لعدد خلايا الدم الحمراء لوحظت في G3 مقارنة بالمجموعات الأخرى ($p<0.05$). لوحظت نسبة الخلايا القاعدية الأعلى في G2 مقارنة بالمجموعات الأخرى ($p> 0.05$). كان لجميع المعاملات قيم AST أقل مقارنة بمجموعة التحكم ($p> 0.05$). علاوة على ذلك، زاد نشاط إنزيم ALP بطريقة تعتمد على جرعة($p> 0.05$) DDP. أظهرت معاملات G2 وG3 أعلى قيم لإنزيم الكاتالاز. كما لوحظ أعلى قطر للحويصلات علي المبيض (مم) خلال الأسبوع الأول من موسم التكاثر في G4، إلى جانب أعلى تركيز لهرمون البروجسترون خلال نفس الفترة. وفي الختام، يمكن أن يؤدي تناول المكملات الغذائية بجرعات 150 و200 مجم/كجم من DPP/وزن الجسم خلال ما قبل موسم اتناسل إلى تحسين الأداء التناسلي والصحة العامة للنعاج الرحماني بشكل كبير.

الكلمات الاسترشادية: نعاج رحماني، ديناميكية الحويصلات، حالة مضادات الأكسدة، الأداء التناسلي.