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Reproductive performance and blood constituents of Damascus goats as affected by yeast culture supplementation

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ABSTRACT

The effect of dietary yeast culture (YC) supplementation during pre-mating and gestation periods on reproductive performance and some blood constituents were studied on 39 Damascus does aged 3-4 years and weighed 45.87±1.00 kg. The animals were divided into 3 comparable groups (13 does each). The 1st group fed a basal ration composed of 60% concentrate feed mixture (CFM) plus 40 % clover and rice straw. The 2nd and 3rd groups fed respectively the same basal ration plus daily supplement of 2.5 or 5.0 g YC which added to a part of the ground CFM. Results showed that YC supplementation significantly ($P<0.05$) improved reproductive ability, conception rate, fertility, fecundity, prolificacy, kids born/does joined, kids weaned/does kidded, kg of kids born or weaned/does joined or /does kidded. It also resulted in higher ($P<0.05$) serum total protein, albumin, total lipids, creatinine, zinc concentrations and AST activity but it decreased cholesterol and urea concentration than control does.

Serum total protein, albumin concentrations and A/G ratio were increased ($P<0.05$) and globulin concentration was decreased ($P<0.05$) during the last weeks before kidding. AST activity significantly decreased ($P<0.05$) from mating up to wk 8, thereafter increase was mild and gradual till kidding.. Meanwhile ALT concentration recorded its minimum value at the 10th wk of pregnancy while it increased gradually till kidding. Serum total lipids concentration was significantly decreased ($P<0.05$) from mating till kidding Total cholesterol concentration was significantly increased ($P<0.05$) from mating up to the 8th wk of pregnancy, thereafter it was gradually decreased till kidding. Concentration of blood urea recorded its minimum value at the 10th week of pregnancy (mid pregnancy). Thereafter it gradually increased till 18th week and decreased till kidding. Meanwhile, serum creatinine concentration increased gradually from conception till kidding. The concentration of serum Zn recorded its maximum value at the 8th week of pregnancy, thereafter it gradually decreased till kidding. However, the concentration of serum Fe recorded its minimum value at the 14th week of pregnancy, thereafter it gradually increased up to the 18th week and decreased till kidding.

It can be concluded that yeast culture supplementation could be added to does ration at the level of 2.5 or 5.0 g/head/day during pre-mating and gestation periods in order to improve reproductive traits and blood components.

Key words: Yeast culture, goats, reproductive traits, blood parameters, growth performance.

INTRODUCTION

Yeast and yeast cultures have been widely used in ruminant to manipulate rumen fermentation to improve animal performance. However, resulted performance of ruminants, fed yeast culture, had been varied. These differences may depend on many factors such as diet composition; forage to concentrate ratio, type of forage fed, yeast dose, feeding strategy and stage of lactation. Several studies have showed that live yeast and yeast culture supplementation may increase feed intake and milk production of dairy cows (**Robinson and Garrett, 1999 and Dann et al., 2000).** Some researchers have suggested that feeding yeast products may be most beneficial to dairy cows during gestation and early lactation because of their effects on rumen fermentation and nutrient digestion (**Robinson and Garrett, 1999; Dann et al., 2000 and Erasmus et al., 2005**).

Moreover, supplementation of yeast culture (YC) to ruminant diets improved animals performance and also found to increase blood total protein (**El-Shaer, 2003**), glucose concentration (Sharma *et al*., 1998) and decrease cholesterol (**Fayed *et al*., 2005).** An improvement in reproductive performance was also obtained by **Abdel-Khalek (2003)** in Friesian cows and **Ebrahim (2004)** in Egyptian buffaloes. The relationship between nutrition and reproduction in ruminants is complex and often quite variable. However, nutrient supply, as a component of the management system, need to be carefully evaluated. Milk yield and fertility are principal factors affecting profitability of dairy herds, since solving fertility problems in dairy herd increased milk production **(Boland, 2002)**. Recently, clinical trials in non-pregnant animals have shown that the consumption of probiotics can improve and maintain animals' physiological function and prevent oxidative stress that might eventually have beneficial effects on postpartum reproductive function (**Zebeli *et al*., 2010**)

The objectives of the present study were to illustrate the effect of yeast culture supplementation during pre-mating and gestation period on reproductive performance and some blood components of Damascus goats.

MATERIALS AND METHODS

The present study was conducted at El-Gemmiza Experimental Station, Animal Production Research Institute, Ministry of Agriculture, Egypt. In this respect, 39 Damascus goats of 3-4 years old and 45.87±1.00 kg body weight were divided into 3 comparable groups. The first group was fed according to **NRC (1981)** on a basal ration composed of 60% concentrate feed mixture (CFM) plus 40 % clover, and rice straw and served as control. The other two groups were fed the same basal ration supplemented daily with either 2.5 or 5.0 g /h/d YC (BGY-35: Table 2), respectively.

The YC was added to a part of the ground CFM. Chemical composition of the basal rations and YC are shown in Tables 1 and 2.

All animals were free of diseases and parasites and housed in semi-shaded well ventilated pens. After two weeks of starting YC supplementation, all does were subjected to heat detection 3-times daily. Does exhibited receptive and stood for mounting were subjected to natural mating by a fertile buck. Reproductive traits of does were recorded including; conception rate (CR) as percentage of does conceived/does joined; fertility as percentage of does kidded/does joined; fecundity as percentage of kids born/does joined; prolificacy as percentage of kids born/does kidded (kidding rate); reproductive ability as percentage of kids weaned of does joined; percentage of kids weaned/does kidded; kilograms of kids born/does joined; kilograms of kids born/does kidded; kilograms of kids weaned/does joined; kilograms of kids weaned /does kidded; mortality rate and finally percentage of dead kids from birth to weaning.

Table (1): Chemical composition of feedstuffs on DM basis

Ingredients	Items %						
	DM	OM	CP	EE	CF	NFE	ASH
Yeast culture	91.66	97.72	37.83	4.51	8.44	46.94	2.28
CFM*	88.7	91.20	14.70	3.02	13.90	59.58	8.80
Berseem 2nd cut	15.3	86.3	16.40	1.90	20.40	47.60	13.70
Berseem 3rd cut	19.3	88.8	14.70	3.10	22.60	48.40	11.20
Rice straw	91.21	84.38	3.63	0.99	37.54	42.22	15.62

*CFM: The ingredients of concentrate feed mixture were 30% wheat bran, 15 % undecorticateted cotton seed meal, 35 % yellow corn, 15 % sunflower meal, 3 % molasses, 1.5 % limestone and 0.5 % salt.

Table (2): Contents of YC (BGY-35, Manufactured by F. L. Emert., Co. USA), as fed.

Vitamins, TDN & NEM		Amino acids		Minerals	
E	36.80 IU/kg	Arginine	1.83%	Calcium	0.22 %
Biotin	2.44 mg/kg	Cystine	0.58%	Phosphorus	0.60 %
Choline	3401.00 mg/kg	Histidine	0.85 %	Sodium	0.15%
Folic acid	7.80 mg/kg	Isoleucine	1.45 %	Potassium	0.20%
Niacin	245.50 mg/kg	Leucine	3.46 %	Magnesium	0.22%
Pantothenic acid	59.20 mg/kg	Lysine	1.63 %	Manganese	21.30 ppm
Riboflavin	18.25 mg/kg	Methionine	0.62 %	Iron	184.05 ppm
Thiamine	46.20 mg/kg	Phenylalanine	2.03 %	Copper	5.00 ppm
Pyridoxine	22.00 mg/kg	Threonine	1.37 %	Zinc	75.00 ppm
TDN	70.00 %	Tryptophan	0.38 %	Selenium	1.00 ppm
NEM	1.72 mcal/kg	Valine	2.05%	-	-

After parturition, kids were kept with their dams all time during the first 6 weeks then between 7 and 16.00h up to 8 weeks of age. Weighing kids was carried out weekly until weaning. Birth weight of each kid was recorded.

Blood samples were collected regularly at 2 wk intervals from 5 does /group by jugular vein puncture, just before morning feeding and drinking, starting at mating day. Harvested serum after centrifugation at 4000 rpm for 15 minutes was stored at – 20^{o}C until chemical analysis for AST & ALT enzyme activities according to **Reitman and Frankel (1957)**; cholesterol & urea (**Henry, 1965);** creatinine (**Bartels, 1971);** total protein and albumin (**Doumas and Biggs, 1972 a & b**) using commercial colorimetric kits. Globulin was calculated by subtraction concentration of albumin from that of total protein then albumin/globulin ratio (A/G ratio) was also estimated. Commercial kits were used for calorimetric determination of serum total lipid. Concentration of Iron, Zinc, calcium and phosphorus in serum were determined by the absorption spectrophotometer.

The obtained data were subjected to statistical analysis using general linear model procedure adapted by **SPSS (1999).** Significant differences among means were separated by **Duncan (1955)** multiple range test.

RESULTS AND DISCUSSION

Reproductive performance

Data in Table (3) clearly indicate that dietary supplementation of YC significantly (P≤0.05) improved conception rate, fertility, fecundity, prolificacy, reproductive ability, kids born per does joined and kids born or weaned per does kidded. While YC insignificantly affected does kidded /does conceived, does aborted / does conceived and twining frequency as compared to control does. Mortality rate of kids from birth to weaning was the lowest with 5.0g YC-supplemented group (15.38%) than the 2.5g YC- supplemented and control groups (38.46%). These findings may partially due to trace elements contents of YC, especially iron, zinc, manganese, copper and selenium (Table 2) and /or improvement of digestibility of CP, CF, EE and NFE (**Komonna, 2007 and Mousa *et al*, 2012)**. The present results agree with those of **Komonna (2007), Abdel-Rahman *et al*. (2012) and Mousa *et al*, (2012),** in sheep, who reported considerable improvement in reproductive performance in response to YC supplementation yielding a positive effect on the general health of treated animals. **Saleh (2004)** also stated that probiotics (bacteria or yeast) had a positive effect on activities of lactic acid bacteria in sheep intestine, which in turn improved their inhibition potency to the unfriendly bacteria such as E. coli.

Table (3): Reproductive performance of Damascus goats as affected by yeast culture supplementation (BGY-35).

Items	Treatments		
	T1 (Control)	T 2 (2.5 g / YC)	T3 (5 g / YC)
Number of does joined with buck	13	13	13
Conception rate,. (%)	(53.85%)^{c}	(100.0%)^{a}	(92.31%)^{b}
Fertility, does kidded / does joined,. (%)	(53.850%)^{b}	(92.31%)^{a}	(84.62%)^{ab}
Does kidded/ does conceived, (%)	-100.00%	-92.31%	-91.67%
Does aborted / does conceived, (%)	0.00%	-7.96%	-8.33%
Fecundity, kids born/does joined, (%)	(92.31%)^{b}	(169.23%)^{a}	(153.86 %)^{a}
Kids born per doe joined, (%)	0.92^{b} ± 0.33	1.69^{a} ± 0.21	1.54^{a} ± 0.27
Prolificacy, kids born/does kidded, (%)	12 (171.45)^{b}	22 (183.33%)^{a}	(181.82%)^{a}
Kids born per doe kidded	1.71^{b} ± 0.34	1.83^{a} ± 0.17	1.82^{a} ± 0.23
Twining frequency, (%)	-42.86%	-66.67%	-81.82%
Number of viable kids at weaning	7	17	18
Reproductive ability (kids weaned/does joined), %	53.85^{b} ± 0.14	130.77^{a} ± 0.13	138.46^{a}± 0.14
Kids weaned/does kidded , %	100.00^{b} ±0.17	141.67^{a} ± 0.13	163.64^{a} ±0.14
Kg. of kids born per doe joined	1.62^{b} ± 0.37	4.23^{a} ± 0.34	3.65^{a} ± 0.41
Kg. of kids born per doe kidded	3.00^{b} ± 0.47	4.58^{a} ± 0.36	4.31^{a} ± 0.37
Kg. of kids weaned per doe joined	7.00^{b} ± 1.99	17.85^{a} ± 1.29	16.92^{a} ±2.22
Kg. of kids weaned per doe kidded	13.00^{b} ±2.16	20.00^{a} ± 1.72	19.33^{a} ±1.65
Mortality rate of kids from birth to weaning %	38.46	38.46	15.38

$^{a \text{ and } b}$ values in the same row not sharing the same superscripts significantly differed ($P<0.05$).

Otherwise, **Callaway and Martine, (1997)** demonstrated that YC provides soluble growth factors (i.e., organic acids, vitamin B and amino acids), which would stimulate growth of rumen bacteria that utilize lactate and digest cellulose.

In addition, it could be observed that kilograms of kids born or weaned per does joined or does kidded were the highest ($P\leq0.05$) in group supplemented with 2.5g YC followed by 5.0g YC supplemented group then the control group. These results are in agreement with the obtained results by **Helal and Abdel-Rahman (2010), Abdel-Rahman *et al*, (2012) and Mousa *et al*, (2012)** who reported that supplementation of yeast to ewes diets increased litter weight at birth and weight gain of their offspring. *Saccharomyces cerevisiae* was reported to balance the energy and the acid-base metabolism in dairy cattle resulted in a significantly higher milk production **(Brydt *et al*., 1995). Masek *et al*.,(2008) and Helal and Abdel-Rahman ,(2010)** came to the same conclusion in sheep since increasing milk yield of ewes is an important factor for the production of robust lambs at weaning. **Ismaiel *et al.* (2010)** reported that yeast culture increased average daily gain of lambs. It was also reported that, yeast or yeast culture are rich source in vitamins, enzymes and other important nutrients and co-factors which make them attractive as digestive enhancers (**Dawson, 1994)**.

Blood components:

***Protein fractions*:**

Yeast culture supplementation significantly ($P<0.05$) increased blood total protein and albumin concentrations (Fig 1). Meanwhile it was not significantly affected blood globulin and A/G ratio. In general, T2 (2.5g YC) recorded the highest ($P<0.05$) value of serum total protein followed by T3 (5.0g YC) than control (Fig 1-a). Concentration of total protein was higher ($P<0.05$) by about 21.52 and 6.43% in T2 (2.5g YC) and T3 (5.0g YC) than control, respectively. The present results are in agreement with the results of **El-Shaer, (2003)** and **Fayed *et al*., (2005)** in sheep and **Kholif, (2001)** in goats. They found that the YC supplementation led to increase blood total protein. Moreover, **Abdel-Khalek *et al*. (2000)** and **Ragheb *et al*., (2003)** found that concentration of total protein was higher in yeast culture (Lacto-Sacc) treated calves than control. The present results could be related to the beneficial effect of YC supplementation on increasing protein digestibility through the enzymatic effect of protease and alteration amino acid profile of digesta due to increasing microbial protein synthesis (**Williams, 1989 and Abdel-Khalek *et al*., 2000**).

Yeast culture supplementation improved digestibility of CP, CF, EE and NFE (**Komonna, 2007 and Mousa *et al*, 2012),** which indicated better utilization of dietary protein through digestive tract. The results agree with the conclusion of **Kumar *et al*. (1980)** who reported that there was a positive correlation between dietary protein and serum protein. **Yousef and Zaki (2001)** noticed that the increase in digestibility of CP may be a reason for the increase of serum total protein. Also, serum proteins are considered reliable index reflecting health and performance characteristics of the animals (**Talha *et al*., 2009**). Additionally, **El-Masry and Marai (1991)** related the variations in serum proteins to alteration in thyroid hormone level and in albumin or globulin concentrations.

Albumin concentration in blood serum was significantly ($P<0.05$) lower in control and T3 than T2 (Fig 1-b). It can be noticed that T2 (2.5g YC) recorded significantly ($P<0.05$) higher values of serum albumin by about 25.89 and 23.85% than control and T3 (5.0g YC), respectively. The significant increase in blood albumin suggested normal status of liver function, since liver is the main organ of albumin synthesis. The obtained results are in accordance with those reported by **El-Shaer (2003)** and **Mahrous and Abou-Ammou (2005)** for sheep and **Kholif (2001)** for goats. The increase of albumin in response to YC supplementation may be associated with improved nitrogen absorption (**Talha *et al*., 2009**).

Fig 1: Blood protein fractions of Damascus pregnant does as affected by yeast culture supplementation.

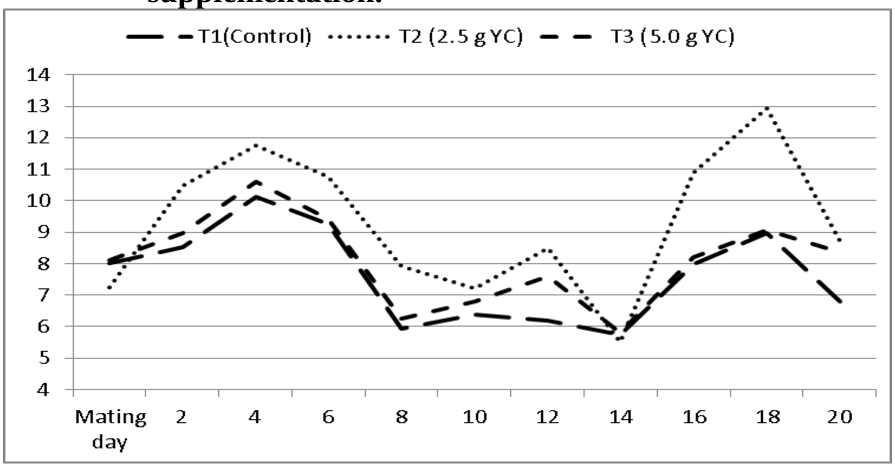

Fig 1-a: Total Protein, g/dI

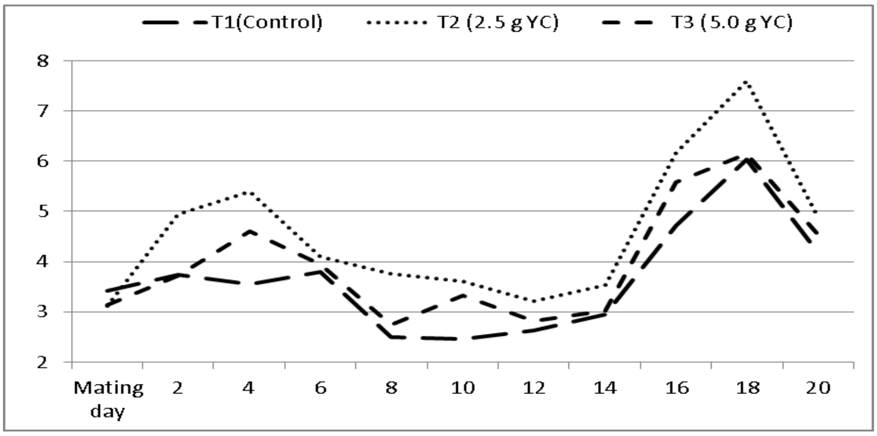

Fig 1-b: Albumin, g/dI

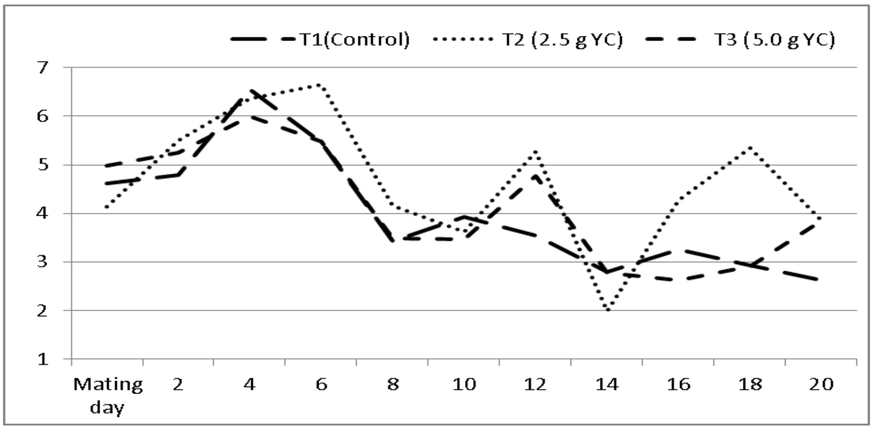

Fig 1-c: Globulin, g/dI

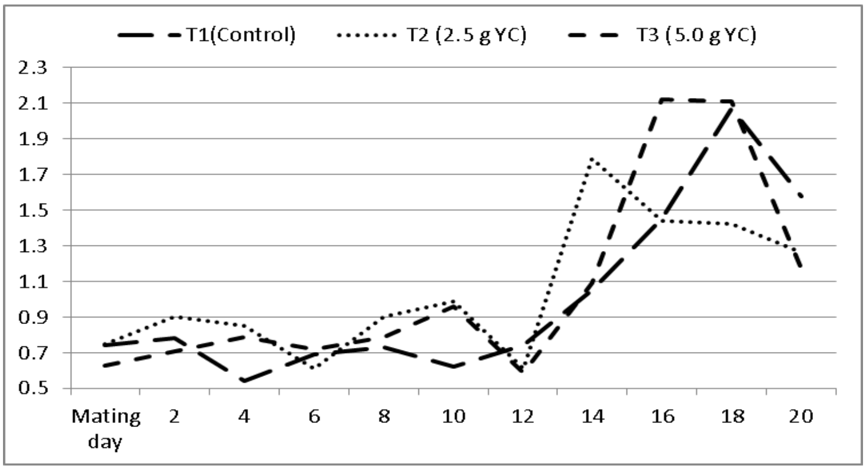

Fig 1-d: A/G ratio

Serum albumin have been shown to be a good indicator of nitrogen status, especially in small ruminants (**Ingraham and Kapple, 1988; Gaskins *et al*., 1991 and Laborde *et al*., 1995**). On the other hand, **El-Ashry *et al.* (2004)** reported that the increase in serum albumin of heifer claves supplemented with YC (Lacto-Sacc) may be due to its role as growth promoter on decreasing the deamination of amino acids. Also, albumin acts as a significant mobile protein store for amino acids **(White et al., 1959)**.

There were no significant differences in globulin between treatments. However, the globulin content in blood serum was the highest with T2 (2.5g YC), followed by T3 (5.0g YC), while control had the lowest value (Fig 1-c). Concentration of globulin was higher by about 16.54 and 4.01% in T2 and T3 does, respectively. These results agree with those obtained by **El Ashry *et al.* (2004)** who used lacto-Sacc with growing buffalo, yeast culture (**Abdel-Rahman *et al*.,2012)** with sheep and live dried yeast with sheep (**Mousa *et al*, 2012).** These three studies revealed that such supplements caused increase of serum globulin level compared to the control. As reported by **Hussien (1986)** this increase was mainly due to the increase in globulin and development of the immune system. The increase in globulin level may be induced by an improvement in immune response in does supplemented with YC. These results agree with those obtained by **Talha *et al*., (2009)** who used Mannan Oligosaccharides (MOS) and probiotic with calves. **Chang and Mowat (1992)** found that chromium supplement to yeast may improve the immune response of calves due to increasing serum total immunoglobulin. The high level of globulin of T2 and T3 may indicate good develop of immunity status **(Kitchernnham *et al*., 1975).** It was reported by **Maxine (1984)** that albumin tends to predominate over globulin in sheep and goats. The globulin concentrations in T2 and T3 were within the normal values indicating good immunity status of animals.

The A/G ratio ranged from 1.00 to 1.06 showing lowest values for control, meanwhile the T3 recorded the highest values. YC supplementation did not affect blood A/G ratio (Fig 1-d). These results are in accordance with those reported by **El-Shaer (2003)** and **Mahrous and Abou-Ammou (2005)** on sheep and **Kholif (2001)** on goats. They also reported that sheep or goats fed diets supplemented with YC or treated with fungi or yeast did not show differences in A/G ratios. It is important to note that all values of A/G ratio were higher than 1.0, which indicate that animals did not suffer from any health problems that might affect the performance of experimental animals as reported by **EL- Sayed *et al*. (2002).**

Regarding the effect of gestation period on protein fractions in the blood serum, it clearly appears that concentrations of total protein and albumin increased (P<0.05) till 4 wk then decreased gradually till 14 wk and increased again till kidding. Meanwhile, globulin concentration increased (P<0.05) till 4 wk then gradually decreased till kidding. While, the A/G ratio increased (P<0.05) from 12 to 18 weeks before kidding as shown in (Fig 1-d. However, serum total protein and albumin concentrations and A/G ratio were increased (P<0.05) while globulin concentration was decreased (P<0.05) during the last weeks before kidding. These findings are in agreement with those reported by **Abdel-Hafez (2002**) and **Abdel-Rahman *et al*. (2012)** on Suffolk x Ossimi ewes and **Mousa *et al* (2012)** on Rahmani ewes. **Abdel-Hafez (2002**) reported that the pre-partum decrease in blood protein fractions might be attributed to the increase in fetus weight and increase of protein breakdown required for gluconeogenesis. While **Putnam and Schwab (1994)** reported that YC stimulates rumen microbes that altered microbial protein synthesis and increase protein passage as well as protein yield**.** The obtained results regarding effect of gestation period is in agreement with those reported by **Abdel-Ghani *et al*. (2003)** that blood globulin concentration was decreased during late pregnancy in buffaloes. However, **El-Malky (2007)** found that YC supplementation had no significant effect on A/G ratio during pregnancy.

Liver function:

Activity of AST was significantly (P<0.05) higher in T2 (2.5g YC; 108.40) than control (70.67) and T3 (5.0g YC; 76.59). However, ALT was not significantly affected by YC supplementation. Activities of AST or ALT increased by about 53.39 & 41.53% or 6.04 & 11.13%, in serum of does supplemented with 2.5g YC (T2) than control and T3, respectively. **Abdel-Rahman *et al*. (2012)** found similar results with pregnant ewes fed diets supplemented with YC. The present results are also in agreement with those reported by **Komonna, (2007) and Mousa *et al*, (2012), while disagrees** with the results obtained by **Abdel-Khalek *et al* (2000)** and **Kholif and Khorshed (2006)** who reported that value of serum AST was not significantly affected by using yeast or selenized yeast treatments. In the present study the values of serum AST are comparatively higher while those of ALT are lower than the normal range obtained in the previous studies on does. These results may be due to several factors such as feeding practices, genetics control, response to stress, age, liver function and body weight (**Talha, *et al*, 2009**).

Supplementation of YC increased (P<0.05) concentration of total lipids by about 14.36 and 18.85 % and decreased cholesterol concentration by about 2.27and 1.17% in T2 (2.5g YC) as compared to the control and T3 (5.0 g YC), respectively,. Mean value of serum total lipids for animals treated (T2) was significantly (P<0.05) higher than that of control animals (T1). Meanwhile, cholesterol was not significantly affected by YC supplementation. **El-Ashry *et al*. (2004)** and **Talha *et al*. (2009)** working on buffalo claves and **Abdel-Rahman *et al*. (2012) and Mousa *et al* (2012)** working on sheep**,** found that feeding diets treated with yeast culture resulted in a decrease of cholesterol concentration. The current study indicated that increasing total lipids was associated with decreasing cholesterol levels as affected by YC supplementation, which may be attributed to stimulation of bacterial lipids synthesis **(Williams, 1989)** and / or due to anti-cholesteroleamic effect of YC treatments **(Fuller, 1989).**

Regarding the effect of gestation period, Fig (2-a) illustrates that the activity of AST significantly decreased (P<0.05) from mating up to wk 8, thereafter increase was mild and gradual till kidding.

Fig 2: Some blood metabolites and liver function of Damascus pregnant does as affected by yeast culture supplementation.

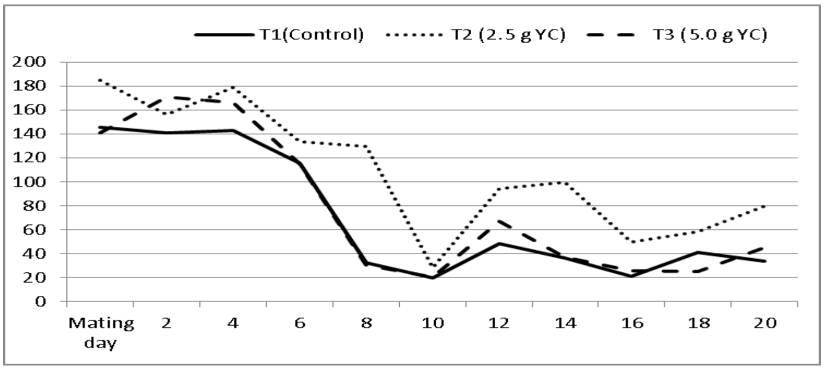

Fig 2-a: AST, U/L

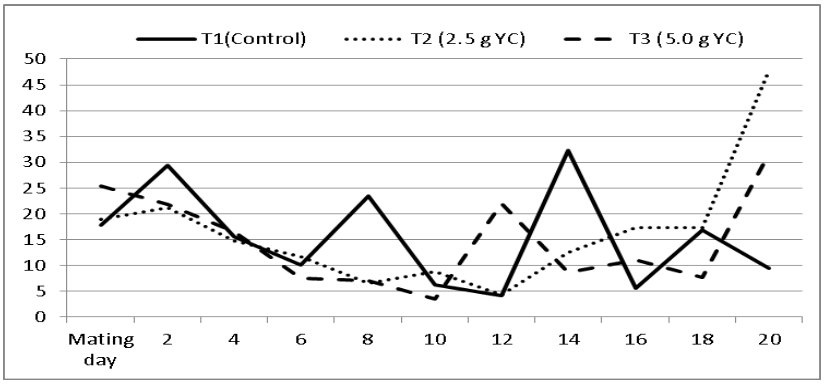

Fig 2-b: ALT, U/L

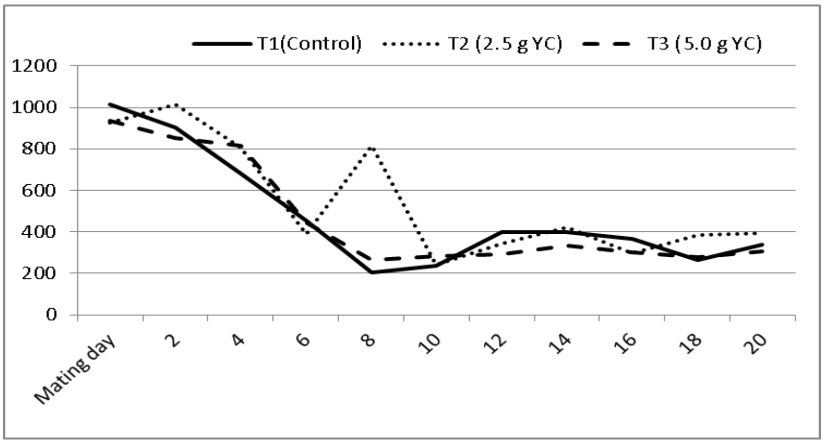

Fig 2-c: Total lipids, g/dl

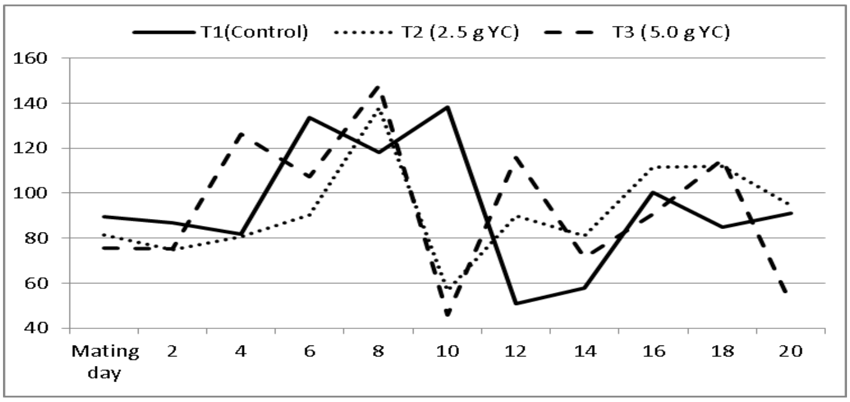

Fig 2-d: Cholesterol, g/dl

Meanwhile ALT concentration recorded its minimum value at the 10^{th} wk of pregnancy.
It was also reported that serum AST and ALT increased from mating up to 90 days after mating, while they declined at the beginning of the last week of pregnancy (**Abdel-Hafez, 2002)**. Moreover, **Juma *et al* (2009)** found that pregnancy period had an influence on concentration of AST and ALT enzymes which mostly in the second period of gestation and during the first week of parturition **(Sarma and Ray, 1985)**. The increased activity of AST and ALT enzymes may be due to more requirements of amino acids during milk production **(Vihan and Rai, 1987).** Blood total lipids concentration was significantly decreased (P<0.05) from mating till kidding (Fig 2-c). Meanwhile, **Piccione *et al.* (2009)** found that total lipids was increased in the middle and end of pregnancy compared to early pregnancy, probably due to the reduced insulin that mediated inhibition of lipolysis observed in late pregnancy **(Schlumbohm *et al*, 1997).** Lipogenesis stimulate by insulin is also responsible of the increased values of total lipids observed in ewes during early lactation. Total cholesterol concentration significantly increased (P<0.01) from mating up to wk 8, thereafter it was gradually decreased till kidding. Additionally, **Juma *et al.* (2009)** found that total cholesterol concentration in blood serum was increased significantly during pregnancy period. This may be due to enhanced progesterone synthesis in the placenta **(Lin *et al.*, 1977),** and its decline after parturition due to estrogen decrease in plasma LDL (**Ganog, 1995)**.

Kidney function:

Supplementation with YC did not show stable trend on urea N (Fig 3-a). On the other hand, **Petr Dolezal *et al*, (2011)** found lower concentration in serum urea-N of cows in response to YC supplementation which suggested as an indicator of better nitrogen metabolism and utilization of protein. These results are in agreement with those reported by **El-Ashry *et al*. (2003)** and **Shakweer (2003)** that sheep fed diets treated with yeast or fungi exhibited lower urea concentration than control. However, the results obtained by **Abdel-Rahman *et al*. (2012) and Mousa *et al* (2012)** on sheep**,** found that feeding diets treated with yeast culture resulted in an increase of urea concentration. These controversial results may be due to the differences in levels and duration of YC treatments **(Khattab *et al*., 2003** and **Mahrous and Abu-Ammou, 2005)** with sheep and **Kholif (2001)** with goats.

Serum creatinine started to increase than control in response to YC supplementation after 10 weeks of gestation till end of experimentation (Fig 3-b). Supplementation of YC increased ($P<0.05$) serum creatinine concentration by about 6.37 and 2.55% as compared to the control (Table 6). Mean value of serum creatinine for the treated animal (T2) was significantly ($P<0.05$) higher than that control animals. The present results are in agreement with those of **Abdel-Rahman *et al*. (2012) and Mousa *et al* (2012)** on sheep**,** who found that feeding diets treated with yeast culture resulted in an increase of creatinine concentration.

Fig (3): Some blood metabolites, kidney function and minerals of Damascus pregnant does as affected by yeast culture supplementation.

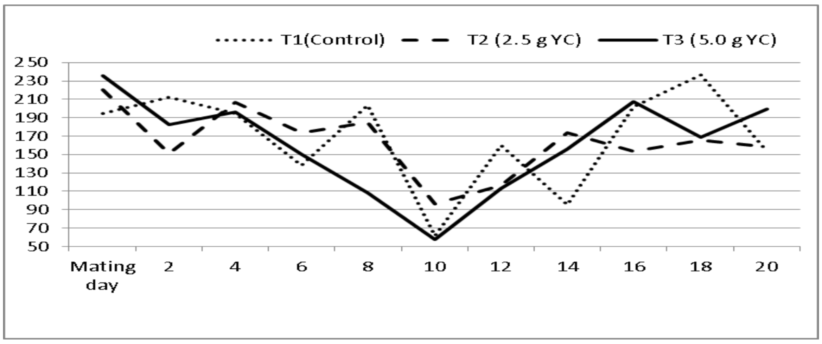

Fig 3-a: Urea. mg/dl

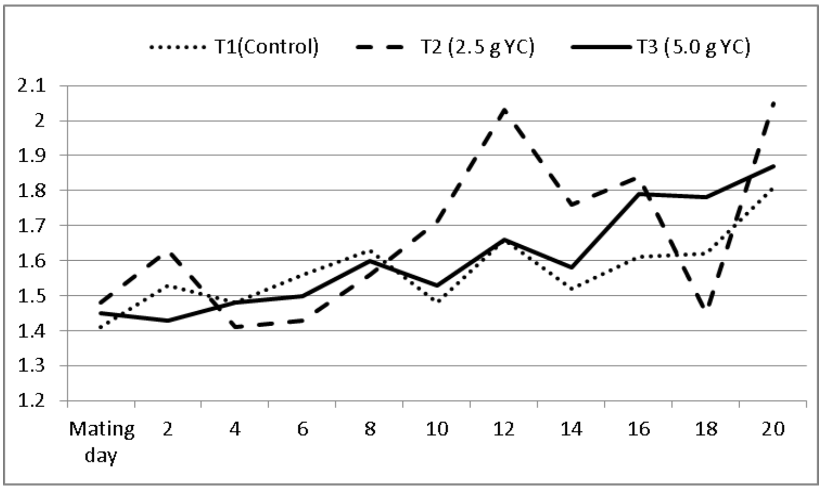

Fig 3-b: Creatinie, mg/dl

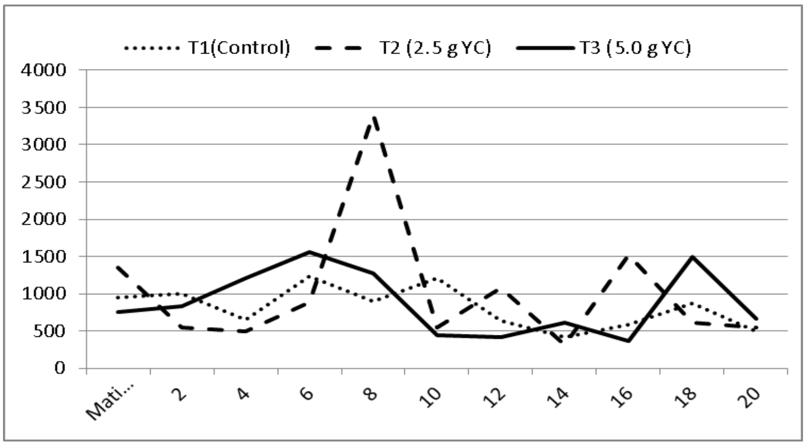

Fig 3-c: Zinc, µg/dl

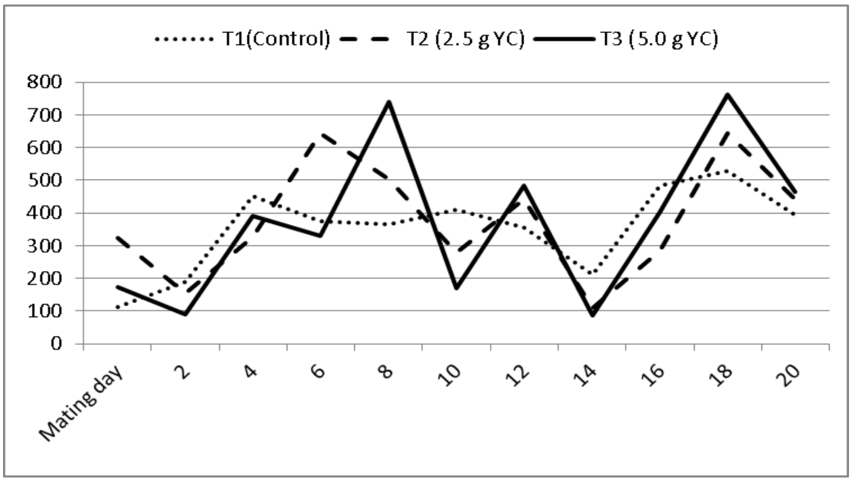

Fig 3-d: Fe, µg/dl

However, some authors reported no significant effect or a decrease of creatinine concentration with the addition of yeast culture (**Khattab *et al*., 2003** in sheep; **Salem *et al*., 2002** in lactating buffaloes; **Ragheb *et al*., 2003** in Friesian calves and **El-Kholi *et al*., 2005** in buffalo calves). Generally, serum creatinine level is a useful indicator of glomerular filtration in the kidney.

Regarding the effect of gestation period, Fig (3-a) illustrates that the concentration of blood urea recorded its minimum value at the 10th week of pregnancy (mid pregnancy), thereafter it gradually increased till 18th week and decreased till kidding. Meanwhile, serum creatinine concentration (Fig 3-b) increased gradually from conception till kidding. The increase in creatinine during this period may be attributed to foetus development **(Korshom *et al*, 1993)**. The present results are in agreement with those obtained by **Abdel-Hafez (2002)** in sheep, who reported that creatinine was increased from 21 days after mating till last week of pregnancy. While, **Abdel-Rahman *et al*. (2012)** in sheep, found that creatinine concentration recorded its maximal value at the 9th wk of pregnancy then it decreased gradually till lambing. **El-Sherif and Assad (2001) and Durak and Altinek (2006)** in sheep, found that plasma urea level started rising during 10th week of pregnancy and reached a peak at parturition. Meanwhile, the present study showed a significant decrease on day 75 of gestation period with progressive increase before and after this day (Fig 3-a). The reason behind those highest values might be the increase of cortisol level that affecting the catabolism of protein in the body **(Silanikove, 2000).**

Zn levels (Fig 3-c) and Fe levels (Fig 3-d) show that YC supplementation for pregnant does did not maintain a clear trend during pregnancy. However, concentrations of both Zinc and Fe measured for some weeks over gestation showed increase than control. Such increases in serum Zn and Fe levels may be due to the apparent effect of YC on minerals in body, which might protect animals against stresses resulting in losses of several trace elements such as Zn, Fe, Cu and Mn. Such pattern is in agreement with that reported by **Chang and Mowat (1992).** On the other hand, it is well known that immunoglobulin production is regulated by specific enzymes that have trace elements at their core, the most common being Zn, Fe and Cu **(Fielden and Rotilio, 1984).** Possibly, YC may participate in certain enzymes that increase immunoglobulin synthesis and indirectly affects immunoglobulin levels.

With regards to the effect of gestation period, Fig (3-c & d) illustrates that the concentration of serum Zn recorded its maximum value at the 8th week of pregnancy. Thereafter it gradually decreased till kidding .Meanwhile, the concentration of serum Fe recorded its minimum value at the 14th week of pregnancy, thereafter its gradually increased till 18th week and decreased till kidding. **Abdel-Hafez (2002)** reported that the serum Zn level increased during oestrus, at 21 and 90 days after mating and decreased during late pregnancy. **Gurdogan *et al*, (2006)** found that the serum Zn concentration tended to decrease at 100 and 150 days of pregnancy. The low Zn level obtained in late pregnant animals may be due to increasing foetus requirement **(Mehta and Gangwar, 1983)**. **Gurdogan *et al*, (2006)** reported that serum Fe concentration decreased at 60, 100 and 150 days of pregnancy in sheep. While, **Pinar *et al* (2009)** found that Fe level decreased at late stage of pregnancy in goats. Decreased level of serum Fe may result from increased demand to Fe storage during normal pregnancy (**Barratt *et al*, 1994**). On the other hand, the recorded decline in serum Fe during late pregnancy could be related to the great demand to this element by foetus (**Swenson and Reece, 1993**), because the Fe concentration in the foetus liver increases continuously with the advance of pregnancy and reaches high levels in the fifth month in sheep **(Rallis and Papasteriadis, 1987)**. An increase in the number of foetuses stimulates this accumulation (**Hafez and Dyer, 1969**). In general, data in Fig 1, 2 & 3 suggest that the two levels of YC (*Saccharomyces cerevisiae*) supplements had improved some blood components without any undesirable effects on kidney or liver functions.

CONCLUSION

It could be recommended that YC supplementation could be added to does ration at the levels of 2.5 or 5.0 g / head / day during pre-mating and gestation periods in order to improve reproductive traits blood components without any observed undesirable effects on kidney or liver functions.

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الأداء التناسلى وبعض مكونات الدم فى الماعز الدمشقى تأثرا باضافة الخميره

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أستخدم فى هذه الدراسة 39 عنزة دمشقى عمر 3-4 سنوات ومتوسط وزن45.87 ± 1.00 كجم وذلك لدراسة تأثير اضافة الخميرة على بعض الصفات التناسلية والانتاجيه ومكونات الدم خلال فترتى التلقيح والحمل. وقد قسمت هذة العنزات الى ثلاث مجموعات متماثلة (13 بكل مجموعة) حيث غذيت على عليقة أساسية (60% علف مركز : 40 % مادة خشنة (برسيم + قش أرز) مع اضافة الخميرة الجافة يوميا الى جزء ناعم من العلف المركز بمعدل 2.5 جم / رأس للمجموعة الثانية ، 5.0 جم / رأس للمجموعة الثالثة بينما تركت المجموعة الأولى دون اضافة الخميرة كمجموعة مقارنة. وقد أوضحت نتائج هذة الدراسة أن اضافة الخميرة أدى الى تحسين معنوى فى كل من القدرة الاخصابيه , معدل الخصوبه ، معدل الحمل ، معدل المواليد ، معدل الولادات ، نسبة الجديان المولوده : الأمهات المعدة للتلقيح ، نسبة الجديان المفطومة : للأمهات التى وضعت وعدد كيلو جرامات الجديان المولودة والمفطومه لكل من الأمهات المعدة للتلقيح والأمهات التى وضعت. كذلك أدت اضافة الخميرة الى ارتفاع معنوى فى تركيزات كل من البروتين الكلى ، الألبيومين ، الليبيدات الكليه ، والكرياتينين ، والزنك وانخفاض غير معنوى لتركيز الكولستيرول فى الدم مقارنة بمجموعة الكنترول. لوحظ أيضا زيادة معنوية فى تركيز البروتين الكلى والالبيومين ونسبة الألبيومين الى الجلوبيولين وانخفاض تركيز الجلوبيولين خلال فترة الحمل حتى الأسبوع الأخير قبل الولادة. بينما ظهر تذبذب واضح فى تركيز كل من الليبيدات الكليه ،الكولستيرول ، اليوريا ، الكرياتينين ، الزنك ، والحديد ونشاط انزيم (الانزيمات الناقلة لمجموعة الأمين) AST و ALT خلال فترات الحمل.

ونستخلص من نتائج هذة الدراسة أن استخدام الخميرة (PGY-35) خاصة عند مستوى 2.5جم أو 5.00 جم / رأس / يوميا للعنزات خلال فترتى التلقيح والحمل للحصول على التحسن المرغوب فى الأداء التناسلى و قياسات الدم.