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## **VITEX AGNUS-CASTUS LEAVES EXTRACT IMPROVES HORMONAL ACTIVITIES OF DOE-RABBITS AND OFFSPRING PERFORMANCE**

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### **ABSTRACT**

The current study evaluated the response of 48 V-line doe rabbits through three parities to oral administration with *Vitex agnus-castus* leaves extract (VLE). Hormonal activities during pregnancy and lactation and offspring performance up to weaning were measured. Two doe groups (n=24, each) of 7-months old were allocated to either a placebo control group was administrated with 1 ml distilled water/kg live body weight or another tested group was administrated with 1 ml VLE/kg live body weight. Treatments were carried out on a daily basis, one week before mating and before weaning. Results obtained indicate that, throughout three parities, VLE achieved significantly higher milk production (g/doe), litter size at birth and litter weight at weaning compared to the control. Litter weight at birth did not significantly affected by tested VLE. hormonal activities during gestation and lactation were notably improved up through VLE oral supplementation. Thyroxine (T<sub>4</sub>) and progesterone activities (ng/ml) in does sera were significantly higher in VLE group during mid gestation or mid lactation. Estrogen activity (pg/ml) did not significantly affected by VLE administration neither during gestation nor during lactation. It is evidence that VLE administration had a positive consequence in prolactin hormone activity (ng/ml) during lactation course not during pregnancy.

It could be recommended to improve the reproductive performance of doe rabbits and the ability to nurse their offspring prior to the critical phase of weaning by oral administration with 1 ml VLE/kg live body weight on a daily basis, one week before mating and before weaning.

**Keywords:** doe-rabbit, *Vitex agnus-castus* leaves extract, gestation, lactation, hormones

### **INTRODUCTION**

Control of the interval from parturition to subsequent conception is crucial to the optimal reproductive rate for rabbits. The re-mating program (interval from kindling; parturition to mating) most widely used in the rabbit industry is the semi-intensive regularity, during the 1<sup>st</sup> week of *post partum*. This should characterize a compromise between the doe's need for improving the reproductive hormones (progesterone; P<sub>4</sub>, estrogen; E<sub>2</sub> and prolactin; PRL) and indirect action through the metabolic hormones, such as thyroid hormones, that alter reproductive hormones and regulate milk synthesis (Neville *et al.*, 2002).

Some medicinal plants have been found to promote the lactation and sexual hormones.

*Vitex agnus-castus*, also called vitex, chaste tree is a small shrub or tree up to 6 ft. tall, is native to the Mediterranean and western Asia (Upton, 2001). It contains a mixture of iridoids and flavonoids, the leaves and flowers found to be similar in chemical structure to human sex hormones (Lucks *et al.*, 2002 and Mustafa, 2007) and also labdanditerpenoids, rolundifuran, vitexilactone which have high binding affinity to dopamine receptors (Hoberg *et al.*, 2000). In addition flavonoids may have antiviral and antioxidant effect and positive effect on the heart blood vessels (Brenda, 2005). The chemical compounds of Vitex extract contain several active compounds such as alkaloid vitexin, flavanols derivatives, and Kaempferol and quercetin which are excessively composed of casticin (Karunamoorthi *et al.*, 2008). Also, Van Die *et al.* (2013) reported that vitex is composed of iridoid

glycosides, flavonoids, diterpenes, and volatile oils. Vitex works by regulating and supporting the pituitary gland, which is considered the master gland for hormone production which support the body's natural progesterone and luteinizing hormone production and to stimulate the flow of milk (Meyer, 1993). Moreover vitex has been used for hundreds of years to regulate the function of the reproductive organs in women (Christie and Walker, 1998). It is thought to exhibit a normalizing or balancing effect on reproductive hormone production, and to increase luteinizing hormone (LH) levels without affecting follicle stimulating hormone (FSH) (Schellenberg, 2001). In rabbits, Abd-El Ghany *et al.* (2017) reported that aqueous extract of vitex at the rate of 5 or 7.5 g/kg diet improved conception rate, litter size and weight, both at birth and weaning and milk yield of 7-month rabbit does.

This study was done to study the response to oral administration of *Vitex agnus-castus* leaves extract on doe rabbits for improving parity and kids performance.

## MATERIAL AND METHODS

### Animals and experimental design

Forty eight, 7-8 month V-line doe rabbits, weighing 3.3-3.50 kg were equally divided into 2 experimental treatments; 1<sup>st</sup> group (n=24) administered orally with distilled water at 1 ml/kg live body weight and 2<sup>nd</sup> group (n=24) administered orally with 1ml/kg body weight with dried *Vitex agnus-castus* leaves extract (VLE) to study the effects on does during pregnancy and lactation and on resulting litters through three parities. VLE was administered on a daily basis through the three parities one week before mating and before weaning. Doe rabbits were individually caged and fed on pellet diet to meet at least the NRC (1977) requirements of doe-rabbits during pregnancy and lactation (17.8% CP, 12.5% CF, 2550 DE/kg diet). Each doe was transferred to the buck's cage and served twice. Palpation was made at the 10<sup>th</sup> day *post-partum* to detect pregnancy. Re-mating interval was 10 days after serving/parturition. Blood serum samples were withdrawn from ear vein at two phases; 1) at 14 day of gestation and 2) at 14 day of lactation. The variables studied for the three consecutive parities were total milk yield (g/doe), litter weight at birth (LWB), litter weight at weaning (LWW).

### Blood hormonal analysis

Some blood serum hormonal measurements were done by using elisa kits biotech, hang zhou, china. Each hormone has a sensitivity range: thyroxin elisa kit analytical sensitivity 0.29 ng/ml assay range 0.781-50 ng/ml colorimetric method, estrogen elisa kit analytical sensitivity 5 pg/ml assay range 13-935 pg/ml, prolactin elisa kit detection range 10-2500pg/ml sensitivity 1.0pg/ml and progesterone detection range 1.0-25ng/ml sensitivity 0.1ng/ml.

### Statistical Analysis

Data from all response variables were subjected to one way analysis using SAS (2001). Variables having significant differences were compared using Duncan's Multiple Range Test (Steel and Torrie, 1960).

## RESULTS AND DISCUSSION

Results showed that administration of VLE had positive effects on does and their offspring performance. Throughout three parities, VLE achieved significantly higher milk production (g/doe), litter size at birth and litter weight at weaning compared to the control. Litter weight at birth did not significantly affected by treatment under study. In line with these findings, hormonal activities during gestation and lactation were leveled up through VLE oral supplementation. Thyroxine (T<sub>4</sub>) and progesterone activities (ng/ml) in does sera were significantly higher in VLE group during mid gestation or mid lactation. Estrogen activity (pg/ml) did not significantly affected by VLE administration neither during gestation nor during lactation. It is evidence that VLE administration had a positive consequence in prolactin hormone activity (ng/ml) during lactation course not during

pregnancy. In accordance with these results, Abd-El Ghany *et al.*, (2017) reported that aqueous extract of vitex at the rate of 5 or 7.5 g/kg diet improved conception rate, litter size and weight, both at birth and weaning and milk yield of 7-month rabbit does. Also, the current results are in match with Loch *et al.*, (2000) who pointed out that vitex may affect the pituitary gland and hypothalamus by helping to increase the production of a lutene hormone. In addition, it also aids in the inhibition of the release of FSH, a follicle-stimulating hormone. This helps balance out the ratio of progesterone to estrogen so the vitex can help to balance and produce hormones that are vital to milk production. Moreover, Schellenberg (2001) suggested that active components of vitex cross the placenta and enter fetal tissues, and increase the fetus growth and has the ability balancing hormonal production, and to increase luteinizing hormone (LH) levels. So this herb could stimulate prolactin activity during lactation and increase milk production and consequently, results in improving litter weight at weaning and at the same level it improves progesterone activity during pregnancy.

**Table1:** Effect of VLE on milk yield, litter performance and hormonal changes at mid gestation, at kindling and at mid lactation of doe rabbits at different parities

Treatments	Total Milk Yield g/h/Parity			LSB <sup>@</sup> / Parity			WB <sup>#</sup> / Parity			WW <sup>\$</sup> / Parity		
	1	2	3	1	2	3	1	2	3	1	2	3
Control	323.1 <sup>b</sup>	356.3 <sup>b</sup>	341.5 <sup>b</sup>	6.89 <sup>b</sup>	7.39 <sup>b</sup>	7.16 <sup>b</sup>	42.1	46.2	48	455. <sup>b</sup>	471.9 <sup>b</sup>	474.0 <sup>b</sup>
VLE	409.3 <sup>a</sup>	439.1 <sup>a</sup>	445.9 <sup>a</sup>	9.20 <sup>a</sup>	9.1 <sup>a</sup>	9.39 <sup>a</sup>	41.9	46.9	46	532.5 <sup>a</sup>	592.5 <sup>a</sup>	592.5 <sup>a</sup>
SEM	3.05	4.18	3.80	0.58	0.49	0.3	1.19	1.38	1.48	15.04	13.01	13.65
P-value	0.017	0.047	0.001	0.047	0.005	0.004	0.233	0.640	0.122	0.001	0.01	0.005
<i>Blood hormones constituents at mid gestation</i>												
	Thyroxine (ng/ml)			Estrogen (pg/ml)			Prolactin (ng/ml)			progesterone (ng/ml)		
	1	2	3	1	2	3	1	2	3	1	2	3
Control	31.78 <sup>b</sup>	31.98 <sup>b</sup>	31.67 <sup>b</sup>	51.38	51.39	51.09	49.5	44.3	70.1	6.39 <sup>b</sup>	6.82 <sup>b</sup>	5.71 <sup>n</sup>
VLE	35.89 <sup>a</sup>	37.9 <sup>a</sup>	36.84 <sup>a</sup>	52.05	52.11	51.98	55.6	47.2	66.5	10.1 <sup>a</sup>	10.5 <sup>a</sup>	9.36 <sup>a</sup>
SEM	0.09	0.11	0.11	2.91	2.92	2.01	2.09	2.21	2.09	0.14	0.11	0.14
P-value	0.014	0.003	0.023	0.536	0.505	0.614	0.114	0.213	0.519	0.012	0.05	0.13
<i>Blood hormones constituents at mid lactation</i>												
	Thyroxine (ng/ml)			Estrogen (pg/ml)			Prolactin (ng/ml)			progesterone (ng/ml)		
	1	2	3	1	2	3	1	2	3	1	2	3
Control	33.94 <sup>b</sup>	32.99 <sup>b</sup>	33.79 <sup>b</sup>	50.25	50.11	50.20	40.70 <sup>b</sup>	40.73 <sup>b</sup>	50.80	3.01 <sup>b</sup>	3.11 <sup>b</sup>	3.05 <sup>b</sup>
VLE	39.65 <sup>a</sup>	38.77 <sup>a</sup>	39.59 <sup>a</sup>	49.16	50.31	49.25	50.90 <sup>a</sup>	51.01 <sup>a</sup>	51.05	6.20 <sup>a</sup>	7.12 <sup>a</sup>	6.97 <sup>a</sup>
SEM	0.19	0.10	0.11	2.94	3.9	3.12	2.48	2.19	2.12	0.11	0.09	0.10
P-value	0.001	0.012	0.002	0.64	0.54	0.138	0.001	0.001	0.031	0.015	0.024	0.034

a, b : different superscripts within a column indicate significant differences.  
LSB<sup>@</sup>=Litter size at birth; WB<sup>#</sup>= weight at birth; WW<sup>\$</sup>= weight at weaning.

## CONCLUSIONS

Our results throughout three parities of doe's rabbits showed that addition *vitex agnus-castus* leaves extract caused an improving in milk production (g/doe), litter size at birth, litter weight at weaning and hormonal activities during gestation and lactation periods.

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