

EFFECT OF MONK'S PEPPER (VITEX AGNUS CASTUS) ON THE REPRODUCTIVE PERFORMANCE OF RABBIT DOES

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ABSTRACT

The study investigated effect of monk's pepper on the reproductive performance of rabbit does and on the growth performance of their bunnies. A total of 24 rabbit does (four months old) were used for the study. The rabbits were randomly allotted to four treatment groups (T1-T4) with 6 rabbits/treatment. Each treatment was replicated six times in a Completely Randomized Design (CRD). Rabbits were kept in individual wire cages. The diets used contained monk's pepper (M/kg) diet in different ratios as follows; 0gM/kg, 2gM/kg, 4gM/kg and 6gM/kg. Feed and water were provided, and the study lasted for 12 weeks. At the end of four weeks, the rabbits were bred at two days intervals. Data on litter weight at birth, litter size at birth, litter weight at weaning, litter size at weaning were subjected to one-way analysis of variance. Significantly different means were separated using Tukey's test at 5% level of probability. Monk's pepper significantly ($p < 0.05$) influenced treatment groups. Results indicated that significant ($p < 0.05$) difference existed among treatments in the values of average litter size at birth, total litter weight at birth, average litter size at birth, total litter size at birth, total litter weight at weaning and average litter weight at weaning. However, there was no significant ($p > 0.05$) difference in average litter weight at birth. Monk's pepper effect significantly ($p < 0.05$) influenced the pre-weaning performance of the bunnies across the treatment groups. There was no significant ($p < 0.05$) difference at week three. It was concluded that dietary inclusion of monk's pepper at 4g/kg of feed improved reproductive performance and pre-weaning performance of rabbit bunnies with no adverse effect

Keywords: Vitex, Rabbits, Reproductive performance, Pre-weaning performance.

INTRODUCTION

The most evident barrier to rabbit production in a tropical environment is their vulnerability to heat stress, which causes oxidative stress, a series of severe alterations in their biological processes that hinder both production and reproduction (Jimoh *et al.*, 2021). Recent research has focused on adding natural antioxidants as nutritional supplements to animal feed to enhance meat quality, health, and reproductive function (Kandeil *et al.*, 2019). Monk's pepper, (*Vitex agnus-castus*), belongs to the family *Verbenaceae* and is a multifunctional perennial herb with a strong aromatic odour (Zhelev *et al.*, 2022). Vitex is known for its antifungal, antioxidant, digestive and phytoestrogenic properties (Nazari *et al.*, 2023). Vitex contains phenolic acids and their derivatives, flavonoids (casticin and isovitexin), tannins, iridoids, diterpenoids, volatile oils (limonene, pinene, and sabinene), and essential fatty acids (oleic, linolenic, palmitic, and stearic acids), have been linked to these therapeutic effects (Boujbiha *et al.*, 2023). These effective ingredients can improve the reproductive performances, nutrient digestibility and immunity of animals as well as decrease the problems of animal diseases and adverse effects of chemical drugs (Abd El-Hack *et al.*, 2016). Due to its antioxidant, antibacterial, antifungal, digestive and phytoestrogenic properties, it is usually used in livestock farms (as an alternative to antibiotics) for enhancing animal health and productivity (Nazari *et al.*, 2023). Adamu *et al.* (2021) reported that Vitex leaf extract inclusion significantly improved the litter size and litter weight as well as improved the weight of the ovaries and uterus of female rats. However, in the studies conducted so far, there is very little information regarding the effect of Monk's pepper on the reproductive performance of rabbits. Thus, the present study aimed to evaluate the effect of Monk's pepper on the reproductive performance of rabbit does.

MATERIALS AND METHODS

Experimental Animals

The study was carried out at the Rabbit Unit of the Department of Animal Science Teaching and Research Farm, University of Nigeria, Nsukka. Nsukka, Enugu State, Southeastern Nigeria. A total of 20 mature (seven months old) rabbit bucks were used for the study. The rabbits were randomly allotted to four experimental diets (5/each) for 12 weeks. The diets were formulated with the inclusion of Monk's pepper (M/kg diet) in different ratios as follows; 0gM/kg, 2gM/kg, 4gM/kg and 6gM/kg of feed for T1, T2, T3, and T4 respectively. The Experiment was arranged in a Completely Randomized Design (CRD). Fresh experimental diets and clean water were made available *ad libitum* for the bucks throughout the experimental period. All the management practices and ethics associated with animal use for experimentation in the University of Nigeria were strictly adhered to.

Data collection and evaluation

Data were collected on does reproductive performance namely: litter size at birth, litter weight at birth, litter size at weaning. On the bunnies pre-weaning performance, data such as birth weight, pre-weaning weight gain and weaning weight gain were recorded.

RESULT AND DISCUSSION

The effects of inclusion of Monk's pepper on the reproductive performance of rabbit does is presented in Table 1 above. The results showed there were significant ($p < 0.05$) differences in average litter size at birth, total litter weight at birth, average litter size at birth, total litter weight at weaning and average litter weight at weaning. However, there was no significant ($p > 0.05$) difference in average litter weight at birth. Average litter size at birth was highest at 4g/kg (7.07 ± 0.13) and lowest at 6g/kg (3.80 ± 0.41).

Table 1: Effect of Monk's Pepper (*Vitex agnus Castus*) on the Reproductive performance of Rabbit Does.

Treatment Parameters	T1 (0g/kg)	T2 (2g/kg)	T3 (4g/kg)	T4 (6g/kg)	P value
Average Litter Size at Birth	5.38 ± 0.12^b	5.29 ± 0.48^b	7.07 ± 0.13^a	3.80 ± 0.41^c	0.00**
Total Litter Weight at Birth (g)	281.08 ± 12.00^b	254.35 ± 11.67^b	344.83 ± 12.80^a	174.89 ± 18.96^c	0.00**
Average Litter Weight at Birth (g)	51.88 ± 0.97^a	52.00 ± 3.91^a	48.49 ± 1.06^{ab}	43.72 ± 1.28^b	0.06 ^{NS}
Average Litter Size at Weaning	3.81 ± 0.67^b	4.14 ± 0.64^{ab}	5.82 ± 0.44^a	3.30 ± 0.26^b	0.00**
Total Litter Weight at Weaning (g)	2321.45 ± 110.52^{ab}	2153.50 ± 109.76^{ab}	2611.07 ± 197.22^a	1807.17 ± 150.99^b	0.04*
Average Litter Weight at Weaning (g)	416.28 ± 8.24^b	379.45 ± 9.70^b	472.09 ± 17.38^b	615.87 ± 96.96^a	0.02*

*Significant ($P < 0.05$), ** significant ($P < 0.01$), NS – not significant.

^{abc} : means on the same column with different superscripts are significantly different ($p \leq 0.05$).

Total litter weight at birth was highest at 4g/kg (344.83 ± 12.80 g) and lowest at 6g/kg (174.89 ± 18.96 g). Average litter weight at birth was not significant. Average litter size at weaning was highest at 4g/kg (5.82 ± 0.44) and lowest at 6g/kg (3.30 ± 0.26). Average litter weight at weaning was highest at 6g/kg (615.87 ± 96.96 g) and lowest at 2g/kg (379.45 ± 9.70 g) while Total litter weight at weaning was highest at 4g/kg (2611.07 ± 197.22 g) and lowest at 6g/kg (1807.17 ± 150.99 g).

The results of the reproductive performance of rabbit does fed diet containing vitex demonstrates Monk's pepper's potential to improve rabbit reproductive performance by enhancing fertility, litter sizes at birth and weaning and litter weight at birth and weaning. The results are in agreement with the findings of Ezekwe *et al* (2018), who reported improved reproductive performance (litter size and litter weight) in rabbits administered 200-600mg/kg body weight of *vitex agnus-castus* leaf extract compared to the control.

Table 2: The effect of Monk's pepper (*Vitex agnus castus*) on the growth and pre-weaning performance of the bunnies.

Treatment Parameters	T1 (0g/kg)	T2 (2g/kg)	T3 (4g/kg)	T4 (6g/kg)	P value
Birth Weight (g)	51.35 ± 1.34	52.00 ± 2.79	48.49 ± 1.03	43.72 ± 1.23	0.24 ^{NS}
Week 1	73.82 ± 2.70^b	108.42 ± 8.84^a	79.95 ± 2.27^b	68.07 ± 3.95^b	0.00**
Week 2	119.35 ± 4.80^c	170.10 ± 12.71^a	145.60 ± 3.73^b	142.09 ± 13.89^{bc}	0.0**
Week 3	163.09 ± 3.78	165.81 ± 7.82	184.61 ± 4.98	187.25 ± 19.08	0.37 ^{NS}
Week 4	218.20 ± 3.57^b	228.97 ± 10.08^b	235.22 ± 6.17^b	303.87 ± 27.68^a	0.00**
Week 5	296.81 ± 3.92^b	295.17 ± 13.19^b	327.91 ± 8.21^b	446.07 ± 43.60^a	0.00**
Week 6	407.35 ± 9.10^b	385.39 ± 21.80^b	447.31 ± 14.10^b	593.04 ± 56.06^a	0.00**

*Significant ($P < 0.05$), ** significant ($P < 0.01$), NS – not significant.

^{a,b,c} – Means in the same row with different superscripts are significant at 5% (* $P < 0.05$.)

According to Adamov *et al.* (2022), Monk's pepper contains iridoid glycosides, flavonoids, essential oils that may influence the secretion of reproductive hormones especially estrogen and progesterone. One of the main active flavonoids found in *Vitex agnus-castus* (Monk's pepper) is apigenin. Apigenin has estrogenic properties and can bind to estrogen receptors in the body. This helps explain Monk's pepper's effect on the reproductive performance

especially average litter size at birth and the total litter weight at birth. In animal studies, apigenin has been shown to influence the hypothalamic-pituitary-ovarian axis by increasing LH and FSH levels. This stimulates ovulation and enhances fertility (Sirotkin *et al.*, 2024). Ajayi *et al.* (2021) stated that the estrogenic effects of apigenin improved uterine lining and receptivity, increase the number of implantation sites, aids early embryo development as well as improve litter size and weights

The result of the study showed that there was no significant difference ($P>0.05$) in birth weight between rabbits in T1 (51.35 ± 1.34 g), T2 (52.00 ± 2.79 g), T3 (48.49 ± 1.03 g) and T4 (43.72 ± 1.23 g). Rabbits in T2 (108.42 ± 8.84 g) had a significantly higher ($P<0.05$) body weight at week 1 compared to those in other treatment groups. T1 (73.82 ± 2.70 g), T3 (79.95 ± 2.27 g) and T4 (68.07 ± 3.95 g) were statistically similar ($P>0.05$). At week 2, rabbits in T2 (170.10 ± 12.71 g) had a significantly higher ($P<0.05$) body weight than T1 (119.35 ± 4.80 g) and T3 (145.60 ± 3.73 g) while T4 (142.09 ± 13.89 g) was statistically similar to T3. There was no significant difference ($P>0.05$) in body weight between treatments at week 3. Rabbits in T4 (303.87 ± 27.68 g) had a significantly higher ($P<0.05$) body weight at week 4 compared to those in other treatment groups which were statistically similar ($P>0.05$).

At week 5, T4 (446.07 ± 43.60 g) gained significantly ($P<0.05$) more weight than other groups which were statistically similar ($P>0.05$). The same trend was observed at week 6 with T4 (593.04 ± 56.06 g) having a significantly higher ($P<0.05$) body weight than those in other treatment groups.

Improved feed utilization leads to increased weight gain and better pre-weaning performance (Sliwa *et al.* 2016). Sirotkin *et al.* (2024) reported that apigenin may indirectly influence prolactin levels. Increased prolactin helps stimulate milk production for nursing litters. When consumed during gestation and lactation, apigenin's effects are thought to program the hypothalamic-pituitary-adrenal axis in offspring, improving their postnatal development. The effect of Monk's pepper on the bunnies at birth through to week 6 supports the claims of İnal *et al.* (2023), who reported that monk's pepper has essential oils containing monoterpenes such as limonene, caryophyllene and sabinene. These aids in digestion, have anti-microbial effects, improves the secretion of hormones involved in growth and development, and protects the gut from pathogens that can stunt growth. By enhancing digestion, nutrient utilization, and immunity, the constituents in Monk's pepper promoted weight gain and improved growth performance in rabbit bunnies.

CONCLUSION

From this study, it was concluded that dietary inclusion of Monk's pepper at 4g/kg of feed improved reproductive performance of rabbits. The study therefore recommends that 4g thyme/kg diet should be included in the diet of rabbit does.

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