

REPRODUCTIVE HORMONES AND SEMEN CHARACTERISTICS OF RABBIT BUCKS FED DIETS CONTAINING SUPPLEMENTAL LEVELS OF DRIED DATES (*Phoenix dactylifera* L.) FRUITS MEAL

*Solomon, I. P., Istifanus, E.F., Tom, E. E. and Ebe, I. A.

Department of Animal Science, Faculty of Agriculture, University of Uyo, Uyo, Akwa Ibom State

Corresponding author: isongesit@yahoo.com

ABSTRACT

This study was conducted to evaluate the effect of dried dates fruits meal on the reproductive hormones and semen qualities in rabbit bucks. A total of thirty-six (36) rabbit bucks were used for the study. The bucks were randomly assigned to the four (4) treatment groups in a completely randomized design, and replicated three times, with three rabbits per replicate in a 24-week study. Four experimental diets were formulated to contain dietary supplemental levels of dried dates fruits meal (DDFM) at 0.00, 0.50, 1.00, and 1.50% respectively, and coded as T₁, T₂, T₃, and T₄. Semen collection was done at the end of the feeding period, using a specially designed artificial vagina for rabbits. Blood samples were also collected through the external ear vein into non-heparinized bottles for hormonal evaluation. The experimental data were subjected to one-way analysis of variance (ANOVA) procedure using IBM Statistical Package for Social Science (SPSS) version 21. The results revealed significant variations ($p < 0.05$) in the reproductive hormones evaluated. Dried dates fruits significantly influenced all semen parameters evaluated except sperm motility. Rabbit bucks in T₂, T₃ and T₄ had higher similar sperm concentration values of 86.67, 92.00, and 92.33 x 10⁶/ml, respectively, then those of bucks in T₁ with mean value of 77.00 x 10⁶/ml, which was statistically similar to T₂. In conclusion, dates fruits meal can be included at 1.00% to improve reproductive hormones and semen characteristics for improved fertility in rabbit bucks.

Keywords: Follicle Stimulating Hormones, Luteinizing Hormones, Testosterone, Semen qualities, Male fertility

INTRODUCTION

Date palm (*Phoenix dactylifera* L.), a member of the *Arecaceae* family, thrives in arid and semi-arid regions globally as stated by Awan *et al.* (2018). According to the authors, it is one of the most significant fruit crops in the Middle East and North Africa, producing edible and nutritious dates. Barakat and Alfheaid (2023) noted that date fruit production has both environmental and economic significance. Khalifa *et al.* (2018) observed that administration of date fruit extracts at 10 and 20 mL decreased nitric oxide and glutathione, increased lipid peroxidation, ascorbic acid and testosterone level and concluded that aqueous extract of date palm could enhance the rabbit buck's fertility and its health performance. The authors also reported increased blood testosterone level using date palm extract than control group. The result on follicle stimulating hormone in their study showed relative increase in bucks fed T₂ (0.50% DDFM), and T₃ (1.00% DDFM) with similar values of 0.50 and 0.50 respectively. The aim of this study was to evaluate the effect of dates fruit on reproductive hormones and semen profile in rabbit bucks.

MATERIALS AND METHODS

Experimental Site

The research was conducted at the Rabbitry Unit of the Teaching and Research farm, Department of Animal Science, University of Uyo, Akwa Ibom State.

Sourcing and Processing of Test materials

Dried date palm fruits were purchased from a local market in Itu Local Government Area of Akwa Ibom State, Nigeria, and used for the study. The dried date fruits were air dried, milled using an electric grinding machine, and used in this study as dried date palm fruits meal (DDFM).

Experimental Animals and Management

A total of thirty-six male grower rabbits, aged 8 – 10 weeks, were used for the study. The rabbit bucks were allowed for two weeks of acclimatization period, during which they were fed with formulated ration and *Calapogonium mucunoides* leaves. Prior to the commencement of the experiment, the rabbits were treated against internal and external parasites. The rabbits were provided with feed, water and forages *ad-libitum* for 168-days (24 weeks) of the experimental period.

Experimental Diets

Four experimental diets were formulated to contain dietary supplemental levels of dried date palm fruit meal (DDFM) at 0.00% (control), 0.50%, 1.00% and 1.50% and coded as T₁, T₂, T₃ and T₄ respectively.

Table 1: composition of experimental diets

| Ingredients | T ₁ (0.00% DDFM) | T ₂ (0.50% DDFM) | T ₃ (1.00% DDFM) | T ₄ (1.50% DDFM) |
|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| Maize | 45.00 | 45.00 | 45.00 | 45.00 |
| Soybean cake | 21.00 | 21.00 | 21.00 | 21.00 |
| Wheat Offal | 17.10 | 17.10 | 17.10 | 17.10 |
| Rice offals | 5.00 | 5.00 | 5.00 | 5.00 |
| Palm Kernel Cake | 8.00 | 8.00 | 8.00 | 8.00 |
| Bone meal | 3.00 | 3.00 | 3.00 | 3.00 |
| Common salt | 0.25 | 0.25 | 0.25 | 0.25 |
| Vit-Premix | 0.25 | 0.25 | 0.25 | 0.25 |
| Lysine | 0.20 | 0.25 | 0.25 | 0.25 |
| Methionine | 0.20 | 0.25 | 0.25 | 0.25 |
| TOTAL | 100.00 | 100.00 | 100.00 | 100.00 |
| Calculated Composition | | | | |
| Metabolizable Energy (Kcal/Kg) | 2806.30 | 2806.30 | 2806.30 | 2806.30 |
| Crude Protein (%) | 17.15 | 17.15 | 17.15 | 17.15 |
| Crude fibre (%) | 5.56 | 5.56 | 5.56 | 5.56 |
| Ether Extract (%) | 6.87 | 6.87 | 6.87 | 6.87 |

DDFM – dried date fruit meal

The four treatment groups were assigned to the four experimental diets in a completely randomized design (CRD). Each treatment was replicated three times with nine (9) rabbits per treatment and three (3) rabbits per replicate. Each replicate received an assigned diet for twenty-four (24) weeks.

Data collection

The ejaculates obtained were evaluated according to the method of Zemjanis adopted by Shinkut (2015), which include visual or gross evaluation of the ejaculate soon after collection for volume and colour as well as microscopic examination for motility, concentration, percentage live spermatozoa and morphological abnormalities. Follicle stimulating hormone, luteinizing hormones and testosterone were analyzed according to the method of Adeyemi (2014).

Statistical Analysis

The experimental data were subjected to analysis of variance (ANOVA) procedure in a completely randomized design, using IBM Statistical Package for Social Science (SPSS) version 20. Differences between treatment means were separated using Duncan multiple Range Test of the software.

RESULTS AND DISCUSSION

Hormonal profile of rabbit bucks fed diets supplemented with dried dates fruits meal

The results on the hormonal profile of rabbit bucks fed diets supplemented with DDFM are presented in Table 2. These results revealed significant variations ($p < 0.05$) in the reproductive hormones evaluated. This finding is similar to the report of Khalifa *et al.* (2018) who found that date extract increased the level of follicle stimulating hormone, luteinizing hormone and testosterone in rats. Orabi and Shawky (2014) also recorded significant increase in blood testosterone in rats fed date palm seed extract when compared with the control.

The result on follicle stimulating hormone showed relative increase in bucks fed T₂, and T₃ with same values of 0.50 and 0.50 respectively. These values were however, not significantly different ($p < 0.0$) from T₁. The FSH value in T₁ (0.40) differed significantly from T₄ (0.20). The mean values of luteinizing hormone increased significantly ($p < 0.0$) with DDFM supplementation in the bucks' diets. Previous studies, Saryono, *et al.* (2016), and Ubah *et al.* (2021) indicated that male rats fed date fruit demonstrated improved spermatogenesis, the concentration of testosterone, FSH and LH and sperm concentration.

Table 2: Hormonal profile of rabbit bucks fed diets supplemented with dried dates fruits meal

| Parameters | T ₁ | T ₂ | T ₃ | T ₄ | SEM |
|------------------------------|--------------------|--------------------|--------------------|--------------------|------|
| Follicle Stimulating Hormone | 0.40 ^b | 0.50 ^{ab} | 0.50 ^{ab} | 0.20 ^a | 0.06 |
| Luteinizing Hormone | 3.60 ^b | 4.20 ^a | 4.20 ^a | 4.40 ^a | 0.10 |
| Testosterone | 17.80 ^a | 18.00 ^a | 16.50 ^b | 16.60 ^b | 0.21 |

SEM – standard error of mean

Semen characteristics of Rabbit bucks fed diets supplemented with dried dates fruits meal

The results on Table 3 showed that dried dates fruits significantly influenced all semen parameters evaluated except, sperm motility. Semen volume significantly increased ($p < 0.05$) with DDFM supplementation in the bucks' diets. Higher mean values were observed in bucks fed 1.00 (0.87ml) and 1.00% DDFM 1.50ml. The significant increase observed with the supplemental levels of DDFM in the rabbit bucks' diets is in variance with the findings of Khalifa *et al.* (2018), who reported non-significant difference in semen volume in male New Zealand white rabbits administered dates water extract at 10 and 20 ml respectively.

Table 3: Semen characteristics of Rabbit bucks fed diets supplemented with dried dates fruits meal

| Parameters | T1 (0.00% DDFM) | T2 (0.50% DDFM) | T3 (1.00% DDFM) | T4 (1.50% DDFM) | SEM |
|--|-----------------------|-----------------------|-----------------------|-----------------------|------|
| Volume (ml) | 0.50 ^c | 0.73 ^b | 0.87 ^{ab} | 0.90 ^a | 0.07 |
| Colour | Milky | Milky | Milky | Milky | |
| Motility (%) | 75.67 | 84.33 | 83.67 | 84.0 | 2.15 |
| Concentration (x 10 ⁶ /ml) | 77.00 ^b | 88.67 ^{ab} | 92.00 ^a | 92.33 ^a | 2.50 |
| Normal cells (%) | 79.00 ^b | 92.33 ^a | 92.00 ^a | 92.33 ^a | 2.34 |
| Abnormal cells (%) | 21.00 ^a | 7.67 ^b | 8.00 ^b | 6.67 ^b | 2.34 |
| Live cells (%) | 78.33 ^b | 85.33 ^{ab} | 89.33 ^a | 91.00 ^a | 1.90 |
| Dead cells (%) | 21.67 ^a | 14.67 ^{ab} | 10.67 ^b | 9.00 ^b | 1.90 |
| Total cells/ejaculate) (X 10 ⁶ /ml) | 38.07 ^b | 63.87 ^{ab} | 79.60 ^a | 83.43 ^a | 6.78 |

SEM – standard error of mean

The semen volume observed were higher than those reported by Solomon *et al.* (2024) for mongrel rabbit bucks fed diets containing garlic meal. This shows the ability of DDFM to increase ejaculate volume. The supplementation of DDFM significantly increased ($p < 0.05$) the sperm concentration in the rabbit bucks. Rabbit bucks in T2, T3 and T4 had higher similar sperm concentration values of 86.67, 92.00, and 92.33 x 10⁶/ml, respectively, than in those of bucks in T1 with mean value of 77.00 x 10⁶/ml, which was statistically similar to T2. The percentages of normal sperm cells in the semen of the bucks were lower ($p < 0.05$) in the control group (79.00%) without DDFM in their diet, when compared to those with 0.50, 1.00, and 1.50% DDFM in their diets with mean percentages of 92.33, 92.00 and 92.33% respectively. Live sperm percentage recorded in this study ranged from 71.33 to 85.67% and were similar to those reported by Adeyemi (2014) and Shinkurt (2015) for rabbit bucks. This is further supported by the higher significant increase in total sperm cells per ejaculate in the study at 1.00 and 1.50% DDFM supplementation respective. A publication by Premium Times (2016) explained that dates contained high levels of estradiol and flavonoid which aid sperm motility and increase sperm count, help to improve sexual activities and increase the production of sex hormones. Khalifa *et al.* (2018) concluded that aqueous extract of date palm could enhance the rabbit buck's fertility and its health performance.

CONCLUSION

The findings of this study demonstrated that dates fruits meal can be included at 1.00% to improve reproductive hormones and semen characteristics for improved fertility in rabbit bucks.

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