SOME SERUM BIOCHEMICAL, HORMONAL AND PROTEIN PROFILE STUDIES ON BUFFALOES AND CATTLE SUFFERING FROM MYCOTOXICOSIS AND/OR BRUCELLOSIS

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SUMMARY

In a private farm, the effects of mycotoxicosis and/or brucellosis were studied on buffaloes and cattle. From each of species (one month after abortion or normal parturition) twenty animals were divided into four equal groups. The first group was served as control animals, the second group was non-infected animals but the mycotoxins were detected in their serum, the third group was naturally brucella infected animals and the fourth group was both naturally brucella infected and mycotoxin poisoned animals. Brucellosis was identified serologically and from the clinical signs. Mycotoxicological, serological, hormonal, serum protein electrophoretical and biochemical studies were carried out. Results indicated that the mycotoxins which were detected in serum of cattle and buffaloes are aflatoxin-B1 ochratoxin-A and fumonsin-B1 by a concentrations in buffaloes more than that in cattle. In contrast, the higher brucella titers were detected in cattle than that in buffaloes. Mycotoxicosis and/or brucellosis could induced reproductive disturbances (due to the changes of serum progesteron, estrogen, triiodothyronin (T3) and thyroxin (T4) hormones), immunosuppression by mycotoxicosis in buffaloes (because of gamma globulinemia), metabolic disturbances (due to the increase of T3, T4 and total lipids), and liver dysunction in buffaloes (due to the increase of total bilirubin concentration and the activity of ALT enzyme). The mycotoxins should be chicked in regions of high incidence of brucellosis in order to controlling or diminuting the mycotoxicosis which is a predisposing stress factor for occurrence of infections by their immunodepressant properties.

INTRODUCTION

Fungi may contaminate animal feed, certain fungi secreted secondary metabolites which are toxic for animals and human **(Miller, 1995)**. Among the identified mycotoxins, five of which are of special toxicological importance are Aflatoxins, deoxynivalenol, Zearalenone, fumonsins, and ocharatoxins **(Anonymous, 1992)**. Aflatoxins are immunotoxic by depressing the cell mediated immune response **(Dietert et al., 1985)** reducing hormonal immune response **(Tang et al., 1995)** and reducing primary haemaglutinin response **(Ghosh et al., 1991)**. Ohratoxins induced nephrotoxicity, carcinogenicity, teratogenicity and immunotoxicity **(Kuiper, 1996)**. Fumonsins induced equine leukoencephalomalacia, pulmonary edema, immunotoxicty and carcinogenicity **(Harrison et al., 1990)**. Brucellosis is an important contagious disease infecting human and animals and induced great losses in animal production allover the world **(Radostits et al., 2000)**.

In a similar study in sheep and goat in Kaleubia province (Egypt), **Abdel Fattah et al., (2004)** identified several mycotoxins in animal feed mixture (concentrates) and maize which were: Aflatoxin-b1 (0.642 - 0.355 mg/kg), Ochratoxin-A (0.143 - 0.231 mg/kg) and fumonsin-B1 (0.125 - 0.274 mg/kg), also they found that 82.61% of mycotoxin poisoned sheep and goats were infected with brucellosis, while 10% of non-infected sheep and goats were mycotoxin poisoned, and they concluded that mycotoxicosis was one the predisposing factor for brucella infection.

The aim of the present study is to studying the hormonal, biochemical and immunological changes that could be induced by brucellosis and/or mycotoxicosis in buffaloes and cattle in order to understanding the intercorrelations between the two diseases and their negative effects of both in the body for diminuting their effects on animal production.

MATERIAL AND METHODS

Serological Diagnosis of Brucellosis:

Serological diagnosis of brucellosis was carried out on serum samples from aborted buffaloes and cattle which showed the clinical signs of brucellosis and could be differentially diagnosed from other diseases causing abortion based on their clinical signs and serological characteristics according to **Blood et al., (1979)** serum samples were collected from a private farm in Kaleubia governorate, one month after abortion or normal parturition, and the Buffer acidified plate antigen (BAPA) test **(Anon, 1984)** was used for the primary diagnosis of brucella infected animals. The tube agglutination test (TAT) was carried out which modified to start with a dilutions of 1/10, and the Rivanol test **(Alton et al., 1988)** were used for additional confirmation of the serological identification of brucellosis.

Mycotoxin analysis:

The standard of Aflatoxin-B1 (AFB1), Ochratoxin-A (OA) and Fumonsin-B1 (FB1) were obtained from sigma Co. (USA), diluted serum samples were acidified with Hcl/Mg cl2 solution. OA was quantitatively extracted into the chloroform extract which was separated from the aqueous serum by centrifugation, each chloroform extract was washed once with water to remove the dissolved acid, then dried under a steam of nitrogen gas, the dried residues were reconstituted in chloroform and the conc. of OA were determined fluorodensitometrically. The AFB1 was extracted and determined fluorodensitometrically, but fumonsin-B1 was extracted and determined using the high performance liquid chromatography (HPLC). All mycotoxins were determined according to **AOAC (1980)**.

The Tested Groups of Animals: Twenty female and twenty caws (one month after abortion or normal parturition) were used. From each species the animals were divided into 4 equal groups (5 animals/group) as follow: The 1st group as the normal control group, the 2nd group was mycotoxin poisoned animals, the 3rd group was naturally brucella infected animals (1 month after abortion) and the 4th group was naturally brucella infected and mycotoxin poisoned caws (1 month after abortion).

Estimation of some serum constituents:

(A) Some Serum Hormones:

The radioimmuno-assay method was used for determination of prolactin, progesteron, estrogen, triiodothyronin (T3) and thyroxin (T4) hormones **(Challis et al., 1973)**.

(B) Serum Protein Electrophoresis Analysis:

The polyacrylamide Gel Electrophoresis technique **(Gordon, 1983)** was used for fractionation of serum protein into the different protein fractions.

(C) Some Serum Biochemical Constituent:

The concentrations of total protein **(Doumas et al., 1971)**, total lipids **(Schmit, 1964)** and the total bilirubins **(Jendrassiki et al., 1983)** and the activity of Alanine aminotransferase enzyme **(Reitman and Frankel, 1957)**, were determined spectrophotometrically.

Statistical Analysis:

The obtained data were statistically analysed using F-test through the analysis of variance (ANOVA), and the student's t-test according to **Snedecor and Cochran, (1969)**.

RESULTS

A- Mycotoxin levels and brucella antibody titers: The serum mycotoxin increased in buffaloes than that of cattle especially fumonsin B1, oppositely, the higher antibody titers of brucella increased in cattle than that in buffaloes (Table, 1).

B- Serum Hormonal Changes:

(1) Prolactin hormone: No significant change in serum prolactin hormone between the groups of buffaloes and cattle.

(2) Progesteron hormone: Brucellosis induced significant decrease of progesteron hormone in buffaloes and cattle than normal control, but mycotoxicosis induced significant increase in progesteron hormone than that of the normal control in either buffaloes or cattle.

(3) Estrogen hormone: Mycotoxicosis and/or brucellosis induced significant decrease of estrogen hormone than that of the normal control buffaloes or cattle.

(4) Triiodothyronin (T_3) Hormone: Only in buffaloes, brucellosis induced significant increase of T_3-hormone than that of the normal control buffaloes, but there was no significant change of T_3 hormones in the serum of cattle groups.

(5) Thyroxin (T_4) Hormone: The serum thyroxin hormone was significantly increased with mycotoxicosis and/or brucellosis (in most cases) than that of the normal control buffaloes and cattle (Tables 2 and 3).

(C) Some Serum Biochemical Constituents:

1- Alanine amino transferase (ALT) Enzyme activity: ALT enzyme activity significantly increased by mycotoxicosis and/or brucellosis in the serum of buffaloes than that of the normal control animals, but ALT activity does not changed in cattle groups.

2- Total Bilirubin: In buffaloes, only brucellosis induced significant increase in serum bilirubin than that of normal control animals but does not changed in the serum of cattle groups.

3- The Total Lipids: Only in buffaloes, the total lipids were significantly increased in animals suffering from mycotoxicosis and/or brucellosis than that of the normal control buffaloes, but it does not significantly changed in the serum of cattle groups.

4- Total Protein: Mycotoxicosis significantly decreasing the total protein (in most cases) than

normal control buffaloes and cattle. In cattle, bruceliosis induced significant increase of total protein than normal control cattle (Tables 4 and 5).

(D) Serum Protein Electrophoresis (Protein Fractions):

1- **Albumin:** In buffaloes, there were no significant change in serum albumin between groups, but in cattle the brucella infected animals showed significant increases in serum albumin than that of control cattle.

2- **Total Globulins:** In buffaloes, there were no significant change in serum total globulins between groups, but in cattle, the mycotoxin poisoned animals (brucella infected or non infected) showed significant decrease in the serum total globulins than that of control cattle.

3- **Alpha (α) Globulin Fraction:** In buffaloes, no significant change of α-globulins between groups, but in cattle, mycotoxicosis and/or brucellosis induced significant increase of the γ-globulins than that of control cattle.

4- **Beta (β) Globulins Fraction:** In either buffalo or cattle, the mycotoxin poisoned and/or brucella infected animals showed significant decrease of γ-globulins than that of control animals.

5- **Gamma (γ) Globulin Fractions (Immunoglobulins):** In case of non-infected buffaloes, the mycotoxin poisoned animals showed significant decrease of γ-globulins than control, also in brucella infected buffaloes, the mycotoxin poisoned animals showed significant decrease in γ- globulins than that of only brucella infected buffaloes, also brucellosis (with or without mycotoxicosis) induced significant inerease of γ-globulins than that of non-infected buffaloes.

In case of cattle, mycotoxicosis not significantly decrease γ-globulins than that of control cattle, but brucellosis could induced significant increase of γ-globulins than that of control cattle (Tables 6 and 7).

DISCUSSION

The different fungi may pollute the environment and become found in the raw nutritive substances and other biological materials, human food, animal feed and feed- or food-products. Also such nutritive materials may kept under unfavourable condition favouring the growth of different fungi. Some types of fungi could secreting toxic materials called mycotoxins and consequently by their consumption induce a disease called mycotoxicosis **(Miller, 1995)**. Poisoning with

mycotoxins may be differed from other poisoning materials, that the latter may be seen (in many cases) with naked eye or identified by their specific odours or tastes, and may induce specific acute or chronic toxicity with specific clinical signs, and may induced intentionally or unintentionally due to the known circumstances, all these data may lead to searching for the source of toxicity and consequently preventing or diminuting it easier than that of mycotoxicosis (which is widely spread and more difficult to detect especially in chronic or long term toxicities). Mycotoxicosis may be the end trial for understanding the real healthy problem in animals and poultry, because the symptoms were non-specific that it may be immunodepressants to different infectious diseases **(Dietert et al., 1995)** or inducing loss of weight without distinctive other clinical signs **(CAST, 1989)**.

So that, mycotoxicosis should need further, difficult and complicated efforts for deminuting it to acceptable limits rendering it to be practically non-significantly effective. The first step for recognizing such problem to understanding the toxicological properties of mycotoxins in Egyptian animals (such as cattle and buffaloes) under the current Egyptian environment.

The farm animals may suffering from some infectious diseases such as brucellosis which is an important contagious and zoonotic disease infecting animals and human, the disease may cause great losses in animals that preventing the reproductive functions and consequently reducing the animal production allover the world **(Radostits et al., 2000)**. So the current study tried to find certain relationships between the brucellosis and mycotoxicosis in buffaloes and cattle from the point of animal health.

An important relationship between the mycotoxicosis and brucellosis could be detected in sheep and goats through a previous study by **Abdel Fattah et al., (2004)** which indicated that the mycotoxins could be detected from 82.6% of brucella infected animals, oppositely, it could be detected from 10% of non-infected animals, and it could be concluded that mycotoxicosis induced immunosuppression to brucella infection in goat and sheep because of the significant hypogammaglobulinemia in these animals. Such conclusion could be detected also by the present study, where the mycotoxicosis could significantly reduced the gamma (γ) globulins (immunoglobulinemia) in brucella infected and non-infected buffaloes than that of control animals, while in cattle the decrease of γ-globulins was non-significant. The immunodepressant property of mycotoxicosis could be recorded also by the previous studies, that the aflatoxicosis may depressed the cell-mediated immune responses **(Dietert et al., 1995)**, reduced IgG **(Tang et al., 1995)** and reduced the primary haemagglutinin response **(Ghosh et al., 1991)**. Also, the ochratoxicosis **(Kuiper, 1996)** and the fumonsin-B1 **(Harrisson et al., 1990)** have reported to induce immunosuppressive actions, so that the immunosuppression should be considered an important predis-

posing factor for increasing the incidence of infectious diseases and it may reduced also the production efficiency in animals **(CAST, 1989)**.

The present study revealed that the mycotoxicosis and/or brucellosis could significantly reduced the beta (β) globulin fraction than that of normal control buffaloes and cattle. Some gamma-globulins (immunoglobulins) could rise into the γ-globulin fraction in response to acute inflammatory diseases, autoimmune disease, hemolytic anemia and iron deficiency **(Kaneko, 1989)**.

The present study revealed that the mycotoxicosis and/or brucellosis could significantly increased the alpha (β) globulin fraction of the serum protein than that of the control buffaloes and cattle. The elevated levels of some γ-globulins have been reported with protein catabolism or with adrenal stimulation **(Schalm, 1975)** or with some toxic materials **(Dolezalova et al., 1983)**.

The present serological diagnosis of brucellosis revealed that there were significant increase of the antibody titres against brucellosis in cattle than that of buffaloes. Oppositely, the serum levels of mycotoxins (especially fumonsin –B1) were decreased in cattle than that detected in buffaloes. This pointed to a reverse relationship between mycotoxin concentration and the specific antibodies (specific immunoglobulins) against brucellosis, leading to the suggestion that the mycotoxins are immunosuppressive to brucellosis in buffaloes and cattle as previously recoded in sheep and goats **(Abdel Fattah et al., 2004)**.

The present work revealed that the mycotoxicosis induced a slight (non-significant) decreasc in pituitary prolactin hormone and revealed a significant decreasc of estrogen hormone in cattle and buffaloes than that of the normal animals. But **Abdel Fattah et al., (2004)** recorded a significant decrease of the prolactin hormone with slight (non-significant) increasc of progesteron hormone in sheep and goats. The major effects of prolactin on the secretion of the follicle stimulating hormone (FSH) and the luteintzing hormone (LH) appear to be exerted by inhibition of the secretion of the Gonadotropin releasing hormone (GnRH) by pituitary gland, so that there was a reverse relationship between the prolactin level and the levels of FSH and LH- pituitary hormones, and consequently the ovarian progesteron hormone **(Cheung, 1983)**. The clinical signs of (acute) mycotoxicosis in cattle may be non-specific as reduced milk yield, increased abortion or embryonic mortalities, silent heat, irregular estrus cycles, decreased conception rates due to the induction of endocrine and neuroendocrine disturbances **(CAST, 1989)**, so that, the changes in both progesterone or estrogen (as induced by mycotoxicosis and/or brucellosis) may lead to disturbances in the normal ovulatory cycle, and consequently lead to the reproductive failure **(Vaitukaitis et al., 1971)**.

The present work revealed that either mycotoxicosis or brucellosis could induced significant

increase of thyroxin hormone (T_4) in cattle and buffaloes than control animals, but the triiodothyronin (T_3) hormone was significantly increased only in buffaloes than control, but its increased in cattle was non-significant. The hyperthyroidism may induce toxic goiter which may lead to excessive metabolic reactions and consequently losing of weight **(Georgieva, 1989)**. The mycotoxicosis reported to induce body weight loss in cattle **(CAST, 1989)**.

In buffaloes, brucellosis induced significant increase of alanine amino transferase (ALT) enzyme activity, total bilirubin and total lipids and induced significant decrease in total protein concentration. Similar results could be detected in sheep suffered from brucellosis by Helal and **Abdel Fattah (2003)**, this results leading to suggestion that the brucellosis induced hepatic dysfunction and hyperlipidemia and hypoproteinemia in buffaloes than that of cattle. The inereased ALT-enzyme activity and total bilirubin concentration are indicative of hepatic dysfunction as reported by **Kachman and Moss (1976)**.

The mycotoxicosis induced significant increase of total lipids in buffaloes and significant decrease of total protein in both buffaloes and cattle than that of control animals. The hyperlipidemia may be induced because of the interference with lipid metabolism, or with xenobiotics **(Stroev, 1986)**, or after estrogen, progesteron, glucocorticoid or sucrose administration **(Young et al., 1975)**. The mycotoxin fumonsin-B1 could induced a mild hepatic damage **(Osweiler et al., 1993)**.

Based on the present study, it could be concluded that the mycotoxicosis induced immunosuppression towards brucellosis (due to induction of hypogammaglobulinemia) in buffaloes than that in cattle, and induced metabolic and reproductive disturbances (because of the hormonal changes), but brucellosis induced hepatic dysufnciton in buffaloes (as a result of some serum biochemical changes).

Table (1): The serum levels of different mycotoxins in brucella infected buffaloes and cattle as serologically diagnosed by tube agglutination and rivanol tests.

Groups		Serum levels of mycotosins			Serological tests of brucalla			
		Aflatoxin B1(AF B1) (ng./ml.)	Ochratoxin-A (OA) (ng./ ml.)	Fumonsin _1 (FB1) (ng./ ml.)	Tube aggl. Test		Rivanol test	
					Titer range	Long to value of the reciprocal titers	Titer range	Long 10 values of the recipracal titers
Buffaloes	Control group	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00	0.00 ± 0.00	0.00	0.00 ± 0.00
	Brucella infected group	201 ± 3.162	178 ± 9.84	197 ± 7.62	1/20 – 1/40	1.482 ± 0.066	1/100 – 1/400	2.301 ± 0.085
Cattle	Control group	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00	0.00 ± 0.00	0.00	0.00 ± 0.00
	Brucella infected group	211 NS ± 8.246	169 NS ± 3.22	171* ± 8.60	1/40 – 1/80	1.903** ± 0.093	1/200 – 1/400	2.42* ± 0.054

N.B.: * = Significant change in serum mycotoxins or in the specific antibody titers (log $_{10}$ values) between brucella infected buffaloes and brucella infected cattle), ** = Highly significant change between means of brucella infected cattle and brucella infected buffaloes, N.S. = Non – significant change.

Table (2): Effects of mycotoxicosis and/or brucellosis on some serum Hormones of buffaloes

Groups	Prolactin hormone (M.I.U./ml)	Progesterone hormone (ng/ml)	Estrogen hormone (ng/ml)	Triiodothyronin (T3) hormone (nmol/L.)	Thyroxin (T4) hormone (nml./L.)
Control (normal) group	1.500 ± 0.126 A	6.900 ± 0.330 A	1248 ± 8.944 A	10.00 ± 0.894 A	72.600 ± 3.622 A
Mycotoxin poisoned group	1.450 ± 0.124 A	9.200 ± 0.707 B	1613 ± 15.221 B	10.70 ± 1.004 A	92.300 ± 6.957 BC
Brucella infected group	1.750 ± 0.268 A	3.200 ± 0.291 C	211 ± 13.914 C	13.80 ± 0.967 B	85.700 ± 7.211 AB
Brucella infected & mycotoxin poisoned group	1.600 ± 0.089 A	3.500 ± 0.558 C	295 ± 6.325 D	17.900 ± 1.649 C	104.32 ± 11.540 C
LSD (P ≤ 0.05)	NS	0.791	19.211	1.648	14.544

N.B.: The different capital litters in columns denote the presence of significant change between means (at P ≤ 0.05), LSD = least significant difference between means (at P < 0.05).

Table (3): Effects of mycotoxicosis and/or brucellosis on some serum hormones of cattle

Group	Prolactin hormone (M.I.U./ml)	Progesterone hormone (ng/ml)	Estrogen hormone (ng/ml)	Triiodo theyronin (T3) hormone (nmol/L.)	Thyroxin (T4) hormone (nml./L.)
Control (normal) group	1.100 ± 0.063 A	54.00 ± 3.298 A	1293 ± 20.396 A	15.700 ± 1.523 A	110.800 ± 6.325 A
Mycotoxin poisoned group	1.070 ± 0.144 A	62.200± 4.209 B	1043 ± 13.796 B	16.600 ± 1.844 A	159.8 ± 10.249 B
Brucella infected group	1.190 ± 0.258 A	49.400 ±5.261 C	1319 ± 17.088 C	17.100 ± 3.578 A	154.400 ± 9.265 B
Brucella infected & mycotoxin poisoned group	1.200 ± 0.029 A	53.00 ± 3.453 AC	1549 ± 24.518 D	18.300 ± 2.039 A	177.300 ± 6.747 C
LSD (P < 0.05)	-	4.043	20.190	-	9.410

N.B.: The different capital litters in columns denote the presence of significant change between means (at P ≤ 0.05), LSD = least significant difference between means (at P < 0.05).

Table (4): The effects of mycotoxicosis and/or brucellosis on the different electrophoretically separated serum protein factions of buffaloes

Grpus	Alpha (_) globulins (g/dl)	Beta (_) globulins (g/dl.)	Gamma (℘) globulins (g/dl.)	Total globulins (g/dl)	Albumin (g/dl)	Total protein (g/dl.)
Control (normal) group	1.712 ± 0.179 A	1.652 ± 0.102 A	1.159 ± 0.064 A	4.523 ± 0.243 A	3.785 ± 0.348 A	8.308 ± 0.289 AC
Mycotoxin poisoned group	1.974 ± 0.200 A	0.835 ± 0.036 B	0.695 ± 0.111 B	3.504 ± 0.291 A	3.519 ± 0.342 A	7.023 ± 0.287 B
Brucella infected group	2.595 ± 0.063 A	0.414 ± 0.032 C	1.952 ± 0.244 C	4.961 ± 0.226 A	3.656 ± 0.510 A	8.617 ± 0.245 A
Brucella infected & mycotoxin poisoned group	2.034 ± 0.228 A	0.766 ± 0.143 B	1.566 ± 0.158 D	4.366 ± 0.233 A	3.557 ± 0.375 A	7.923 ± 0.158 C
LSD (P ≤ 0.05)	NS	0.256	0.281	NS	NS	0.492

N.B.: The different capital litters in columns denote the presence of significant change between means (at P ≤ 0.05), LSD = least significant difference between means (at P < 0.05).

Table (5): Effects of mycotoxicosis and/or brucellosis on the different electrophoretically separated serum protein factions of cattle

Grpus	Alpha (_) globulins (g/dl)	Beta (_) globulins (g/dl.)	Gamma (℘) globulins (g/dl.)	Total globulins (g/dl)	Albumin (g/dl)	Total protein (g/dl.)
Control (normal) group	0.717 ± 0.030 A	2.078 ± 0.038 A	1.430 ± 0.084 AC	4.225 ± 0.252 AC	3.467 ± 0.416 A	7.692 ± 0.086 A
Mycotoxin poisoned group	1.154 ± 0.063 B	1.452 ± 0.152 B	0.952 ± 0.169 A	3.558 ± 0.292 B	3.282 ± 0.364 A	6.840 ± 0.352 B
Brucella infected group	1.671 ± 0.033 C	0.762 ± 0.096 C	2.120 ± 0.231 B	4.553 ± 0.357 A	3.811 ± 0.335 B	8.364 ± 0.416 C
Brucella infected & mycotoxin poisoned group	1.215 ± 0.031 B	1.124 ± 0.267 B	1.761 ± 0.226 CB	4.100 ± 0.203 C	3.823 ± 0.443 B	7.923 ± 0.222 AC
LSD (P ≤ 0.05)	0.078	0.360	0.526	0.332	0.223	0.537

N.B.: The different capital litters in columns denote the presence of significant change between means (at P ≤ 0.05), LSD = least significant difference between means (at P < 0.05).

Table (6): Effects of mycotoxicosis and/or brucellosis on some serum biochemical constituents of buffaloes

Groups	ALT-enzyme activity (I.U/L)	Total bilirubin (mg/dl.)	Total lipids (g/dl.)	Total protein (g/dl.)
Control (normal) group	8.245 ± 0.321 A	1.674 ± 0.141 A	27.060 ± 1.718 A	8.308 ± 0.289 AC
Myeotoxin poisoned group	8.910 ± 0.430 B	1.765 ± 0.267 A	34.116 ± 1.303 B	7.023 ± 0.287 B
Brucella infected group	9.160 ± 0.595 B	2.156 ± 0.148 B	31.811 ± 1.075 C	8.617 ± 0.245 A
Brucella infected & mycotoxin poisoned group	10.920 ± 0.357 C	2.238 ± 0.173 B	39.382 ± 1.173 D	7.923 ± 0.158 C
LSD ($P \leq 0.05$)	0.665	0.315	2.155	0.492

N.B.: The different capital litters in columns denote the presence of significant change between means (at $P \leq 0.05$). SD = Least significant difference (at $P \leq 0.05$).

Table (7): Effects of mycotoxicosis and/or brucellosis on some serum biochemical constituents of cattle

Groups	ALT-enzyme activity (I.U./L)	Total bilirubin (mg/dl.)	Total lipids (g/dl.)	Total Protein (g/dl.)
Control (normal) groups	14.500 ± 1.166 A	1.728 ± 0112 A	26.779 ± 1.334 A	7.692 ± 0.086 A
Mycotoxin poisoned groups	14.910 ± 0.911 A	1.916 ± 0.261 A	28.821 ± 1.897 A	6.840 ± 0.352 B
Brucella infected groups	16.620 ± 0.825 A	1.824 ± 0.280 A	29.119 ± 1.318 A	8.364 ± 0.416 C
Brucella infected & mycotoxin poisoned groups	18.334 ± 1.026 A	2.037 ± 0.163 A	29.086 ± 0.939 A	7.923 ± 0.222 AC
LSD ($P \leq 0.05$)	NS	NS	NS	0.537

N.B.: The different capital litters in columns denote the presence of significant change between means (at $P \leq 0.05$), LSD = Least significant difference (at $P \leq 0.05$).

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الملخص العربى

بعض الدراسات البيوكيميائية والهورمونية والفصل الكهربى لبروتين مصل الجاموس والبقر التى تعانى من السموم الفطرية والبروسيللا

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تم دراسة أمراض التسمم الفطرى والإجهاض المعدى (البروسيللا) فى الجاموس والبقر حيث قسم ٢٠ حيوان من كل نوع إلى أربعة مجموعات متساوية فى مزرعة خاصة، وذلك بعد شهر من الإجهاض أو الولادة الطبيعية، المجموعة الأولى استخدمت كضابط للتجربة، والمجموعة الثانية فهى حيوانات بها سموم فطرية بالدم، والمجموعة الثالثة هى حيوانات مصابة بالبروسيللا، والمجموعة الرابعة فهى حيوانات مصابة بالبروسيللا وكذلك بها سموم فطرية بالدم. وقد تم تشخيص مرض البروسيللا بالطرق السيرولوجية ومن الأعراض الإكلينيكية، وقد تم عمل دراسات سيرولوجية وسمية فطرية وهرمونية وبيوكيميائية وكذلك تم فصل مكونات بروتين المصل بطريقة الفصل الكهربى، وأوضحت النتائج أن السموم الفطرية التى تم اكتشافها فى مصل الجاموس والبقر هى الأفلاتو كسين ب١ والأوكراتوكسين-أ والفيومونزين ب١، وكانت تركيزاتها فى الجاموس أكثر منها فى البقر، وعلى عكس من ذلك فقد وجد أن مستوى الأجسام المناعية فى البقر أعلى معنويا عن مستواها فى الجاموس، وقد أحدث التسمم بالسموم الفطرية وكذلك مرض البروسيللا خللا فى الوظائف التناسلية (بسبب التغيرات فى هرمونات البروجسترون والاستروجين والثيرونين ثلاثى اليوم (T3) والثيروكسين (T4)، وقد أحدثت السموم الفطرية نقص فى المناعة (بسبب النقص المعنوى للجلوبيولينات المناعية والأجسام المضادة ضد البروسيللا خاصة فى الجاموس)، وكذلك حدثت إضطرابات أيضية نتيجة زيادة هرمونات الغدة الدرقية (T4.T3) وزيادة الدهون الكلية، واضطراب فى وظيفة الكبد فى الجاموس (نتيجة زيادة تركيز البيليروبين الكلى وزيادة نشاط إنزيم (ALT) وقد أمكن إستنتاج أنه يجب فحص السموم الفطرية فى المناطق التى يكثر فيها إنتشار البروسيللا من أجل تقليل التسمم بالسموم الفطرية وبالتالى القضاء على مرض نقص المناعة ضد البروسيللا والأمراض المعدية الأخرى.