قسم طـــب الحيـــــوان
كلية الطب البيطري ـ جامعة أسيوط
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دراسة تأثير سمـــوم الفيوزاريـــوم على الجاموس المصـري الحلـــــــــــــــوب

ضيفى سالم ، عادل شحاته ، ثابت عبد المنعم ، عبد العزيز شعبان

يعد التسمم الغذائى من أخطر أنواع التسمم الذي يصيب الانسان والحيوان على السـواء وتعد السموم الفطرية من أهم مسببات التسمم الغذائى ، ويعد الفيوزاريوتوكسين وخاصـــة للزيرالينون من أهم وأخطر السموم التى تفرزها فطريات الفيوزاريوم المتعددة والتى يكمـــن خطرها فى تأثيرها على الاجهزة التناسلية للجنسين مما يؤدي الى انهيار اقتصاديات المزرعة ٠ وقد تم اختيار الجاموس المصري الحلوب لهذه الدراسة لكونه المصدر الاساسى فى غذاءالانسان طيلة مراحل حياته سواء من البان أو لحوم ٠ وقد تمت الدراسة على اثنتين من المزارع الحكومية للجاموس بمحافظة أسيوط همـــا : ـ

مزرعتا الحواتكه وكلية الزراعة وذلك نتيجة للشكوي الدائمة من ارتفاع معدلات الاجهاض مـع انخفاض فى معدلات الخصوبة وتناقص انتاج الالبان بهاتين المزرعتين ٠

وقد اثبت الفحص الاكلينيكى للحيوانات المفحوصة انها جميعا فى حالة صحية جيدةولاتظهر عليها أي أعراض اكلينيكية للتسمم وبفحص السجلات الخاصة بهاتين المزرعتين ، اتضحوجود نقـص واضح فى معدلات انتاج الالبان فى كل من فصلى الشتاء والربيع فى موسمي ١٩٨٤ ، ١٩٨٥ بالمقارنة بالعام السابق ١٩٨٣ وايضا ارتفاع فى معدلات الاجهاض مع انخفاض فى معدلات الخصوبة خـــلال عامي ١٩٨٤ ، ١٩٨٥ ٠ وقد أظهرت نتائج التحليل بأستخدام جهاز كروماتوجرافيا الطبقة الرقيقـة لعينات من علائق الحيوان وجود الزيرالينون فى ٣٧,٥ من العينات المفحوصة والزيرالينـــول فـــى ٢٠٪ كما اثبتت نتائج تحليل عينات الالبان فى كل من مزرعتي الحواتكه وكلية الزراعة الى عـــدم وجود كل من الزيرالينون والزيرالينول فى الالبان المفحوصة وقد تم اكتشاف الزيرالينون فى عينـــه واحده من عينات البول المفحوصة بمزرعة الحواتكه والزيرالينول فى عينتين فقط بنفس المزرعة ٠

من النتائج التى تم الحصول عليها من واقع المراجع العلمية مع وجود الزيرالينون والزيرالينول فى عليقة وبول الحيوانات بمزارع الحواتكه وكلية الزراعة بأسيوط وعلـى الرغم من تعدد الاسبـــاب المؤدية الى ظهور حالات العقم والاجهاض ونقص ادرار اللبن الا انه يمكن القول بأن للفيوزاريوتوكسين دور بارز فى احداث هذه الاضرابات من خلال تأثيرها المباشر علـــى معـدلات الخصوبةوالاجهـــــاض والادرار ٠

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INCIDENCE OF ZEARALENONE AND ZEARALENOL IN DAIRY FARMS IN ASSIUT (EGYPT) I- BUFFALOE

(With One Table & Two Figs.)

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SUMMARY

A toxicological studies were carried out to detect zearalenone and zearalenol mycotoxins in feedstuffs (20 samples commercial concentrate and 20 samples rice straw), milk (20 samples) and urine (10 samples) in two dairy farms (El-Hawatka and Faculty of Agriculture farms) in Assiut governorate, Zearalenone was detected in 15 samples of feedstuffs and a single urine sample. Zearalenol was detected in 8 samples of feedstuffs and two urine samples. Relationship between reproductive disturbance and fusariotoxicosis were discussed.

INTRODUCTION

The problem of mycotoxin contamination of animal feed has been widely recognized since the discovery of aflatoxins. Zearalenone (F2 toxin) and zearalenol are two mycotoxins produced by various species of fusarium. Fusariotoxicosis has been reported in different countries (WYLLIE and MOREHOUSE, 1977). The signs of zearalenone intoxication in farm animals include infertility, abortion, hyperestrogenism, feed refusal, lethargy and anemia (MIROCHA, et al. 1968, 1974; KORPINEN, 1972, JEMMALI, 1973). Infertility was observed in England in dairy cattle fed 14 ppm zearalenone in hay (MIROCOHA, et al. 1968) while abortion appeared in cattle at 12 ppm and 32 ppm in swine in United States (MIROCHA, et al. 1974).

In many regions throughout the world the presence of fusarium toxins in major cereal crops (corn, rice, oats, wheat, maize) are prevalent and cause losses in animal resources enough to cause heavy economic losses (CHRISTENSEN, 1979). HASSAN and SELIM (1982) reported that eleven isolates, (belonged to the genus fusarium) were isolated from 10 corn samples representing the crops harvested from different governorate in Egypt. EL-MARAGY (1984) reported that zearalenone was detected in nine wheat grains extracts. The toxin was present alone in 5 samples and together with other mycotoxins in 4 other samples. The wheat grains were callected from different localities in Egypt. MIROCHA, et al. (1981) reported that free and conjugated farms of zearalenone and diastereomeric zearalenole were present in cows milk receiving 25 ppm dietary zearalenone in 7 days. The cow had consumed about 1.4 gm of total zearalenone in 7 days and about 0.7% of the consumed dose was found in the milk as total metabolites.

The detection of potentially toxic substances before toxic concentrations are reached, is important for prevention and stopage of the dangerous effect of intoxication. This is specially applicable to natural and environmental toxicity, where many toxic substances such as aflatoxin

and fusariotoxins might enter the human diet directly in cereal products or in the form of residues in animal tissue, milk or other dairy products (HAGIER, et al. 1980).

The persistance complain in two dairy farms in Assiut governorate was a high percentage of infertility, abortion and a decrease in milk yield. This initiated the question of investigating the presence of mycotoxins, and planning for detection and estimation of zearalenone that might produce these syndroms.

MATERIAL and METHODS

A total number of fourty dairy buffaloes constitute the animal population in the two dairy farms (El-Hawateka and Faculty of Agriculture) at Assiut governorate were investigated in this study. Twenty samples of feedstuffs (10 from commercial concentrate mixture and 10 rice straw) were collected from each farm.

Twenty milk samples (250 ml for each) were collected randomly from each farm, in clean dry bottles and kept in the freezer (-10°C) till used for analysis.

Ten random vioided urine samples were collected in mcCartney bottles from each farm and preserved in the deep freeze till analysis. Determination of zearalenone and zearalenol in feed samples were determined by using thin layer chromatography according to SHOTWELL, et al. (1976). Determination of zearalenone and zearalenol in milk and urine samples were carried out according to HAGLER, et al. (1980). Statistical analysis of the data was calculated after KALTON (1967).

RESULTS

The study of seasonal milk yeild values (mean ± S.E.) revealed that there was a significant decrease at faculty of agriculture and El-Hawateka farms in winter and spring of 1985. These results were statistically compared by season's of 1983 (table 1).

The clinical examination of female buffaloes showed that there was no observed clinical deviation from normal. On the other hand the percentages of infertility and aborted cases were significantly elevated in 1984 and 1985 compared with 1983 (table 1).

The percentages of infertility in El-Hawateka farm were 7-19% in 1983, 15.3% in 1984, and 16-18% in 1985.

Analysis for zearalenone and zearalenol was performed in fourty samples of feed stuffs. Overall, 37.5% (15 samples) were found to contain zearalenone and 20% (8 samples were found to contain zearalenol (Table 2).

Analysis for zearalenone and detection of zearalenol in milk and urine samples by using thin layer chromatography revealed that only one sample of urine at El-Hawateka farm containeed zearalenone, and two samples contained zearalenol.

DISCUSSION

Zearalenone and zaralenol are amongest the most common mycotoxins found in feed stuffs, which has been suspected to cause mycotoxicosis. In order to obtain a true picture of the real danger in this respect, a study was carried out to invesigate the occurence of the toxins in feedstuffs, milk, and urine at El-Hawateka and Faculty of Agriculture dairy buffaloes farms at Assiut governorate.

The estimation of zearalenone and detection of zearalenol in feedstuffs of both two farms revealed that 37.5% of total samples (commercial concentrate mixture and rice straw) contained zearalenone, while zearalenol was detected in 20% of the total examined feed samples.

Non detectable lower concentrations less than 0.5 mg/kg may attributed to the low sensetivity of thin-layer chromatography, as previously discused by many authers (EPPLEY, 1968) attributed this phenomena to the weak flouresence of zearalenone in comparison to other mycotoxins and to the interference of the oily material.

The clinical examination of animals revealed no obvious symptoms of intoxication. The clear sign the high percentage of infertility in the two farms. The previous records of high infertility percentages through a light to the relationship between infertility and contamination of feed by fusariotoxins. MIROCHA, et al. (1968); ROINE, et al. (1971); KORPINEN (1972); JEMMALI (1973) and MIROCHA, et al. (1974), recorded a marked decrease in both cattle and swine fertility, when fed on a ration mixed with zearalenone or infested with fusarium species. This support our openion about the revalance relationship between the detection of fusariotoxins in feed stuffs and the high percentage of infertility in the investigated farms.

The evidence of abortion in the two farms is in agreement with MIROCHA, et al. (1974) who reported that abortion in cattle was observed in the United States when animals were fed sorghum contained 12 ppm zearalenone.

Our data recorded a significant decrease in milk yield in winter and spring which is considered as one of the important records due to feed contamination with fusariotoxins. Loss of appetite and decreased milk production were observed after ingestion of mouldy feed with fusarium species in Australia (FISHER, et al. 1967) and in Hungary (DANKO and TOTH, 1969). The subtropical climate of Assiut governorate during spring and winter seasons usually record a high temperature in the morning and low at night in the same day which enhance the production of the toxin by fusarium molds.

The sensitivity of the analytical method for detection of trace amounts of zearalenone or zearalenol beside the minor excretions of these toxins via milk and the fastly excretion of them from the body (SHREEVE, et al. 1978), clearfied the negative result of zearlenone and zearalenol in milk obtained in our results. Also due to the previous causes we can attribute the low positively results obtained in urine analysis.

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Table (1)
Mean values (± S.E.) of seasonal daily milk yield and infertility % at El-Hawateka and Faculty of Agriculture farms

Year	Season	El-Hawateka farm		Faculty of agriculture farm	
		Milk yield (kg/day)	Infertility %	Milk yield (kg/day)	Infertility %
1985	Winter	3.740±0.188**	18.61	6.126±0.256*	-
	Spring	4.412±0.133**		4.882±0.168**	
	Summer	4.098±0.880		5.043±0.530	
	Autumn	4.141±0.259		6.335±0.397	
1984	Winter	4.847±0.133*	15.30	6.628±0.284*	-
	Spring	4.915±0.118*		5.270±0.370*	
	Summer	4.024±0.201		5.218±0.374	
	Autumn	4.307±0.205		5.430±0.631	
1983	Winter	5.197±0.177	7.10	8.243±0.600	-
	Spring	5.128±0.120		7.065±0.940	
	Summer	4.274±0.111		6.115±0.335	
	Autumn	4.549±0.217		5.213±0.229	

** Significant at P/ 0.01
* Significant at P/ 0.05

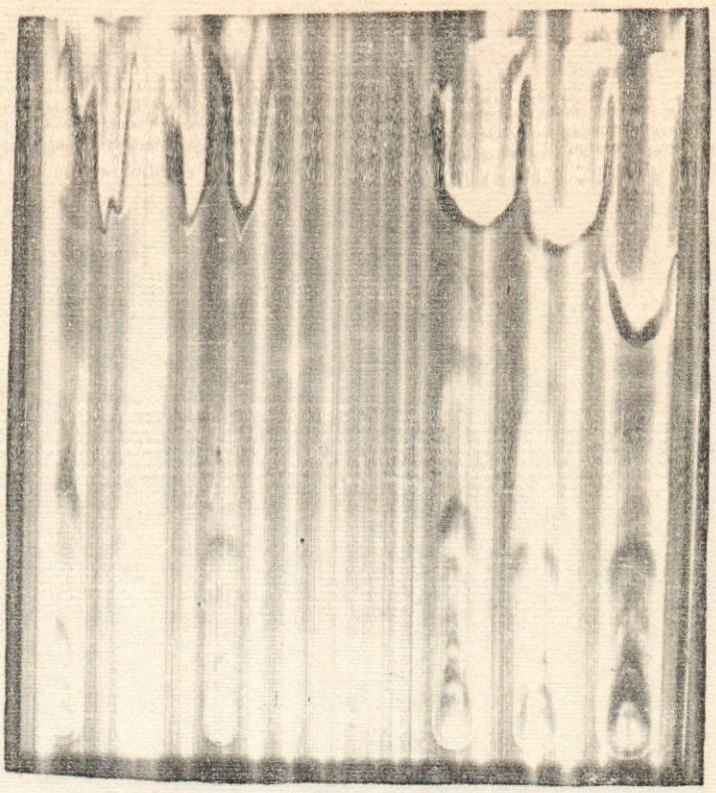

Fig. (1)
TIC plate showing zearalenone + ve at the three concentrations of the sample after comparison with zearalenone standard

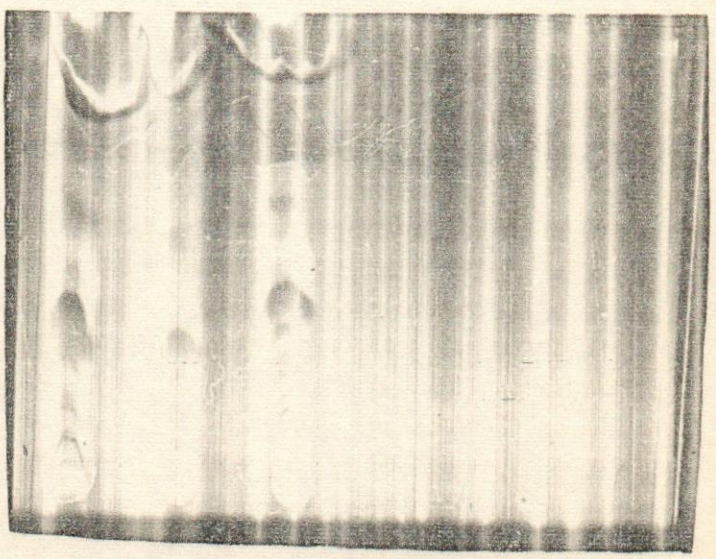

Fig. (2)
TLC plate showing zearalenone + ve at two concentrations of the samples, one on each side of zearalenone standard