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Field trials for Treatment of She Camels Mastitis in Sharkia Governorate

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Abstract

Thirty mastitic milk samples were collected from she camels for the isolation and identification of bacteria causing mastitis and to determine their antibiogram against certain antibiotics. Bacteriological examination of mastitic milk samples revealed 18 single isolates (60%) and 12 mixed isolates (40%). Gentamicin was found to be the highest effective drug against the isolated bacteria than other used drugs. A total of 25 she camels (15 healthy and 10 mastitic) were divided into 5 equal groups receiving gentamicin alone and/or in combination with isoflupredone acetate. Blood and milk samples were taken from all she camels at 1st, 7th and 15th days post treatment for haematological and biochemical analysis. The results revealed a significant decrease in RBCs count, Hb, PCV%, serum total protein, albumin, globulin, Ca, Ph, Na levels in healthy she camels received gentamicin. While, isoflupredone acetate induced significant increase of WBCs count, AST, ALT, ALP, Ca, Ph, K levels in healthy she camels. Mastitis in she camels lead to significant decrease in RBCs count, Hb, PCV%, albumin, A/G ratio, Ca, Ph, Na, zinc, iron levels and milk production beside no statically difference in K and copper, WBCs, total protein, globulin, AST, ALT and ALP. Hematological and biochemical parameters alterations were returned to nearly normal levels on 10th day post treatment. It could be concluded that gentamicin and isoflupredone acetate had better results in reducing clinical signs of mastitis and improve adverse effects in she camels.

Keywords: Mastitis, She Camels, Gentamicin, Isoflupredone

Introduction

Camels are most capable animal in utilizing marginal areas and in survival and production under harsh environment [1]. Camels are a good source of meat, milk, wool and hair [2]. Milk is synthesized in mammary gland [3]. Mastitis affects all domestic animals [4]. It has different causes and intensity degrees [5]. Udder infections originate from lymphatogenous or cutaneous routes [6]. It is caused by single or mixed infection [7]. It is infrequent in animals due to hand milking [8]. Gentamicin is an aminoglycoside antibiotic acting by inhibiting bacterial protein synthesis [9]. It has good efficacy in treating drug resistant G–ve bacteria [10]. Anti-inflammatory drugs are widely used in veterinary practice to provide symptomatic relief of acute and chronic inflammatory conditions [11].

Isoflupredone acetate is a synthetic corticosteroid anti-inflammatory used in Veterinary Medicine. It is used as supportive treatment with antibiotics [12]. Combination of isoflupredone acetate with antibiotics has been approved by FDA [13]. No antagonistic interactions occurred between antimicrobial and anti-inflammatory activities [14].

The present study aimed to isolate and identify bacterial agents causing mastitis in she camel together with an antibiogram for the isolated strains, to evaluate the effect of mastitis on hemato-biochemical parameters in she camels.

Material and Methods

Drugs

Gentamicin (Garamycin®), Memphis Co. intramuscular injection. Each ml of solution

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contains 40-mg Gentamicin sulfate. Isoflupredone acetate (Predef 2x®) a sterile injectable solution from Upjohn Co, Kalamazoo, U.S.A available as 50 ml vials.

Animals and Experimental design

A total of 25 dairy she camels of 5-7 years old (15 healthy and 10 mastitic) from different localities in Sharkia Province were divided into 5 equal groups (Gp). Gp. (1) healthy she camels (control) Gp. (2) healthy she camels received 5 mg gentamicin /kg bwt. daily by I/M route for 4 days, Gp (3) healthy she camels received 0.2mg isoflupredone acetate/kg/B.wt daily by I/M route for 4 days, Gp. (4) mastitic she camels treated by gentamicin in the same doses and period, Gp. (5) mastitic she camels treated with gentamicin plus isoflupredone acetate in same dose, route and period.

Milk samples and Bacteriological examination

Milk samples were taken from affected quarter in sterile bottles for bacteriological and chemical examination. Udder was washed with running water and dried with clean towel. Teats orifices were disinfected by 70% ethyl alcohol, after that few squirts of milk were discarded then milk sample from each infected quarter were collected. Milk samples were activated by incubation for 12h at 37oC then centrifuged at 3000 rpm for 30min. A loopful of sediment from each sample was streaked on surface of nutrient agar, MacConkey agar and blood agar containing 7.5% defibrinated sheep blood. All plates were observed after incubation for 24 h. at 37oC and any growth was recorded. Biochemical tests of isolated strains were performed [15].

Antibacterial sensitivity tests

All isolated bacteria were used to check their susceptibility for gentamicin (10ug), cefotaxime (75ug), enrofloxacin (10ug), flumoquine (30ug), chloramphenicol (30ug), and oxytetracycline (30ug) [16].

Blood samples

Two blood samples were collected from all she camels at 1st, 7th and 15th day post treatment, 1st sample was taken in a tube containing EDTA for studying blood picture [17] and 2nd sample was taken to obtain clear serum for estimation of total protein [18] albumin [19]**,** transaminases (AST-ALT) [20] and ALP [21]. Serum and milk **c**alcium were determined [22], sodium and potassium were measured using flame photometer [23] inorganic phosphorus [24], copper[25], iron [26], zinc [27].

Milk yield per day

Daily milk yield from healthy and mastitic she camels were collected before and at 1, 7 and 15 days post treatment.

Statistical analysis

The obtained data were analyzed by T test [28].

Results and Discussion

Mastitis is a serious inflammatory disease; its main clinical signs are depression, anorexia, fever, hotness beside pain of affected udder, swelling, firmness of infected quarters and clots in milk and in some cases milk become viscous. The same clinical signs were previously observed in mastitic she camels [29].

The etiological agents for mastitis in our study were single isolates (18) 60% (*S. aureus* (6) 20%, *Corynebacterium* spp. (3) 10%, *E. coli* (6) 20% and *Streptococcus* spp. (3)10%), mixed isolates (12) 40% (*Corynebacterium* spp + *Streptococcus* spp (3) 10%, *Streptococcus* spp + *S. aureus* (3) 10% *S. aureus* + *E. coli* (6) 20%) (Table 1). Identified bacteria isolated from mastitic milk samples were not re-isolated at 7th day post treatment. This result was similar to these reported by Obied *et al.* [30] in mastitic she camel. Tibary *et al.* [31] isolate *Streptococcus* spp. and *E. coli* from she camel mastitic milk and Bakeer *et al.* [32] isolate *S. aureus* from mastitic she camel.

Table 1: Main bacterial isolates from mastitic milk causing mastitis in she camels (N=10)

No. of she camels	Type of isolates	No	%	Isolates	No	%	Re-isolation at 7th day post treatment
30	Single isolate	18	60	*S. aureus*	6	20	– ve
				Corynebacterium spp.	3	10	– ve
				E. coli	6	20	– ve
				Streptococcus spp.	3	10	– ve
	Mixed isolate	12	40	*Streptococcus* + *Corynebacterium*	3	10	– ve
				Streptococcus + *S. aureus*	3	10	– ve
				S. aureus + *E. coli*	6	20	– ve

The most effective antibiotic on isolated bacteria was gentamicin (Table 2). This result was similar with Abdel-Khalek and El - Sherbini [33]. They conducted that gentamicin had high effect on *E. coli*, *S. aureus*, *Corynebacterium* spp. and *Streptococcus* spp. Moreover Al-Juboori *et al.* [34] reported that, *Streptococcus* spp. isolated from mastitic milk of she camels was sensitive to gentamicin.

Mastitic she camels treated with gentamicin alone or plus Isoflupredone acetate revealed cure rate was of 100 % at 5 and 3 days post treatment respectively (Table 3). These results agreed with EL- Sheikh [35]. Treatment of mastitis in she camels with gentamicin plus isoflupredone acetate is one of most important potent treatment due to anti-inflammatory, anti-shock, anti-allergic and antitoxic activities of isoflupredone acetate as corticosteroid drug [36].

The obtained results revealed significant decrease in RBCs count, Hb, PCV% and significant increase in WBCs count in healthy she camels receiving gentamicin, isoflupredone acetate or mastitic one (Table 4). Same results were previously recorded by Priuska and Schacht [37] they recorded that gentamicin chelates with iron and interfere with hemoglobin biosynthesis and formation of RBCs. These results are comparable with the results obtained by Naeshiro *et al.* [38]**.** They stated that gentamicin induces anemia due to deficiency of erythropoietin post kidney injury by gentamicin, site of erythropoietin production. Same haematological changes were previously recorded [39] in healthy sheep receiving Isoflupredone acetate. Anti-inflammatory drugs induce deleterious effect on bone marrow and changes in hemogram [40]**.** The same results were recorded in mastitic she camel [41]. Change in blood picture in mastitic animals may be due to inflammatory reactions [42]**,** damage of erythrocyte by bacterial toxin [43]**.**

Table 2: Sensitivity tests of isolated organisms against different antimicrobial agent

Antibiotic disc	Disc conc.	Bacterial isolates			
		S. aureus	***E. coli***	***Corynebacterium***	***Streptococcus***
Gentamicin	10ug	++++	+++	+++	+++
Cefotaxime	75ug	+++	+++	++	++
Enrofloxacin	10ug	++	+	++	++
Flumequine	30ug	++	++	++	++
Chloramphenicol	30ug	+	-	+	-
Oxyteracycline	30ug	+	-	-	+

Data presented in Table (4) revealed that gentamicin induce significant decrease in total protein, albumin and globulin but isoflupredone acetate induce significant decrease in T. protein, globulin and nonsnificantig decrease in albumin in healthy she camels, meanwhile mastitic she camel showed significant increase in total protein, globulin beside significant decrease in albumin and A/G ratio. Same changes were recorded in healthy sheep received gentamicin [44]. Reduction in protein picture may be due to damage of liver cells induced by gentamicin [45]**.** The same reduction in protein picture post isoflupredone acetate treatment in rabbits was recorded by Nabila [46]**.** These changes in protein picture may be due to immunosupressive effect glucocorticoids [47]**.** Elevation in protein picture in mastitic she camels was recorded [29]**.** Reduction in serum albumin may be due to infiltration from blood to milk due to increase permeability of blood vessels as a result of inflammation [48]and/or due to damage of hepatic tissues by bacterial toxins [42]**.**

Table 3: Efficacy of gentamicin alone or plus Isoflupredone acetate in treatment of mastitis in she camels (n=5)

Drugs	No. of she camel	3 days post treatment		5 days post treatment		6 days post treatment	
		No. of cured animal	%	No. of cured animal	%	No. of cured animal	%
Gentamicin	5	3	60	4	80	5	100
G+I	5	5	100	-	-	-	-

G+I: Gentamicin plus Isoflupredone acetate

The obtained results showed a significant increase in AST, ALT and ALP activities in healthy and mastitic she camels receiving gentamicin or isoflupredone acetate (Table 4). These results are in accordance with Sandhya and Varalakshmi [49] in healthy rats receiving gentamicin. Elevated liver enzymes induced by gentamicin may be due to liver damage [50]**.** Liver enzymes were elevated after isoflupredone acetate use in small animal [51]**.** Mastitis induced significant elevation in AST, ALT and ALP [52] and these elevations may be due to damage of hepatic tissues by bacterial toxins [53]

In the current work obtained data indicated nonsnificantig decrease in milk macro and micro elements, nonsnificantig increase in milk production post gentamicin or isoflupredone acetate administration to healthy she camel, but mastitis ones showed nonsnificantig decrease in milk Ca, Ph, K, micro elements and nonsnificantig increase in Na beside significant decrease in milk production (Table 5). Aminoglycoside antibiotic induce nonsnificantig decrease in milk copper, iron and zinc [54]**.** Isoflupredone acetate had no effect in milk production in healthy cows [55]**.** The same change in milk mineral was recorded by Bruckmaier *et al.* [56] in mastitic she camels and Batavani *et al.* [57] in mastitic cattle milk**.** Reduction in mastitic animals depended on degree of inflammation [58]**.** Mastitic cows treated with isoflupredone acetate and antibiotic showed an increase in production of milk [59]**.**

Serum Ca, Ph, Na but K and microelements in healthy she camels received gentamicin were nonsnificantigly decreased but healthy she camels received isoflupredone acetate showed significant increase in Ca, Ph, nonsnificantig decrease in Na, microelements and K significantly decreased. Meanwhile, Mastitic she camels showed significant decrease in Ca, Ph, Na, zinc, iron, nonsnificantig decrease of K and cupper (Table 5).Serum macro elements were decreased in healthy sheep received gentamicin [44]**.** Similar results were also reported in rabbits injected with dexamethasone [60]. Mastitis induces reduction in serum mineral due to anorexic condition and decreased intestinal absorption

of mineral [61]**.** Mastitis induced reduction in serum mineral may be due to anorexia in mastitic animals [62]**.**

The hemato-biochemical parameters and milk elements in mastitic she camels were improved towards the normal level at 15th day post treatment with either gentamicin or plus Isoflupredone acetate. These results are in agreement with Hussein *et al.* [63] who reported that erythrogram and biochemical parameters in mastitic buffaloes were improved at 10th day post treatment with gentamicin.

Conclusion

It could be concluded that, mastitis induce several adverse effects on haemogram, biochemical parameters and milk elements which returned to the normal levels 15th days post treatment with gentamicin plus Isoflupredone acetate.

Conflict of Interest

The authors declare no conflict of interest.

Table 4: Blood picture, Protein profile and Liver enzymes activities of healthy and mastitic she camels

Groups	Parameters		Blood picture				Protein profile (g/dl)				Liver enzymes (IU.L)		
			RBC (X106/µl)	Hb (g/dl)	PCV %	WBC (X103/µl)	T.Protein	Albumin	Globulin	A/G	AST	ALT	ALP
Healthy she camels	Non treated (control)		9.83±0.90	11.37±0.90	29.39±0.93	13.41±0.73	8.45±0.30	4.74±0.21	3.71±0.50	1.28±0.21	44.13±1.94	23.07±0.88	36.26±1.96
	Gentamicin		7.58±0.26*	8.13±0.16*	26.13±0.81*	14.46±0.84*	6.38±0.76*	3.30±0.3*	2.58±0.20*	1.47±0.32	49.20±1.12*	26.59±1.20*	43.05±1.25*
	Isoflupredone acetate		7.37±0.34*	8.41±0.43*	26.42±0.69*	15.67±0.67*	6.13±0.46*	3.83±0.33	2.30±0.31*	1.66±0.22	48.96±0.37*	26.58±1.16*	43.86±1.40*
Mastitic she camels	pre treatment		7.23±0.31*	7.96±0.97*	26.97±0.99*	16.32±0.75*	9.17±0.13*	3.76±0.35*	5.49±0.36*	0.68±0.12*	50.26±1.67*	27.06±1.51*	43.65±1.47*
	post treatment	Gentamicin 1st	7.52±0.15*	8.28±0.84*	26.06±0.96*	15.13±0.54*	9.17±0.11*	3.90±0.2*	5.27±0.30*	0.74±0.10*	49.33±1.01*	28.16±1.60*	42.31±1.77*
		7th	8.76±0.48	10.93±0.61	27.98±0.89	14.06±0.68	8.94±0.53	4.49±0.42	4.45±0.34	1.01±0.25	46.13±1.92	26.86±1.48	38.16±1.28
		15th	9.66±0.33	11.18±0.47	28.98±0.86	13.22±0.89	8.44±0.49	4.56±0.27	3.88±0.28	1.02±0.24	45.75±1.48	24.02±1.39	37.08±1.69
		Gentamicin + soflupredone acetate 1st	7.30±0.20*	8.05±0.69*	26.20±0.89*	15.83±0.33*	9.03±0.25	4.20±0.46	4.84±0.70*	0.87±0.21	46.86±1.11	26.12±1.65	41.85±1.33*
		7th	8.59±0.72	11.21±0.51	28.79±0.83	13.59±0.38	8.44 ±0.49	4.27±0.31	4.17±0.53	1.02±0.19	44.91±1.41	25.39±1.52	37.05±1.55
		15th	9.44±0.82	11.43±0.85	29.30±0.75	13.12±0.94	8.37±0.80	4.38±0.72	3.99±0.65	1.10±0.25	44.10±1.83	23.30±1.70	36.11±1.94

Means with different superscripts within the same column are significantly different at $p \leq 0.05$

Table 5: Some serum, milk elements and milk production of healthy and mastitic she camels

Groups		Parameters	macro elements								trace elements						Milk production
			Serum				milk				Serum (µg/dl)			Milk (µg/dl)			
			Ca mg %	Ph mg %	Na (mEq/L	K (mEq/L)	Ca (mg %)	Ph (mg %)	Na (mEq/L)	K (mEq/L)	Copper	Zinc	Iron	Copper	Zinc	Iron	
Healthy she camels		Non treated (control)	9.38 ± 0.73	6.06 ± 0.59	136.28 ± 0.96	5.23 ± 0.44	89.58± 0.75	45.64 ± 0.83	32.42 ± 0.89	65.09 ± 0.87	104.52 ± 1.49	77.15 ± 1.05	82.48 ± 1.23	80.63 ± 1.96	36.15 ± 1.21	178.57 ± 1.52	3.95 ± 0.51
	Treated	Gentamicin	6.09 ± 0.84*	4.12 ± 0.43*	133.16 ± 0.80*	4.82 ± 0.63	86.93± 0.82	43.95 ± 0.99	29.06± 0.95	63.24 ± 0.59	102.32 ± 1.60	76.86 ± 1.18	82.10 ± 1.53	80.41 ± 1.75	35.47± 1.42	176.06 ± 1.94	4.08 ± 0.45
		Isoflupredone acetate	11.05± 0.38*	8.12 ± 0.48*	135.05 ± 0.54	4.07 ± 0.20*	87.21± 0.89	44.28 ± 0.75	30.41 ± 0.64	63.12 ± 0.49	103.11 ± 1.45	77.02 ± 1.09	81.09 ± 1.26	80.34 ± 1.21	35.62 ± 1.14	176.90 ± 1.87	3.99 ± 0.38
		pre treatment	7.54± 0.29*	4.08± 0.82*	133.10 ± 0.83*	4.42± 0.74	86.32± 0.98	43.20 ± 0.89	33.06 ± 0.59	63.21 ± 0.54	102.61 ± 1.76	72.50 ± 1.2*	78.10 ± 1.40*	78.99 ± 1.84	35.14 ± 1.60	175.18 ± 1.83	2.42 ± 0.36*
Mastitic she camels	post treatment	Gentamicin 1st	7.97 ± 0.41*	4.49 ± 0.37*	133.99 ± 0.43*	4.79 ± 0.52	88.20± 0.90	43.98± 0.74	32.69 ± 0.87	63.59± 0.73	103.34 ± 0.34	75.48± 1.74	79.37 ± 1.61	79.02± 1.89	35.23 ± 1.72	176.23 ± 1.94	2.66± 0.28*
		Gentamicin 7th	9. 51 ± 0.91	5.82 ± 0.49	133.88 ± 0.74	4.94± 0.48	88.92± 0.63	44.53 ± 0.61	32.68 ± 0.71	64.68 ± 0.66	104.61 ± 0.48	76.29 ± 1.49	81.09 ± 1.82	80.48± 1.37	35.81 ± 1.48	178.41 ± 1.61	3.22 ± 0.38
		Gentamicin 15th	9.47 ± 0.50	5.87 ± 0.52	135.06 ± 0.73	5.20 ± 0.55	89.30± 0.51	45.32 ± 0.59	32.69 ± 0.95	65.12 ± 0.39	104.39 ± 0.76	76.99 ± 1.29	82.05 ± 1.58	80.69 ± 1.73	36.08 ± 1.62	178.50 ± 1.05	3.68 ± 0.30
		Gentamicin plus Isoflupredone acetate 1st	8.14 ± 0.61	5.73 ± 0.21	134.12 ± 0.62	4.63± 0.49	88.04± 0.84	44.09 ± 0.33	32.53 ± 0.59	64.30± 0.71	103.12 ± 0.95	76.40 ± 1.23	80.19 ± 1.59	79.02 ± 1.79	35.32 ± 1.47	177.30 ± 1.38	2.88 ± 0.34
		Gentamicin plus Isoflupredone acetate 7th	9.55 ± .48	5.79 ± 0.17	135.38 ± 0.80	4.98 ± 0.85	89.12± 0.55	44.52 ± 0.29	32.46 ± 0.48	64.73 ± 0.50	103.87 ± 0.78	76.90 ± 1.47	81.49 ± 1.61	80.28 ± 1.37	35.95 ± 1.33	178.42 ± 1.72	3.46 ± 0.42
		Gentamicin plus Isoflupredone acetate 15th	9.44 ± 0.62	5.90 ± 0.55	136.32 ± 0.75	5.30 ± 0.33	89.63± 0.48	44.69 ± 0.41	32.40 ± 0.92	65.15 ± 0.38	104.48 ± 0.48	77.17 ± 1.38	82.39 ± 1.40	80.70 ± 1.16	35.18 ± 1.21	178.63 ± 1.31	3.89 ± 0.38

Means with different superscripts within the same column are significantly different at p≤0.0

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الملخص العربي

محاولات حقليه لعلاج التهاب الضرع في النوق بمحافظة الشرقية

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بالفحص البكتيريولوجي لعدد ٣٠ عينة لبن من نوق مصابه بالتهاب الضرع تم عزل البكتيريا المسببة لالتهاب الضرع فى النوق ووجد ان ١٨ عينة في صوره عدوى منفردة بنسبه ٦٠% و ١٢ عينة في صوره عدوى مشتركة بنسبه ٤٠%: وبعمل أختبار الحساسية لهذه المعزولات وجد أن الجنتاميسين اكثر المضادات الحيوية تاثيراً علي هذه المعزولات. تم إجراء هذا البحث على ٢٥ ناقه بأماكن مختلفه بمحافظة الشرقية (١٥ ناقه سليمه ظاهريا- ١٠ ناقه مصابة بالتهاب الضرع). قسمت النوق إلى ٥ مجموعات متساويه (٥ ناقه/ مجموعة) تم حقنها بالجنتاميسين منفردا او مع خلات الأيزوفلوبريدون. تم تجميع عينة لبن من النوق المصابه قبل العلاج وعند ١ ,٧, ١٥يوم بعد نهاية العلاج لدراسة تأثير التهاب الضرع على كميه وبعض مكونات اللبن. تم تجميع ٢ عينة دم من كل ناقه عند ١ ,٧, ١٥يوم بعد نهاية العلاج لدراسة تأثير التهاب الضرع والعلاج على الصورة الدموية البيوكيميائية. لم يتم عزل البكتيريا المسببه لالتهاب الضرع من اللبن عند ٧ يوم من نهاية العلاج. استخدام الجنتامايسين منفردا او مع خلات الأيزوفلوبريدون كان لهم دور فعال فى شفاء الاصابه بالتهاب الضرع فى النوق حيث اختفت الأعراض الظاهرية للمرض وكانت نسبه الشفاء ١٠٠% عند اليوم الخامس والثالث على التوالى من العلاج واديا الى عودة صورة الدم والوظائف البيوكيميائيه إلي المستوى الطبيعي في مصل النوق المصابه والمعالجه بعد العلاج ب ١٠ يوم. الجنتاميسين فى النوق أحدثت نقص معنوى فى العدد الكلى لكرات الدم الحمراء, تركيز الهيموجلوبين, وحجم كرات الدم المرصوصة% , البروتين الكلى,الزلال الجلوبيولين, الكالسيوم, الفوسفور الصوديوم بجانب زيادة معنوية فى العدد الكلى لكرات الدم البيضاء, الالنين امينوترانزفيراز , الاسبرتيت امينوترانزفيراز, الفوسفاتيز القاعدى ونقص غير معنوى فى البوتاسيوم ومعادن اللبن (الكالسيوم, , الفوسفور, الصوديوم والبوتاسيوم) والمعادن النادرة فى السيرم واللبن (النحاس الزنك والحديد).خلات الأيزوفلوبريدون أحدثت نقص معنوى فى , العدد الكلى لكرات الدم الحمراء, تركيز الهيموجلوبين, وحجم كرات الدم المرصوصة%, البروتين الكلى, الجلوبيولين بجانب زيادة معنوية فى العدد الكلى لكرات الدم البيضاء, الالنين امينوترانزفيراز , الاسبرتيت امينوترانزفيراز, الفوسفاتيز القاعدى, الكالسيوم, , الفوسفور والبوتاسيوم ونقص غير معنوى فى الزلال, الصوديوم معادن اللبن (الكالسيوم, , الفوسفور, الصوديوم والبوتاسيوم) والمعادن النادرة فى اللبن والسيرم (النحاس, الزنك.التهاب الضرع فى النوق أدى الى حدوث نقص معنوى فى , العدد الكلى لكرات الدم الحمراء, تركيز الهيموجلوبين, وحجم كرات الدم المرصوصةو الزلال والنسبة بين الزلال الجلوبيولين, الكالسيوم, , الفوسفور, الصوديوم ,الزنك ,الحديد وانتاج اللبن ونقص غير معنوى فى البوتاسيوم والنحاس بجانب زيادة معنوية فى العدد الكلى لكرات الدم البيضاء البروتين الكلي، الجلوبيولين, الالنين امينوترانزفيراز , الاسبرتيت امينوترانزفيراز, الفوسفاتيز القاعدى مصحوبه بنقص غير معنوى فى معادن اللبن (الكالسيوم, , الفوسفور, الصوديوم والبوتاسيوم ,النحاس الزنك والحديد).نستخلص من تلك الدراسة ان التهاب الضرع ادى الى حدوث تأثيرات عكسية على صورة الدم وبعض الوظائف البيوكيميائية ويمكن إستعمال الجنتاميسين وخلات الأيزوفلوبريدون بجرعتهم العلاجيه كعلاج للالتهابات الضرع فى النوق.