EFFET OF AQUEOUS AND ALCOHOLIC VITEX EXTRACTS ON REPRODUCTIVE AND PRODUCTIVE PERFORMANCE OF DOE RABBITS

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SUMMARY

This study was designed to investigate the effect of feeding vitex (*Vitex agnus- castus*) extracts on productive and reproductive performance of doe rabbits. Fifty New Zealand white does, 7 months old were divided into 5 treatment groups (10 does per group). The first group was fed diet without vitex leaves extract. The second and third were fed diets supplemented with two doses of the aquatic extract (5or 7.5g / kg of diet, respectively). Fourth and fifth groups fed diets supplemented with two doses of the alcoholic extract (5or7.5g / kg of diet, respectively). The studied traits were conception rate, litter size, litter weight at both birth and weaning, pre-weaning mortality and milk yield for three parities. The inclusion of vitex extract affected conception rate, litter size at birth (P<0.05) and weaning (P<0.05), as well as milk yield (P<0.05). However, it tended to increase the kit milk intake in most lactation periods (P<0.05) leading to increase in individual kit weight at weaning (P<0.05), and by using a vitex extract the blood cholesterol levels were reduced. The present results indicate an increase of net revenue for rabbits fed on diets contained extract of vitex leaves at all levels compared to those in control diet. In conclusion, supplementation of vitex leaves extract in the rabbit diet of does can improve their productive and reproductive performance.

Keywords: *vitex extract, doe rabbits, litter size ,mortality rate ,milk yield, economical evaluation.*

INTRODUCTION

Rabbits are the most promising domestic livestock species providing people with a relatively inexpensive source of meat. It has many advantages including high reproductive rates, rapid growth, using of non-competitive feeds, simple housing and requirements (Cheeke, 1987). Moreover, it needs some additives to improve their reproductive process. *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, in Egypt it cultivates in several area especially, in gardens. It is now cultivated all over the World (Upton, 2001). Vitex or chestberry is one of the verbenaceae family comeback to (order Lamiales, class Magnoliopsida, and division magnoliophyta). It can be grown as a large, deciduous, multistemmed shrub with small and narrow leaves, green on top. It contains a mixture of iridoids and flavonoids, the leaves and flowers found to be similar in chemical structure to human sex hormones (Milewicz *et al*., 1993; Odenthal, 1998; Lucks *et al*., 2002 and Mustafa, 2007) and also labdanditerpenoids, rolundifuran, vitexilactone which have high binding affinity to dopamine receptors (Hoberg *et al*., 1999 and Hoberg *et al*., 2000). In addition flavonoids may have antiviral and antioxidant effect and positive effect on the heart blood vessels (Brenda, 2005). Also, 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 (Hobbs, 1991 and 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 addition to that James *et al*. (2011) suggested that the use of aqueous extract of vitex and its combination possess antidiabetic and antioxidant activity in rats, could exert a beneficial action against the disease associated with free-radicals complications. Also, Hayder *et al*. (2014) indicated that the median acute toxicity value (LD_{50}) of vitex leaves methanol extract was found to be 17.21 g/kg body weight in rats and the extract showed no significantly of toxicity at 5 g/kg of the vitex methanol extract concentration. The effect of alcoholic extract of *Vitex agnus-castus*

was examined for its effect on some blood parameters in mice with two doses (6 mg and 12 mg / mouse), results showed a significant decrease in total serum protein, total serum cholesterol with both doses in comparison to the control group (Mustafa, 2007).

The aim of this study is to investigate the potential effect of vitex aqueous or alcoholic extracts on productive and reproductive performance of rabbit does with doses.

MATERIALS AND METHODS

Farm work was conducted at farm belong to Ismael Radwan Farm, Sahl- Elhosainya, Sharqia Governorate, Egypt**.** The lab work was conducted at Animal Production Department, National Research Centre and Agricultural Research Station, Animal Production Research Institute, Agricultural Research Center, By–product Department, Ministry of Agriculture, Egypt.

Vitex extracts preparation

The vitex leaves were rinsed with tap water, dried in the dark for 5 days, and then ground to a powder using an electric blender. One hundred grams was placed in 900 ml of 80% ethanol for four to five days in a laboratory glass container (1 L) with daily stirring. Afterward, the mixture was filtered through filter paper (Whatman No. 1). The filtrate was evaporated at 40°C and the percentage yield of vitex extract powder was obtained for alcoholic extract. For aqueous extract the same method followed without using 80% ethanol, but used distillated water. Samples of aqueous and alcoholic before evaporating stored in a refrigerator at 4°C, until making phytochemical screening using methods of Harbone (1973) and Trease and Evans (1983) were used to identify the phytochemicals in the extracts: alkaloids, saponins, tannins, anthraquinones, flavonoids, terpenoids and cardiac glycosides.

Experimental protocol

A total of fifty does (7 months old) of New Zealand White breed were used in this study for four months. The rabbits were divided to five groups (10 in each group). Two groups were fed diets treated with aqueous extract of vitex powder leaves (5 or 7.5 g/ kg of diet), other two groups were fed diets treated with ethanolic extract of vitex leaves (5 or 7.5 g/ kg of diet) as powder and one group as control group. All experimental animals were apparently healthy and were kept under the same managerial, hygienic and environmental conditions throughout the experimental period. Does were individually housed in galvanized wire batteries provided with feeders and automatic stainless steel nipples for supplying each cage with a clean fresh water all the time. The does' batteries were also provided with nest box measuring 40X30X30cm for parturition and rearing of the bunnies. All batteries were located in an open rabbitry and exposed to natural environmental temperature and photoperiod and ventilated by windows and exhausted fans. Ceiling electric fans were also used when needed. Rabbit does were fed on diets before mating for 4 weeks. Then, each doe showing the signs of receptivity was taken to the buck's cage for mating and, then returned back to its cage after being bred. Mating was assured after 2 successful trials and the day of mating was designated at first day of pregnancy, All mated does were palpated 14 days post mating to determine pregnancy or to repeat mating in case of pregnancy failure. Five days before kindling, does were provided with an access to nest boxes that were attached to each cage, and supplied with rice straw to provide a comfortable and warm place for kindling and rearing of bunnies. Once bunnies were observed for the first time inside the nest box, they were examined, counted and weighed to obtain the total litter size and litter weight at birth for each doe, then kits were weighed at the day of weaning (the 30^{th} day). Kit's mortality rate was recorded for each group from birth till weaning. Does were weighed individually at the start of the experiment and just at mating and at half of pregnancy period. These does were used for three consecutive parities. An experimental balanced pelleted ration was used *ad libitum* according to the reproductive state of animals. Does were fed experimental diet to cover their requirements according to Agriculture Ministry Decree (1996) recommendations.

Sampling and analysis

The formulation and chemical composition of the basal experimental diet are shown in Table (1). Chemical analyses of diet was determined according to AOAC (2005).

Table (1): Formulation and chemical analysis of the experimental diet.

Item	Content,%
Clover hay (12%CP)	20.08
Yellow corn	24.85
Soybean meal (44%CP)	21.30
Wheat bran	26.90
Molasses	3.00
DL-Methionine	0.11
*Vit. & Min. mixture	0.30
NaCl	0.50
Limestone	1.05
Di-Calcium Phosphate	1.91
Chemical analysis[1]	Content
Crude protein, %	18.03
Ether extract, %	2.80
Crude fiber, %	11.11
NDF,%	36.22
ADF,%	19.56
Hemicellulose[2], %	16.66
Calcium %	1.22
Total Phosphorus, %	0.81
Methionine, %	0.36
TSAA	0.65
Lysine, %	0.86
**Digestible energy Kcal/Kg	2603
C/P ratio	144

** provided per 1 kg diet: 6000 IU vit. A; 900 IU, vit. D_3; 40 mg, vit. E; 2.0 mg, vit. K_3; 2.0 mg vit., B_1; 4.0 mg , vit. B_2; 2.0 mg, vit. B_6; 0.010 mg vit. B_{12} ; 10.0 mg vit, B_5; 0.05 mg B_8; 3.0 mg B_9; 250 mg choline; 50.0 mg Fe;50.0 mg Zn; 8.5 mg Mn; 5.0 mg Cu; 0.20 mg I, and 0.01 mg Se.*

[1] *according to Feed composition for animal and poultry feed stuff used in Egypt (2001.* [2]Hemicellulose = %NDF - % ADF.

Milk yield and chemical composition

Milk yield for each doe was recorded at 7, 14, 21 and 28 days of lactation. For doing this bunnies were separated from their dams at 8.00 pm; thereafter the bunnies were allowed to suckle at 8.00 am in the next day. Milk production was calculated as the average of the differences between weight of each doe and their bunnies before and after suckling (weight-suckling-weight method) as described by (Davies et al. ,1964 and Zarrowe et al.,1965) .Milk samples (10 ml) were collected from each does on day 21 using "home made air vacuum pump" from nipples of mammary gland. Milk were analyzed according to methods of AOAC (2005).

Digestibility trail

Digestibility trail was carried out to determine the digestion coefficients and nutritive value using three rabbits from each treatment. Feces were collected daily, weighed and dried at 60 ^{o} C for 48 hrs , finely ground and stored for chemical analysis. Data of quantities and chemical analysis of feed and feces were used to calculate the nutrients digestion coefficients and the nutritive values of the dietary treatments, as described by Cheeke *et al*. (1982). The samples of feed and feces were chemically analysis according to AOAC (200**5).** Neutral detergent fiber (NDF), Acid **detergent fiber** (ADF) and **Detergent** lignin (ADL) were determined by method of Van Socest (1982)**.**

***Blood parameters*:**

Individual blood samples were taken at 9.00 am from the marginal ear vein and collected in 5 ml from three does of each group in heparinized test tubes and centrifuged at 3000 r.p.m for 20 minutes, then plasma were transferred and stored in deep freezer at approximately -20º C till the time for determine total lipids (Zollner and Kirsch, 1962), creatinine (Schirmeister, 1964), urea (Fawcett and Scott, 1960), total protein (Gornal *et al*., 1949), albumin (Doumas and Waston 1971), transaminase (AST, aspartate aminotransferase, ALT alanine aminotransferase, HDL, LDL and Triglyceride (Reitman and Frankle, 1957). Fresh blood samples were taken after collection for determine blood pictures including, red blood cells count (RBCs, / (10^3/ µl). White blood cells count (WBCs, (10^3/ µl), hemoglobin (Hb, g/dl), hematocrit (PCV), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), mean corpuscular haemoglobin concentration (MCHC) and Platelet count (10^3/ µl) according to Drew *et al*. (2004).

Economic efficiency (EEF):

The percentage of economic efficiency (EEF) was calculated according to price marketing during 2017.

Statistical Analysis:

Data of different parameters were statistically analyzed using **SAS (2001),** to determine variables differences between groups, statistical significant effects were further analyzed and means were compared using Duncan's Multiple Range tests (Duncan, 1955) to detect significant differences between means.

Kindling rate and pre-weaning mortality were compared within and between each treatment groups and parturition order by chi square analysis. The statistical model used was:

$Yijk = \mu + Ti + Eijk$

where:

Yijk = the observation µ = Overall mean

Ti = Treatments

Eijk = Experimental error, associated with i, j and k observations assumed to be randomly distributed

RESULTS AND DISCUSSION

Reproductive performance

Reproductive performance of rabbit does and offspring are presented in Table (2). All traits (conception rate, litter size at birth, litter size at weaning, litter weight at birth and litter weight at weaning), except kit's mortality rate were significantly ($P<0.05$) affected by experimental treatments, where rabbits fed diets supplemented with aqueous vitex extract (5 or 7.5 g/kg) followed by the alcoholic extract gave the higher values compered to the control. These results may be due to the positive effect of vitex on hypophysis, which is progesteronic-like and may decrease extra level of prolactin (Azarnia *et al*., 2007). The vitex components crosses the placenta and enters fetal tissues, and increase the fetus growth or due to the balancing effect of vitex on hormone production, and to increase luteinizing hormone (LH) levels (Schellenberg, 2001).

Table (2): Effect of the experimental treatments on reproductive performance of rabbit does.

Parameter	Treatments				
		aqueous extract		alcoholic extract	
	Control	5g/kg	7.5 g/kg	5g/kg	7.5 g/kg
Conception rate %	71.50 ^{b}±6.74	88.00^{a}±5.33	96.00^{a}±4.42	92.00^{a}±2.66	81.00 ^{ab}±6.83
Litter size at birth (no)	5.96 ^{b}±0.30	7.06 ^{a}±0.34	7.16 ^{a}±0.28	6.73 ^{ab}±0.32	6.80 ^{ab}±0.42
Kit's mortality rate %	1.51±0.86	1.40±0.79	3.61±1.72	2.58±1.79	4.23±3.36
Litter size at weaning (no)	5.86 ^{b}±0.28	6.96 ^{a}±0.31	6.93^{a}±0.30	6.56 ^{ab}±0.27	6.56 ^{ab} ±0.38
Litter weight at birth (g)	283.00 ^{b}±12.1	324.33^{a}±13.88	331.3 ^{a} ±12.4	312.0 ^{ab} ±14.08	321.66 ^{ab} ±14.72
Litter weight at weaning (g)	2731.7^{b}±125	3155.00^{a}±135.0	3268.3^{a}±129.2	2990.0^{ab}±130.4	3086.7^{ab}±150.6

a and b: Values in the same row with different superscripts are significantly differ at P<0.05.

Milk yield

It is evident from obtained results that milk yield was gradually increased by increasing age of the suckling kits reaching the peak at the third week, then decreased thereafter during the fourth week.

Milk yield of does fed the diet with 7.5g aqueous extract of vitex leaves significantly (P<0.05) higher than other treatments including control group that show the lowest milk yield (Table 3). These result may be due to that vitex works on 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 helps to balance and produce hormones that are vital to milk production. So This herb is believed to help stimulate lactation (Loch *et al*., 2000).

Table (3): Effect of the experimental treatments on Mmilk yield (g/day) of rabbit does.

Suckling period (day)	Treatments				
	Control diet	aqueous extract		alcoholic extract	
		5g/kg	7.5 g/kg	5g/kg	7.5 g/kg
7	59.00 ^{c}±4.33	61.33 ^{bc}±3.34	94.16 ^{a}±2.76	69.83 ^{b}±2.45	69.50 ^{b}±3.36
14	98.66 ^{c}±4.55	103.16 ^{c}±4.57	141.00 ^{a}±5.99	123.16 ^{b}±3.32	111.50 ^{bc}±3.54
21	130.50 ^{c}±5.25	144.00^{bc}±8.59	182.00 ^{a}±5.64	158.66 ^{b}±4.03	151.66 ^{b}±4.96
28	76.66 ^{d}±2.54	81.16 ^{c}±2.32	98.50 ^{a}±3.09	90.83 ^{b}±2.386	86.66 ^{c}±2.51

a, b, c, d: Values in the same row with different superscripts are significantly differ at P <0.05.

Milk Composition

Does which having 7.5g alcoholic extract of vitex leaves showed significantly (P<0.05) increase in dry matter, protein, lactose and minerals than other treatments (Table 4). These result may be due to that vitex extract can have a significant effect on blood parameters, and there were no significantly effect on fat. Rabbit milk composition varies depending on various factors; breed, nutrition, lactation stage , and number of pups (Lukafahr *et al*., 1983 and Chrastinova *et al*., 1997). The exact mechanism of flavonoid effect on cholesterol and proteins is still not clear (Anderson, 1995and James and Anderson, 1994).

Table (4): Effect of the experimental treatments on milk compostion (g) of rabbit does.

Milk analysis	Treatments				
	Control	aqueous extract		alcoholic extract	
		5g/kg	7.5 g/kg	5g/kg	7.5 g/kg
Dry matter	37.83 ^{c}±0.07	38.06 ^{b}±0.13	38.36 ^{ab}±0.13	38.40 ^{ab}±0.16	38.71^{a} ±0.17
Protein	15.46 ^{ab}±0.10	15.17^{b}±0.11	15.40 ^{ab}±0.07	15.40 ^{ab}±0.02	15.55^{a} ±0.03
Fat	16.45 ±0.23	16.67±0.11	16.78 ±0.14	16.73 ±0.14	16.83 ±0.04
Lactose	3.23 ^{b}±0.04	3.33 ^{b}±0.06	3.50^{a}±0.03	3.55 ^{a} ±0.03	3.53^{a} ±0.04
Ash	2.53 ^{b}±0.06	2.80^{ab}±0.06	2.68^{ab}±0.08	2.71 ^{ab}±0.11	2.83^{a}±0.09

a, b,c: Values in the same row with different superscripts are significantly differ at P <0.05

Body weight of does

The results in Table (5) show that body weight of does were significantly influenced (P<0.05) by adding vitex, and the control group showed lowest body weight at mating and at half of pregnancy period than other groups (3.250 and 3.575 kg), respectively. The enhancing in body weight might attributed to the nutrient of vitex extracts might which have allowed proper utilization of the nutrients in the normal level, this result agreed with Akhondzadeh (2000).

Table (5): Effect of the experimental treatments on body weight (g) of rabbit does.

Weight of does (kg)	Treatments				
	Control	aqueous extract		alcoholic extract	
		5g/kg	7.5g/kg	5g/kg	7.5g/kg
At starting	3.13±0.05	3.15±0.04	3.22±0.06	3.21±0.057	3.20±0.05
At mating	3.25 ^{b}±0.06	3.36 ^{ab}± 0.06	3.56 ^{a}±0.06	3.46 ^{ab}±0.11	3.40 ^{ab}±0.111
At half of pregnancy period	3.58 ^{b}±0.06	3.78 ^{ab}±0.11	4.10 ^{a}±0.11	3.95 ^{ab}±0.18	3.81 ^{ab}±0.15

a, b: Values in the same row with different superscripts are significantly differ at P<0.05

Feed intake

The following figure (Figure1) shows that feed intake was increased gradually as the age increase, and the result showed significantly decrease (P<0.05) in feed intake of does reared under control group than other groups having vitex extract. The significantly (P<0.05) increase in feed intake of vitex groups may be due to the positive impact on feed conversion ratio (Berrin *etal*., 2016). Also Nath *et al.* (2012) indicated that vitex in the broiler rations may be useful and could be used as an alternative growth promoters.

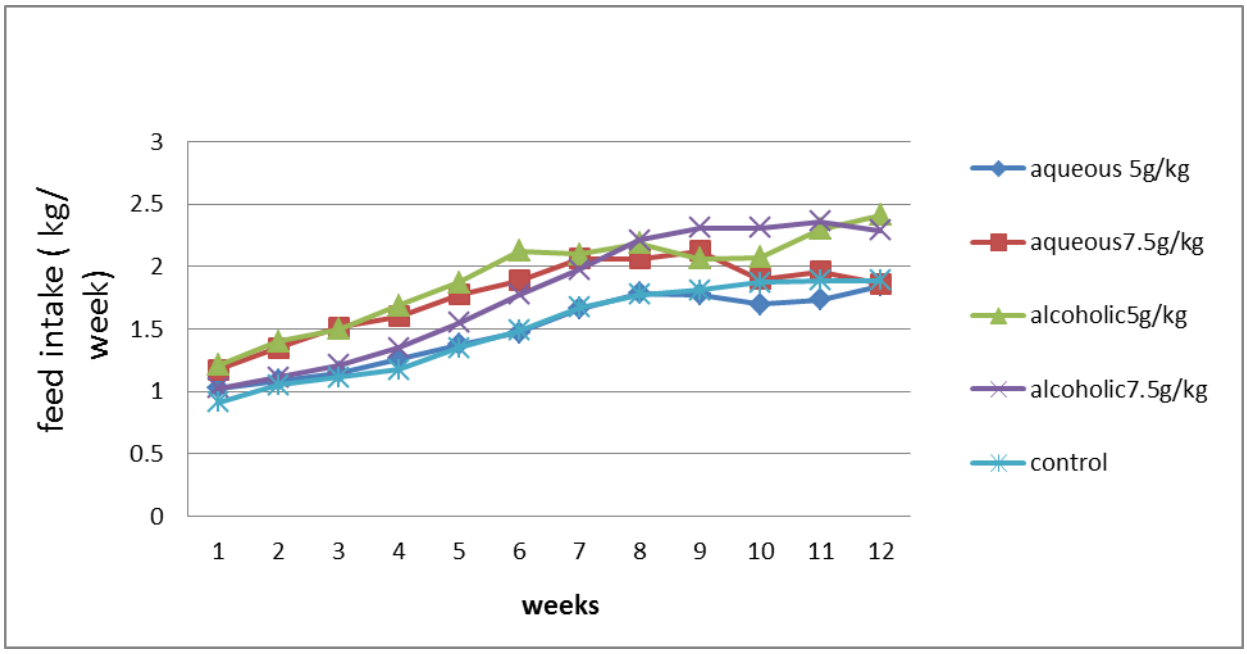

Figure (1): Effect of the experimental treatments on feed intake (g) of rabbit does.

Digestion coefficients of nutrients and nutritive values.

Data tabulated in Table (6) indicate that values of all nutrients digestion coefficients, except NFE and nutritive values as DCP were significantly (P≤ 0.05) improved with dietary treatments, especially with using aqueous extract. And the best value was reported for 7.5 g/kg aqueous extract.

The positive effect of vitex extracts on digestion coefficients of different nutrients and nutritive values may be due to antimicrobial and anti-protozoal properties of compounds in vitex extract which promotes gastrointestinal health (Kale *et. al*., 2003 and Bishnu *et al*., 2009) which improved the feed consumption

and feed efficiency for animals. Also, results are agreed with those reported by Siddig and Abdelati (2001) who carried out a research work in broiler fed rations containing turmeric and cloves showing higher weight gain. The improvement in growth performance using cinnamon rations may probably be due to the fact that cinnamon extract inhibits growth of intestinal bacteria such as S. aureus and E. coli as reported by Hanafy and Hatam (1991). Resultantly, when the load of these bacteria in the intestine is low, birds may absorb more nutrients, thus leading to improve the digestion coefficients and Nutritive values of the birds using rations supplemented with turmeric and cloves.

Table (6): Effect of the experimental treatments on digestion coefficients of nutrients (%) and nutritive values.

Treatments		Digestion coefficients (%)						Nutritive values	
		DM	OM	CP	CF	EE	NFE	TDN	DCP
Control diet		64.31^{b}	60.21^{b}	72.01^{c}	49.43^{c}	81.62^{c}	77.24	69.79	12.90^{c}
		±0.95	±0.17	±0.84	±1.57	± 0.58	±1.79	±2.00	±0.15
aqueous extract	5g/kg	64.66^{b}	60.70^{b}	77.85^{b}	52.31^{bc}	84.37^{b}	77.91	70.93	13.75^{b}
		±0.53	±0.65	±0.67	±0.91	±0.52	±0.58	±0.59	±0.12
	7.5g/kg	67.24^{a}	63.47^{a}	80.84^{a}	53.32^{b}	86.11^{a}	78.90	69.57	14.37^{a}
		±0.42	±0.69	±0.30	±0.81	±0.04	±0.39	±0.60	±0.05
alcoholic extract	5g/kg	68.72^{a}	64.82^{a}	77.54^{b}	56.91^{a}	83.13^{bc}	78.23	69.90	13.78^{b}
		±0.56	±1.35	±0.95	±0.32	± 0.75	±0.56	±0.54	±0.17
	7.5g/kg	67.89^{a}	64.16^{a}	78.23^{b}	53.34^{b}	84.70^{ab}	76.80	69.33	13.98^{b}
		±0.28	±0.35	±0.43	±0.33	±0.32	±1.57	±0.91	±0.07

a, b, c: Values in the same column with different superscripts are significantly differ at P <0.05.

Blood parameters

Results of blood constituents (Table 7) show that there wasn't significant effect of experimental treatments on all traits, except total lipid and triglyceride were affected significantly (P≤ 0.05). That, the highest value for triglyceride was for 5g/kg aqueous extract (80.09 mg/dl) besides, the highest value for total lipid (mg/dl) was for 7.5 g/kg alcoholic extract (352.26) whereas, the lowest value for total lipid was for 5g/kg aqueous extract (344.09 mg/dl) however the lowest value for triglyceride was for 5g/kg alcoholic extract (79.36) comparing with the values for control diet which were 351.90 and 80.02 mg/dl for total lipid and triglyceride respectively. In this turn, Mustafa (2007) reported that no changes were noticed in blood profile, and this may be due to the differences in the solvent that used in extraction. And pointed out that blood cholesterol levels were reduced by using a plant extract, this action may attributed to the existence of flavonoids. Flavonoids are known to regulate cholesterol production and exert a potent hypocholesterolemic effect via suppression of the 3-hydroxy-3-methyl-glutaryl-coenzyme A reductase (HMGCoA reductase enzyme). Also, Unlike statin drugs, which reduce the activity of the HMG-CoA reductase enzyme. Flavonoids appear to reduce total cholesterol levels by anovel post-transcriptional mechanism that regulates the degradation rate of the HMG-CoA reductase enzyme

(Nawarskas, 2005).Other studies have demonstrated the antioxidant and anti-inflammatory benefits of flavonoids, and when combined with the current findings of a significant and repeatable reduction of total cholesterol and triglycerides, they lend further support to the overall cardio-protective benefits of these natural extracts (James *et al*., 2007).

Table (7): Effect of the experimental treatments on some blood constituents of rabbit does.

Parameter	Experimental treatments				
	Control diet	aqueous extract		alcoholic extract	
		5g/kg	7.5 g/kg	5g/kg	7.5 g/kg
Total protein, (g/dl)	5.55 ±0.10	5.77±0.13	5.84±0.09	5.74±0.16	5.810.12
Albumin,(g/dl)	4.43±0.08	4.34±0.10	4.35±0.14	4.11±0.09	4.360.11
HDL (mg/dl)	64.25±0.13	64.59±0.19	64.31±0.16	64.18±0.11	64.67±0.13
LDL (mg/dl)	135.11±0.07	135.04±0.11	135.15±0.09	135.24±0.05	135.26±0.12
Total lipid (mg/dl)	351.90^{a}±1.05	344.09^{c}±1.2	347.52^{b}±1.3	349.40^{ab}±1.22	352.26^{a}±1.09
Triglyceride (mg/dl)	80.02^{ab}±0.13	80.09^{a}±0.22	79.82^{ab}±0.2	79.36^{c}±0.24	79.61^{bc}±0.19
Urea-N,(mg/dl)	47.38±0.40	47.33±0.43	47.30±0.48	47.07±0.50	47.14±0.37
Creatinine mg/dl	0.656±0.01	0.652±0.06	0.645±0.03	0.653±0.04	0.654±0.08
AST(U/L)	46.18±0.17	46.04±0.23	46.37±0.11	45.89±0.25	45.91±0.33
ALT(U/L)	57.42±0.14	57.16±0.18	57.59±0.13	57.150.23	57.21±0.15

ALT: alanine amiotransferase; AST: aspartate aminotransferase HDL: high density lipoproteinLDL: low density lipoprotein.
a, , b and c means in the same row with different superscripts are significantly different (P≤0.05).

Hematological parameters:

Data listed in Table (8) show no significant effect of experimental treatments on all traits belong hematological parameters (haemoglobin, red blood cell, hematocrit (PCV), MCV, MCH, MCHC, platelet

Table (8): Effect of the experimental treatments on haematological parameters of rabbit does.

Parameter	Experimental treatments				
	Control diet	aqueous extract		alcoholic extract	
		5g/kg	7.5 g/kg	5g/kg	7.5 g/kg
Haemoglobin (g/dl)	13.38±0.25	12.80±0.30	12.99±0.26	13.07±0.29	13.60±0.32
Red blood cell (10^6/ µl)	5.87±0.18	5.57±0.22	5.69±0.37	5.59±0.20	5.58±0.25
Hematocrit% (PCV)	13.38	12.80	12.99	13.07	13.60
MCV (1) (fl)	45.63±0.23	44.79±0.34	45.25±0.37	45.65±0.25	45.58±0.28
MCH(2) (pg)	23.03±0.28	22.89±0.30	22.80±0.38	23.16±0.25	23.57±0.33
MCHC(3) (g/ l)	29.51±0.18	29.79±0.20	29.72±0.22	29.71±0.30	29.69±0.25
Platelet count (10^3/ µl)	257.67±2.13	258.01±2.38	255.43±2.22	256.26±2.27	254.54±2.35
White blood cell (10^3/ µl)	7.20±0.11	6.90±0.15	7.07±0.20	6.93±0.18	7.03±0.25

1:Mean corpuscular volume , 2: Mean corpuscular hemoglobin 3: Mean corpuscular hemoglobin concentration.

count and white cell count).These results agree with Mustafa (2007) who reported that vitex extract had no significant effect on white blood cells compared with the control group. The decrease in some blood parameters maybe due to the presence of flavonoids in this plant, it has been shown that the flavonoids can decrease the number of red blood cells and packed cell volume and hemoglobin (Wang and Tang , 1995 and Young *et al*., 1997). The essential oils of this plant can also affect blood parameters by inhibition of synthesis of red blood cells (Wang and Tang, 1995). Essential oils and flavonoids were also shown in another study to affect blood parameters resulting in decreased production of its elements (Blumenthal, 2000).

Table (9). Phytochemical composition of aquatic and alcoholic extract of Vitex agnus-castus

Phytochemical	Aquatic extract	Alcoholic extract
Flavonoids	+	+
Saponins	+	+
Terpenoids	+	+
Anthraquinones	+	+
Cardiac glycosides	-	-
Alkaloids	+	+
Tannins	+	-

Phytochemical Screening in Table (9) showed that, alkaloids, saponins, tannins, anthraquinones, flavonoids and terpenoids were detected in aqueous extract. However, alkaloids, saponins, anthraquinones, flavonoids and terpenoids were detected in alcoholic extract. These results agree with Varadarajan et al. (2008) who reported that medicinal values of the plant leaves may be related to their constituent phytochemicals.

Economical evaluation

Data concerning economical evaluation are summarized in Table (10). The present results indicated an increase of net revenue for rabbits fed diets contained aqueous extract of vitex leaves at all levels compared to those fed alcoholic extract of vitex leaves and control diets, that the values of economic efficiency for 5 and 7.5 g/kg aqueous extract were 38.89 and 30.23 respectively compared with 11.68 for control diet, this related to improving in weaning rabbit of aqueous extract groups with a low total feed cost comparing with control group. These results agree with Nath *et al.* (2012) who indicated that polyherbal supplementation like vitex in the broiler rations may be useful for the safe, economical and efficient production of broiler and this formulation could be used as an alternative to commercial growth promoters.

Table (10): Economical evaluaton for rabbit as affected by different dietary treatments.

Item	Experimental treatments				
	Control diet	aqueous extract		alcoholic extract	
		5g/kg	7.5g/kg	5g/kg	7.5g/kg
Total feed intake (kg)[(1)]	18.98	17.84	19.18	21.96	21.46
Price diet/kg L.E	4.25	4.27	4.32	4.30	4.35
Total feed cost (L.E.)	80.67	76.18	82.86	94.43	93.35
Weaning rabbit produced (kg/ doe)	2.73	3.16	3.27	3.00	3.1
Selling price (L.E.)[(2)]	90.09	104.28	107.91	99	102.3
Net revenue (L.E.)[(3)]	9.42	28.10	25.05	4.57	8.95
Economic efficiency %[(4)]	11.70	36.90	30.23	4.8	9.6

*1 Total feed intake= (Pregnant does daily feed intake X 30) + (Lactating does daily feed intake X 30) 2 Price of kg live body weight was 33 L.E. 3 Net revenue= Selling price – total feed cost (according to price marketing during 2017) 4 Economic efficiency = Net revenue/ total feed cost *100.*

CONCLUSION

Supplementation of aqueous vitex leaves extract with 7.5 g/kg in the diet of rabbit does improved their reproductive and productive performance.

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تاثير كلا من المستخلص المائى والكحولى لنبات الفيتكس(كف مريم) على الاداء التناسلى و الانتاجى لامهات الارانب

فاطمة طلعت فرج عبدالغني[1] و ولاء حسين خليفة [2] وعادل محمد محمد سيد أحمد[1]

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تهدف هدة الدراسة لمعرفة تاثيراستخدام مستخلص نبات الفيتكس(كف مريم) على الاداء التناسلى والانتاجى للارانب تم استخدام خمسين انثى ارنب نيوزيلاندى ابيض عمر 7 شهورتم تقسيمها الى 5 مجموعات متساوية (10 اناث لكل مجموعه) المجموعه الاولى تم تغدبتها على عليقه خاليه من مستخلص نبات الفيتكس كما تم تغديه كلا من المجموعه الثانيه والثالثه على عليقه مضاف لها المستخلص المائى لنبات الفيتكس بتركيز (5 و 7,5جم/ كجم عليقه) على التوالى بينما غديت كلا من المجموعه الرابعه والخامسه على عليقه مضاف لها المستخلص الكحولى لنبات الفيتكس بتركيزين (5 و 7,5جم/كجم عليقه) على التوالى .تم تسجيل كلا من معدل الحمل , حجم ووزن الخلفه عند الميلاد وعند الفطام (اليوم28 من الولاده) , معدل الوفيات قبل الفطام وانتاج اللبن لثلاثه بطون متتاليه. وقد اوضحت النتائج ان نبات الفيتكس يؤثرمعنويا على كلا من معدل الحمل وحجم الخلفه عند الميلاد والفطام وبالتالى يؤثرعلى انتاج اللبن حيث ان زياده كميه اللبن للخلفات فى معظم فترات الرضاعه ادى الى زياده معنويه فى وزن الخلفات عند الفطام كما انه باستخدام مستخلص نبات الفيتكس حدث انخفاض معنوى فى مستوى الليبدات الكليه والجلسريدات الثلاثيه فى الدم للامهات كما انه استخدام المستخلص المائي للفيتكس ادى الى زياده كبيره فى العائد الاقتصادي مقارنه بالكنترول . نستنتج من هذه الدراسه ان اضافه المستخلص المائي نبات الفيتكس الى العليقه بنسبة 7,5جم لكل كجم عليقه ادى الى تحسين الاداء التناسلى و الانتاجى للارانب مع زيادة العائد الاقتصادي .