Egypt. J. Agric. Res., 81 (3), 2003.

INFLUENCE OF BLACK SEED, GARLIC AND ONION SUPPLEMENTATION ON REPRODUCTIVE PERFORMANCE IN RABBITS

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(Manuscript received 27 January 2003)

Abstract

An experiment was conducted to study the effect of using black seed (BS), dried garlic (DG) and onion (DO) powder at level of 1% each on physiological parameters and reproductive performance. A total of 32 New-Zealand White (NZW) rabbits does were distributed into 4 treatments (8 rabbits each). The diets were formulated to be iso-nitrogenous (17% CP) and iso-energetic (2700 Kcal DE/Kg diet). The dietary treatments were fed to rabbits for two parities.

The results showed that Ht, Hb, P_4, GOT, GPT, Alb, Glb, A/G ratio, T_3, RBCs, TP and WBCs counts were significantly improved by adding of either black seed, garlic or onion to rabbit diets. Also, there was an improvement in all parameters studied, especially those related to reproductive performance, and marked reduction in total lipids and cholesterol values were obtained due to BS, DG and DO supplementation as compared to the control group. The second parity showed a slight improvement in all parameters studied as compared to the first one. It can be concluded that supplementation of BS, DG and DO showed a significant role in enhancing the immune system, and reproduction due to their contents from active principles belonging to each of them.

Key Words: Onion – Garlic – Black seed – Rabbits – Immune system - Performance.

INTRODUCTION

The food industry and politicians are increasingly concerned about environmental matters and keeping energy inputs low. In addition, arguments for food produced as natural as possible are increasingly heard from organic farm organization and consumer organization. Now, the use of new technologies such as genetic engineering in food and animal feed production is being questioned, even synthetic amino acids, vitamins or other feed additives produced by modern technologies are banned in certain production system. Actually, the problems that in 25 years there will be almost 9 billion inhabi-

tants (FAO STAT, 1998) on earth who expect to get enough food to meet their nutritional needs. So, the goal is to produce sufficient food for every-one, and this can only be achieved if world food production increases by about 2% per year, and the world food production must also accomplish this growth without increasing the environmental waste load or pollution. This precondition demands the efficient and responsible use of all available resources of traditional and modern technologies and also feed additives, especially, after antibiotic feed additives have been banned in animal nutrition due to increased pathogens resistant to therapeutic antibiotics used in both animals and humans.

With this restriction use of antimicrobial agents, new ways of improving and protecting the health status of farm animals must be explored. This goal can be achieved by good housing or climate conditions, as well as, by the best possible combination of the so-called *Pronutrients* (Rosen, 1996) including pro-or prebiotics, organic acids, dietary fiber, highly available nutrients, herbs, spices or botanicals. For example, garlic scientifically known as *Allium sativa*, is a complex mixture of chemicals displaying antiviral, anti-bacterial, anti-cancer, anti-blood clotting, decongestive, cholesterol-reducing and immunity-boosting properties (Carper, 1995). Also, garlic was tested to treat tuberculosis, cholera and typhus and during world war II, British Physicians treated battle wounds with garlic. In Russia, it is called Russian penicillin (Carper, 1995). French farmers fed garlic and onions to their horses to dissolve clots in the animals legs (Carper, 1995).

Black seed (*Nigella sativa*) is recently used for medical purpose, where, it is well known as antibacterial, antifungal, antidiabetic and immune enhancing (Khodary *et al.*, 1996).

The goal of the present study is to evaluate the use of black seed, garlic and onion in NZW does as antimicrobial, antifungal, immune enhancing and as well as a natural growth promoters, and to detect which of the black seed, garlic or onion is the best to accomplish our purpose. The chemical analysis of tested feed additives are presented in Tables 1, 2 & 3.

MATERIALS AND METHODS

Thirty-two New-Zealand White does rabbits were randomly assigned individually into 4 treatments (8 rabbits each). The experimental diets were formulated to be isonitrogenous (17% CP) and iso-caloric (2700 Kcal DE/Kg diet). Ingredients and chemical composition of the control diet is presented in Table 4.

The four experimental treatments were as follows :

1. Basal diet (control).
2. Basal diet + 1% whole black seeds (BS).
3. Basal diet + 1% dried garlic powder (DG).
4. Basal diet + 1% dried onion powder (DO).

Feed and water were offered *ad libitum* through two parities.

Blood samples were collected by mid pregnancy in the two parities for determination of haemoglobin (Hb), hematocrit (Ht), total protein (TP), albumin (Alb), globulin (Glb), cholesterol (Chl), total lipid (TL), triiodothironine (T_3), glutamic oxaloacetic transaminase (GOT), pyruvic transaminase activity (GPT) and progesterone (P_4) by kits from Bio Merieux (France) according to the procedure outlined by the manufacturer. White blood cells differential were done. Moreover, litter size and weight at birth and at weaning, mortality rate and milk yield were recorded for each of the two parities.

Statistical analysis was conducted by analysis of variance using SAS package (1995). The means and standard error of all parameters were estimated and Tukey's test was used to detect significant differences among means of the experimental groups.

RESULTS AND DISCUSSION

1. Influence of supplemented stuffs on blood parameters

The blood parameters taken through the mid pregnancy in doe rabbits were presented in Tables (5 & 6). It can be noticed that most parameters (TP, Alb, Glb, GOT, GPT, T_3, P_4, Ht, Hb, RBCs, WBCs and the WBCs differential) were increased due to BS, DG and DO dietary supplement in respective to the parity. On the contrary, the TL and

Table 1. The chemical composition of the onion[1].

Onion nutrition facts	1 / 2 cup (80 g) Chopped raw onion
Calories	30
Total Fat	0
Cholesterol	0
Sodium	0
Total Carbohydrate	7 g
Dietary Fiber	1 g
Sugars	5 g
Protein	1 g
Vitamin C	5 mg
Vitamin B6	0.1 mg
Calcium	16 mg
Iron	0.2 mg
Folic Acid	15.2 mcg
Potassium	126 mg
Selenium	0.5 mcg
Zinc	0.2 mg

[1]Source : Healthy Facts "http://onions-usa.org".

Table 2. Chemical analysis of black seed[1].

Essential oil composition (1.4%)	Black seed oil
Carvone	21.1%
Alfa-Pinene	7.4%
Sabinene	5.5%
Beta-Pinene	7.7%
P-cymene	46.8%
Others	11.5%
Fatty acids	**Black seed oil.**
Myristic Acid (C14:0)	0.5%
Palmitic Acid (C16:0)	13.7%
Palmitoleic Acid (C16:1)	0.1%
Stearic Acid (C18:0)	2.6%
Oleic Acid (C18:1)	23.7%
Linoleic Acid (C18:2)(Omega-6)	57.9%
Linolenic Acid (18:3n-3) (Omega-3)	0.2%
Arachidic Acid (C20:0)	1.3%
Saturated & Unsaturated fatty acids	**Black seed oil**
Saturated Acid	18.1%
Monounsaturated Acids	23.8%
Polyunsaturated Acids	58.1%
Nutritional value	**Black seed oil**
Protein	208 µg/g
Thiamin	15 µg/g
Riboflavin	1 µg/g
Pyridoxine	5µg/g
Niacin	57 µg/g
Folacin	610 IU/g
Calcium	1.859 mg/g
Iron	105 µg/g
Copper	18 µg/g
Zinc	60 µg/g
Phosphorus	5.265 mg/g

[1]Source : Black seed USA "http://www.blackseedusa.com".

Table 3. Chemical analysis of garlic[1].

Garlic nutrition facts	(%) or mg
Moisture	65.79%
CP	6.60%
EE	0.9
CF	7.70%
Ash	1.50%
NFE	17.51%
Ca	0.10%
Total P	0.13%
Na	0.05%
Mg	0.04
K	0.46
Fe	5.74 mg/100 gm
Zn	1.52 mg/100 gm
Cu	0.11 mg/100 gm

[1]Source : Soliman *et al.* (1999).

Table 4. The ingredients and chemical composition of the control diet.

Items	%
Ingredients	
Wheat bran	35.0
Alfalfa meal (14%)	33.6
Yellow corn	10.5
Soybean meal (44%)	15.77
Molasses	2.6
Bone meal	1.4
Limestone	0.3
Salt	0.4
Vitamins &minerals premix*	0.3
DL- Methionine	0.11
L- Lysine	0.02
Total	100
Calculated analysis	
Digestible energy (DE),kcal/kg	2721
Crude protein (CP), %	17.12
Crude fiber (CF), %	13.30
Calcium (Ca), %	1.13
Phosphorus (P), %	0.82
L-Lysine, %	1.0

*Vitamins and minerals premix per kilogram contains:

Vit. A, 6000 IU; Vit. D, 900 IU; Vit. E, 40 mg; Vit. K_3, 2 mg; Vit. B_1, 2 mg; Vit. B_2, 4 mg; Vit. B_6, 2 mg; Vit. B_{12}, 10 µcg; Nicotinic acid, 50 mg; Biotin, 50 µcg; Folic acid, 10 mg; Choline chloride, 250 mg; Zinc, 50 mg; Manganese, 85 mg; Iorn, 50 mg; Copper, 5 mg; Iodine, 0.2 mg; Selenium, 0.1 mg; Cobalt, 0.1 mg.

Cholesterol were low in doe rabbits in treatment groups compared to control group. These improvements may be due to improvement in immune system responsiveness. Black seed (BS), DG and DO contain Zn, Cu, Mn, Mg, Se, vit. C, vit. A, vit. E and folic acid which they have a role in enhancing immune system. Folic acid, Fe and vit. C have roles in red blood cell formation, maturation, and in hem biosynthesis, absorption and utilization (William, 1999). So, the Ht%, Hb, RBCs and WBCs increased in supplemented groups as reported here. Also, the blood parameters improved significantly compared to control. No significant differences were obtained between the supplemented groups in most of the blood parameters (Table 6). Garlic gave the best results in all parameters studied (except the Alb/Glob ratio) followed by onion then BS. The same trend was observed for the other parameters, where total protein, albumin and globulin were increased in supplemented groups compared to control, and this can be attributed to the special improvement in metabolic process, and the presence of the fatty acids in BC may affect muscle protein synthesis and protein deposition through a prostaglandin depend mechanism as reported by (Palmer, 1993).

Supplementation of DG, DO and BS increased plasma T_3 concentrations where the biological role of DG, DO and BS in activities metabolic functions and biosynthesis of hormones were noticed (Table 5). Enhancement in thyroid activity may be related to, and reflected in the increase in leukocytes populations mainly lymphocytes (Bachman and Mashaly, 1986). The increase in leukocytes counts (lymphocytes) due to treatments can be explained by the fact of garlic and onion as they have a significant role against bacteria, protozoa and fungi (Sendle *et al.*, 1992). Much research shows that garlic contains many biologically active chemicals (allicin, quercetin and aflavonoid "one category of antioxidant compounds") which in laboratory animals 1) block cancers of every type, 2) suppress the growth of prostate cancer cells, 3) kill viruses responsible for cold and the flu; 4) has an effect on sore throat. Studies suggest that garlic revs up immune functioning by stimulating infection-fighting T-cells (Carper, 1995).

The BS has active materials known as nigellon, thymoquinone and thymohydroquinone, and these compounds were shown to possess antimicrobial, pharmacological activities, antibacterial (due to their volatile oils) and antifungal effects besides as a protector from hepatotoxicity, diabetic and pancreatic damage (Khodary *et al.*, 1996). For all these reasons, the immunity responsiveness represented in the increase of leu-

Table 5. Influence of supplementary black seed, garlic or onion on some blood parameters of rabbits in the first and second parity.

No. of Parity	Control	Dietary supplementation			Mean
		Black seed	Garlic	Onion	
		Total protein (g/100 ml)			
1st parity	6.41±0.09	6.77±0.09	7.29±0.09	7.19±0.09	6.29
2nd parity	6.39±0.09	6.74±0.09	7.42±0.09	7.46±0.09	7.00
Mean	6.40[b]	6.76[ab]	7.36[a]	7.33[a]	
		Albumin (g/100 ml)			
1st parity	3.17±0.06	3.67±0.06	3.79±0.06	3.56±0.06	3.55
2nd parity	3.29±0.06	3.68±0.06	3.74±0.06	3.50±0.06	3.55
Mean	3.23[b]	3.68[a]	3.77[a]	3.53[a]	
		Globulin (g/100 ml)			
1st parity	3.24±0.04	3.10±0.04	3.50±0.04	3.63±0.04	3.37
2nd parity	3.10±0.04	3.06±0.04	3.68±0.04	3.96±0.04	3.45
Mean	3.17[b]	3.08[b]	3.59[a]	3.80[a]	
		A/G ratio			
1st parity	0.98	1.18	1.08	0.98	1.06
2nd parity	1.06	1.2	1.02	0.88	1.04
Mean	1.02	1.19	1.05	0.93	
		Total lipid (g/100 ml)			
1st parity	404±29.43	340±29.43	339±29.43	325±29.43	352.00
2nd parity	422±29.43	358±29.43	337±29.43	338±29.43	363.75
Mean	413[b]	349[a]	338[a]	332[a]	
		Total cholesterol (g/100 ml)			
1st parity	81.77±4.11	70.42±4.11	62.19±4.11	68.47±4.11	70.71
2nd parity	80.29±4.11	69.41±4.11	63.75±4.11	68.30±4.11	70.44
Mean	81.03[b]	69.92[a]	62.97[a]	68.39[a]	
		GOT (g/100 ml)			
1st parity	23.43±0.49	33.60±0.49	33.89±0.49	33.24±0.49	31.04
2nd parity	22.96±0.49	32.54±0.49	34.64±0.49	32.41±0.49	30.64
Mean	23.20[b]	33.07[a]	34.27[a]	32.83[a]	
		GPT (g/100 ml)			
1st parity	14.45±0.32	21.99±0.32	20.09±0.32	21.43±0.32	19.37
2nd parity	13.61±0.32	21.74±0.32	19.94±0.32	21.50±0.32	19.20
Mean	14.03[b]	21.87[a]	20.02[a]	21.47[a]	
		T_3			
1st parity	1.42±0.10	1.53±0.10	1.58±0.10	1.60±0.10	1.53
2nd parity	1.40±0.10	1.52±0.10	1.77±0.10	1.66±0.10	1.59
Mean	1.41	1.53	1.68	1.63	
		P_4			
1st parity	6.65±0.07	7.21±0.07	7.65±0.07	7.66±0.07	7.29
2nd parity	6.46±0.07	6.62±0.07	6.63±0.07	6.84±0.07	6.64
Mean	6.56[b]	6.92[a]	7.14[a]	7.25[a]	

[a, b] means in the same raw with different superscripts are significantly different ($P<0.05$).

kocytes counts mainly lymphocytes type increased as shown in Table 6. The improvements in immune system or responsiveness can be due to the special materials (nigellone, thymoquinon and thymohydroquinone), trace minerals and vitamins belonging to each of the supplemented stuff, and the improvements in blood metabolites can be affected and reflected positively on immune system (William, 1999).

From the results presented in Table 5, it was found that there was a significant decrease in total lipids and cholesterol in additives supplemented groups compared to control groups. This finding can be explained on the basis that DG, DO and BS are considered as antiarthosclerotic agents due to their content from essential oils. Quercetin can prevent fat-induced hyperlipemia (hypo-lipemic and hypo-cholesterolemic properties) mainly through the inhibition of the key enzyme in cholesterol and lipid synthesis or inhibition of the low - density lipoprotein (LDL) oxidation (Konjufca *et al.*, 1997). Dried garlic (DG) was more effective than DO and DS in reducing total lipids and cholesterol due to the higher content of sulfur compounds compared to others (Sklan *et al.*, 1992). These compounds were found to be responsible for the inhibition of the biosynthesis of cholesterol and lipids (Sklan *et al.*, 1992).

In general, members of the lily family (G and O) are high in vit. C and contain quercetin and adenosine which is thought to fight LDL an undesirable type of cholesterol (Ask Yahoo "http://ask.yahoo.com").

The BS mechanisms in reducing total lipids and cholesterol is different, where black seeds contain high amounts of unsaturated fatty acids which can stimulate the cholesterol excretion into the intestine and it can be oxidized to bile acids (Khodary *et al.*, 1996). Also, the role of minerals found in BS, DG and DO in reducing the total lipids and cholesterol cannot be ignored. Konjufca *et al.* (1997) reported that copper deficiency was shown to induce hyper-cholesterolemia in rats by elevating hepatic GSH (reduced glutathione) levels and changing the GSH:GSSG (oxidized glutathione) ratio.

Concerning the GOT and GPT, it was noticed to have a slight increase in liver enzyme activities due to treatments, but this increase was still within normal range as indicated by the non-sign of toxicity. Back to the Alb/Glob ratio, the best ratio, as a good indicator for increasing immunity responsiveness was recorded with onion group compared to other treatments.

Table 6. Influence of black seed, garlic or onion supplementation on some physiological parameters of rabbits in the first and second parity.

No. of Parity	Control	Dietary supplementation			Mean
		Black seed	Garlic	Onion	
Hematocretes (Ht)					
1st parity	30.25±0.78	34.00±0.78	40.00±0.78	39.50±0.78	35.94
2nd parity	30.57±0.78	34.75±0.78	41.25±0.78	40.25±0.78	36.75
Mean	30.50^{c}	34.38^{b}	40.63^{a}	39.88^{a}	
Hemoglobin (Hb)					
1st parity	10.48±0.82	16.28±0.82	17.55±0.82	16.78±0.82	15.27
2nd parity	10.40±0.82	16.50±0.82	17.78±0.82	17.03±0.82	15.40
Mean	10.44^{b}	16.39^{a}	17.67^{a}	16.91^{a}	
Total red blood cells (RBCs)					
1st parity	4.58±0.17	4.73±0.17	4.85±0.17	4.78±0.17	4.74
2nd parity	4.57±0.17	4.75±0.17	4.92±0.17	4.91±0.17	4.79
Mean	4.58	4.74	4.89	4.85	
Total white blood cells (WBCs)					
1st parity	25.85±1.38	29.83±1.38	31.13±1.38	31.72±1.38	29.63
2nd parity	25.43±1.38	30.20±1.38	31.40±1.38	31.15±1.38	29.55
Mean	25.64^{b}	30.02^{a}	31.27^{a}	31.44^{a}	
Lymphocytes					
1st parity	58.25±0.87	64.75±0.87	66.75±0.87	65.50±0.87	63.81
2nd parity	58.75±0.87	64.25±0.87	68.75±0.87	65.50±0.87	64.31
Mean	58.50^{b}	64.50^{a}	67.75^{a}	65.50^{a}	
Monocytes					
1st parity	3.50±0.26	2.75±0.26	3.25±0.26	2.25±0.26	2.94
2nd parity	3.75±0.26	3.25±0.26	3.50±0.26	2.50±0.26	3.25
Mean	3.63^{a}	3.00^{a}	3.38^{a}	2.38^{b}	
Neutrophils					
1st parity	34.75±0.90	29.50±0.90	27.25±0.90	29.50±0.90	30.25
2nd parity	34.25±0.90	29.75±0.90	26.75±0.90	29.50±0.90	30.06
Mean	34.50^{a}	29.63^{b}	27.00^{b}	29.50^{b}	
Basophils					
1st parity	1.75±0.21	2.25±0.21	1.75±0.21	1.75±0.21	1.88
2nd parity	2.00±0.21	2.25±0.21	1.00±0.21	1.50±0.21	1.69
Mean	1.88^{ab}	2.25^{a}	1.38^{b}	1.63^{b}	
Eosinophils					
1st parity	1.75±0.13	1.75±0.13	1.50±0.13	1.00±0.13	1.50
2nd parity	1.25±0.13	0.75±0.13	0.50±0.13	1.50±0.13	1.00
Mean	1.50^{a}	1.25^{ab}	1.00^{b}	1.25^{ab}	

a, b means in the same raw with different superscripts are significantly different ($P<0.05$).

There was no significant effect between the two parities in blood parameters studied. Slight changes in blood parameters have occurred between the first and second parities except P_4 which decreased from 7.29 to 6.64, respectively. A/G ratio got better compared to the 1st parity in DG and DO groups only. It was so clear that the P_4 increase was accompanied by the increased litter size in treatment groups compared to control (Table 7). In spite of increased litter size in second parity, the P_4 decreased. This can be explained by the fact that the biosynthesis of progesterone is believed to start with acetate or cholesterol (Hafez, 1987). Therefore, P_4 decreased in the treatments group as compared to the control, whereas, the DG, DO and BS showed a great effect on decreasing cholesterol, subsequently P_4 decreased. This effect was so clear in the second parity and was not pronounced in the first parity, and this may be due to the accumulating effect of these substances in the 2nd parity.

2. Influence of supplemented stuffs on reproductive performance

With concern to the reproductive parameters as affected by BS, DG and DO and parity (Table 7), there was an increase in litter size and litter weight at birth and at weaning due to BS, DG and DO treatments and parity. The DG treatment and the 2nd parity were the best in all parameters studied.

The milk yield increased in treatment groups and in 2nd parity compared to the control group and 1st parity, respectively, where, the DG group gave the best yield compared to all other treatments with significant difference to control (355 g more than the control yield), and with no significant differences to the DO and BS (Table 7). The milk yield in the 2nd parity increased by about 114.00 g compared to 1st parity. The improvement in the second parity in any parameter may be due to the accumulating effect of the treatment and their components (Zn, Cu, Mn, Vit. A and Vit. E) which had a direct effect on reproduction. The increase in milk production could be due to the increase in number of litter size at birth and at weaning, where there was a positive correlation between the litter size and milk yield. The special distinguished increase in milk yield in DG group could be due to that suckling rabbits like garlic, where when rabbit does eat garlic, they stay longer at the breast and drink more milk according to test at Monnel Chemical Senses Center in Philadelphia (Carper, 1995), and also to the increase in the litter size in DG group compared to BS and DO groups.

The effect of treatments on stillbirths and the total mortality were so clear where the treatments groups recorded 0% stillbirths, while, the control group recorded almost 9% (Table 7). Total mortalities were decreased by about 33% in supplemented group from the control value, and the best results were obtained with the DO. This can be due to its components which have a great effect on immune system which destabilizes the bacteria in the colon. The great role of the supplemented stuff on decreasing mortality rate and their positive effect on weight and body gain was so clear in this study.

Finally, it can be concluded that the whole improvements in reproductive performance were strongly due to the improvements in animal health and the responsiveness of the immune system, and to the decrease in the pre-embryonic mortality, stillbirths and post-natal mortality rate rather than on reproductive hormones. Any how, there was no way to ignore their roles in increasing the litter size at birth and at weaning and the milk yield which had been reflected on babies body weight, body weight gain and mortality rate through the suckling period. Also, we should be aware of using these additives for long run, which may affect negatively the reproductive hormone. Actually, further studies are needed to determine the magnitude of negative or side effect of these additives on reproductive hormones especially in the subsequent parities (third, fourth...etc. parity).

Table 7. Reproductive parameters of rabbits as affected by dietary supplementation of black seed, garlic and onion in the first and second parity.

No. of Parity	Control	Dietary supplementation			Mean
		Black seed	Garlic	Onion	
		Average litter size at birth			
1st parity	4.13±0.30	5.13±0.40	6.50±.0.50	5.00±0.37	5.19
2nd parity	4.63±0.41	5.75±0.33	7.38±0.55	6.88±0.44	6.16
Mean	4.38[c]	5.44[b]	6.94[a]	5.94[b]	
		Average litter size at weaning			
1st parity	2.75±0.22	3.88±0.40	5.00±0.40	4.25±0.51	3.97
2nd parity	2.88±0.31	4.38±0.50	5.50±0.55	5.00±0.47	4.44
Mean	2.81[c]	4.13[b]	5.25[a]	4.63[b]	
		Average litter weight at birth (g)			
1st parity	46.67±2.13	54.39±3.41	55.19±3.11	56.50±1.89	53.10
2nd parity	47.03±1.85	55.43±3.30	53.90±2.93	53.45±2.11	52.45
Mean	46.86[a]	54.91[b]	54.55[b]	54.98[b]	
		Average litter weight at weaning (g)			
1st parity	336±8.81	371±10.01	383±5.65	377±6.77	366.75
2nd parity	343±9.32	375±8.63	381±6.87	378±6.35	369.00
Mean	339[b]	372[a]	382[a]	377[a]	
		% Mortality (from birth to weaning)			
1st parity	33.33	24.39	23.08	15	23.95
2nd parity	37.84	23.91	25.42	27.27	28.61
Mean	35.71	24.15	24.25	21.14	
		Average milk production (g)			
1st parity	1732.5±17.31	1977.5±20.62	2065±26.11	1986.25±25.37	1940.31
2nd parity	1837.5±19.23	2047.5±23.51	2213.75±28.17	2117.50±29.16	2054.10
Mean	1785.00[c]	2012.50[b]	2139.41[a]	2051.91[b]	
		Stillbirths (%)			
1st parity	9.1	0	0	0	2.28
2nd parity	8.11	0	0	0	2.03
Mean	8.61	0	0	0	

[a, b, c] means in the same raw with different superscripts are significantly different (P<0.05).

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تأثير إضافة الحبة السوداء والبصل والثوم على الأداء التناسلى فى الأرانب

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أجريت تجربة لدراسة أثر إضافة الحبة السوداء والثوم والبصل على الأداء التناسلى والوظائف المناعية فى إناث الأرانب حيث أستخدم مستوى ١٪ من كل منها وتم إضافته إلى العلائق المحتوية على ١٧٪ بروتين و ٢٧٠٠ كيلوكالورى/كجم عليقة وأستمرت التجربة لمدة بطنين متتاليتين، حيث قُسمت الإناث إلى أربع مجاميع معاملة كالتالى : المجموعة الأولى كنترول - والمجموعة الثانية أضيف لها حبة البركة والثالثة أضيف لها الثوم المجفف والرابعة البصل المجفف.

وأظهرت النتائج ما يلى :

١- تحسن كل من قيم الهيماتوكريت والهيموجلوبين والألبيومين والجلوبيولين والنسبة بينهما وكذلك T_3 والبروتين الكلى وعدد كرات الدم الحمراء والبيضاء معنوياً مقارنة بالكنترول.

٢- أنخفضت بصورة معنوية كل من قيم الليبيدات الكلية والكوليسترول فى المجاميع المعاملة مقارنة بالكنترول.

٣- أظهرت البطن الثانية بعض التحسن فى المقاييس التناسلية مقارنة بالبطن الأولى على الرغم من إنخفاض البروجسترون فى البطن الثانية مقارنة بالبطن الأولى.

٤- تحسنت كل المظاهر التناسلية من زيادة عدد النتاج ووزنه عند الميلاد والفطام وكذاك إنتاج اللبن ونسبة النفوق فى المجاميع المعاملة مقارنة بالكنترول.

يمكن القول أن إضافة الثوم والبصل وحبة البركة لها تأثير إيجابى على رفع كفاءة الجهاز المناعى وكذلك تحسين الكفاءة التناسلية ولكن أستخدامها على المدى الطويل يجب أن يدرس لأن هناك بعض المقاييس تأثرت سلبياً كالبروجسترون مثلاً فى البطن الثانية مقارنة بالبطن الأولى.