FIELD STUDY ON THE EFFECT OF ALUMINUM SILICATE ADSORPANT ON PERFORMANCE OF 51 WEEKS OLD BROILER BREEDER CHICKENS.

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ABESTRACT

In 9 weeks field study, a total of 14100 (Ross broiler breeders) 51 weeks-old chickens fed on a same ration, placed in 2 houses (6600 female + 450 male / house). Birds of house 1 were treated with antimycotoxin adsorpant Aluminum silicate (G-V-tox®) 5 k. gm/ ton, while those of house 2 were kept as nontreated controls. Productivity and reproductivety parameters were calculated for comparison. Treated flock showed improved average egg production (Average 62.2%/week) compared with nontreated (Average 61.7%/week), but all still lower than farm stander (Average 76.4%/week). Marked improvement was in the 1st 3 weeks (51-53) of treatment only. Total 9 weeks production declined was 5.5% and 8.4% in control and silicate treated flock; with weekly average of 0.61, and 0.93; respectively. Control flock was slower in decline of production (0.61%/week) than treated flock (0.93%/week).

Average weekly egg production and hatching eggs/ hen in treated flock was lower than standard and higher than nontreated. Hatchery parameters of treated were improved in treated at the first 3 weeks post treatment. The fertility was higher in Aluminum silicate treated group (77.2%), than the untreated one (72.19%). The hatchability was in silicate treated (63.66%) versus (62.25%) in the untreated control. Culls % in hatched chicks was 1.91% in treated flock and lower than in non treated (2.85%). Difference percentage between fertility and hatchability of G.V. tox treated chickens was (10.84%) higher than untreated control (16%). The number of marketable chicksl100 was also improved in treated than non treated.

In conclusion, our field study cleared that administration of Silicate in ration for treatment of broiler breeders resulted in an improved production and hatchary performance as compared with nonmedicated control. However; it did not restore it to the farm stander. Consequently the results indicated that we still in need for more effective products to be used to control mycotoxins in breeder chicken.

INTRODUCTION

Mycotoxinis are toxic and carcinogenic metabolites of fungi that occurr in poultry feed under conditions of high temperature and high moisture ***(Bacon, et al, 1973)***.
Aflatoxins are toxic metabolic product of *A. flavus*, *A. parasiticus*, and *Penicillium puberulum*, while Ochratoxin A (OA) is the most toxic product of *Penicillium viridicatum and Aspergillus ochraceous* ***(Dwivedi and Burns, 1986)*** causing disease conditions ***(Wyatt and Hamilton, 1975; Abdullah and Lee, 1981; Choudary and Rao***

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, 1982; Jones, et al., 1982; Hetzel, et al., 1984; Dafalla, et al. , 1987; Shoyinka, et al., 1987; Anjum, 1994 and Saif, et al 2003) .

Nowadays, hundreds of mycotoxins are recognized ***(Uraguchi and Yamazaki, 1978).*** The synergistic interaction between OA and Aflatoxins was recorded ***(Huff, et al., 1983 and 1992).*** Mycotoxins affects poultry production by lowering weight gain ***(Asplin and Carnaghan, 1961),*** feed efficiency, egg production ***(Prior and Sisodia, 1978 and Bryden, et al, 1980)*** and reproductive performance, increased susceptibility to infectious disease ***(Wyatt and Hamilton, 1975 and Bryden, et al, 1980)*** immunosuppression ***(Pier, 1973; Burns and Dwivedi. 1986 and El-Karim, et al,. 1991)*** , vaccination failure ***(Anjum, 1994; Azzam and Gabal, 1997 and 1998 and Bunaciu, et al., 1998)*** interaction with mineral metabolism ***(Gardiner and Oldroyd, 1965)***, low hatchability due to embryonic death in broiler breeders ***(Cottier, et al., 1969; Choudhury, et al., 1971 and Niemiec, et al., 1995)*** and impaired egg production ***(Kratzer, et al. 1969 and Huff, et al., 1975).***

Many commercial products including mycotoxin-binding agents are used for detoxification contaminated feeds. Inorganic mineral adsorbents as Silica containing products are more practical and economical feed additives to ameliorate the toxic effects of mycotoxins and ochratoxin A ***(Prior and Sisodia, 1978; Huff, et al. 1992; Kubena, et al. 1993; Harvey, et al.,1993 and Bailey, et al., 1998).***

This study was carried out as a field trial to evaluate the preventive value of commercial products including Aluminum silicate as adsorbent (G.V- tox.) in Ross broiler breeders where reproductivety and hatchery parameters were determined during period of production to evaluate the total effect income of breeder flocks.

MTERIAL and METHODS

CHICKEN:

A total of 14100 Ross broiler breeders 51 weeks old chickens including 13200 females and 900 males housed in 2 closed houses; approximately 6600 females with 450 males in each house.

RATION:

Mash, corn, Soya, 16% protein broiler breeder layer ration manufactured according to Ross breeders management guide and adjusted to fulfill the requirements of layer breeder according to ***NRC (1984).***

DETECTION OF MYCOTOXINS:-

The used ration was analyzed for detection of mycotoxins according to ***Soares and Rodrigez-Amaya (1989)*** and found to contain Aflatoxins (4 ppb) and Ochratoxin (2.45 ppb). The aflatoxin content of ration were analyzed by using immunoaffinity columns (Vicam AflaTest® Affinity Column) and quantified by high performance liquid chromategraphy (HPLC) (Agillent 1100 Series).

DIAGNOSIS OF MAYCOTOXICOSIS:

In relation to low reproductively and detection of toxins in ration dead cases had lesions including hydropericardium and ascites. Liver was shrunken firm nodular or yellow fatty, ocher discoloration, hemorrhages in the capsular surface, distended gall bladder, white foci also seen in hepatic tissues. Kidneys were pale with increased ureates and catarrhal enteritis ***(Saif et al., 2003).***

DETOXIFYING PRODUCTS:
The detoxifying commercial product G-V-tox® (aluminum silicate adsorpants) was used according to producer's recommendations in ration of breeder chickens in rate of 5 kg / ton for 9 successive weeks.

PERFORMANCE:
The calculated parameters in this field study were compared with a control untreated house and farm standerd for Ross breeder chickens for 9 weeks post medication between 51 and 59 weeks of age. Hen day production and hatching eggs were determined to evaluate the effect of used drug on productivity, while hatchery parameters including fertility and hatchability, difference between fertility and hatchability; culled chicks %, number of marketable chicks/1000 housed hens/day and weekly chicks / hen were calculated as average during the whole production period.

EXPERIMENTAL DESIGN:
Both hens and cockerels were fed on the same ration. Breeder house 1 was fed with aluminum silicate in ratio of 5 kg/ ton of ration, while house 2 was kept as control nontreated. Obtained results are shown in tables (1-2) and Figs. (1-4).

RESULTS and ***DISCUSSION***

There are various approaches to control or combat mycotoxin problems. The simplest method based on the prevention or minimizes formation of mycotoxins in ration by good storage and prevention of grain damage during processing, shipping and handling ***(Dawson, 2001 and Saif et al., 2003).*** Silica adsorbents as more practical and economical feed additives are added to poultry feeds to ameliorate the toxic effects of mycotoxins ***(Prior and Sisodia, 1978; Huff, et al. 1992; Kubena, et al. 1993; Harvey, et al.1993 and Bailey, et al. 1998).***

Weekly egg production rates were declined gradually as a physiological state, but this production was lower as compared to Ross Farm standard. The condition was diagnosed as a result of mycotoxicosis. As decrease in egg production was reported as a sign of mycotoxicosis in breeder chickens ***(Choudhury, et al., 1971; Prior and Sisodia, 1978; Page, et al.; 1980 and Niemiec, et al., 1995).***

Administration of silicate adsorpant to breeder chicken flock for 9 weeks (from 51-59) resulted in increase in weekly egg production than control flock (Table1 fig1). Treated flock showed improved average egg production (Average 62.2%/week) compared with nontreated (Average 61.7%/week), but all still lower from farm standerd (Average 76.4%/week). Marked increased egg production was seen in the 1st 3 weeks (51-53) of treatment only. Production declined in 9 weeks reached 5.5% and 8.4% in control and silicate treated with average weekly decline 0.61 and 0.93; respectively. Control flock was slower in decline than treated flocks. This result indicated that silicate was of value in amelioration of the toxic effects of mycotoxins and ochratoxin A ***(Prior and Sisodia, 1978; Huff, et al. 1992; Kubena, et al. 1993; Harvey, et al.1993 and Bailey, et al. 1998).***

Average weekly cumulative egg production/ hen housed in the treated flock was higher (3.94/hen) than nontreated (3.81/hen) and both were lower than standard (4.76/hen). Treated flock show higher and stale average cumulative egg production (4.0 eggs / hen) from the 2nd week (week 52) to the weeks 56th week of age. In

contrast nontreated chickens showed gradual weekly decrease. Generally, the silicate treated birds were higher in egg production (table 1, fig 2).

Cumulative hatching egg / hen housed (Table 1 fig 3) of treated and nontreated control were lower than the standard level. The treated group showed the higher average cumulative hatching egg (3.81 hatching egg / hen) than nontreated (3.61 hatching egg / hen). The treated flock showed improved hatching egg / hen (3.95) in the 51st weeks and remains higer till the 59th. This result proved that the determined Aflatoxin and Ocratoxin in ration had adverse effect on egg quality ***(Page, et al., 1980; Prior and Sisodia, 1978; Prior,et al., 1981 and Niemiec, et al.,1995).*** Also, aflatoxins affect calcium and phosphorus metabolism by altering the metabolism of vitamin D3 and parathyroid hormone as reported by ***Glahn, et al. (1991).*** The periodical improvement in number of hatched eggs can be attributed to the limited effect of Silica in removal of the Ocratoxin A or synergism of Aflatoxin and Ocratoxin A ***(Huff, et al., 1983 and 1992)***.

Hatchery parameters in table (2) including fertility, hatchability and culled chicks of treated with control flock at the first 3 weeks post treatment as average rates; the higher fertility in silica treated flocks (77.2%) and the untreated control show 72.19% fertility. This result indicated the effect of mycotoxins on fertility as reported by ***Ortalatli, et al., (2002)*** who detected microscopically abnormal spermatozoa and cessation spermatogenesis in seminiferous tubules in aflatoxin feed cocks.

The hatchability was 63.66% in treated; while it was 62.25% in untreated control. Percentages of culls in hatched chicks were the lower in nontreated flock (1.91%) than in treated flocks (2.85%). Loss of hatchability was attributed to embryonic death in broiler breeders and leghorns induced by aflatoxin ***(Cottier, et al., 1969 and Howarth and Wyatt, 1976)*** and Ocratoxin A ***(Oloudhury, et al., 1971; Prior and Sisodia 1978; Tohala, 1983 and Niemiec, et al., 1995***) that had tratogenic effect on chicken embryo (***GHani, et al., 1975)***.

Difference between fertility and hatchability of treatment chickens in treated (13.54) was higher than untreated control (16%).

Regarding the improved cull percentage in treated than non treated (1.91 and 2.85) and accordingly the number of marketable chicks/1000 hens (667.36 and 637.71) can be due to removal of the effect of aflatoxins on calcium and phosphorus metabolism as reported by ***Glahn, et al. (1991).***

Our field study pointed out that the administration of selicate as adsorpoant in ration for control of mycotoxins in breeders resulted in slight improvement in reproductive performance in the 1st weeks after administration and over all average weekly egg and hatching egg production, also, hatchery performance data in treated birds was higher than non medicated control. Aluminum silicate was not able to treat flock to reach the farm standerd.

Consequently our results indicated that Aluminum silicate was of value but we still in need of more effective products for mycotoxins in breeder chicken flocks especially those showing chronic affection.

Table (1): Weekly average hen egg production, egg produced and hatching eggs / hen housed / week of treated flock compared with farm standerd and non treated control.

Age / weeks	Weekly hen production			produced eggs / hen housed / week			Hatching eggs / hen housed / week		
	E. St.*	Al. S.**	Control	F. St.	Al. S	Control	F. St.*	Al. S	Control
51	80.0	66.5	63.5	5.00	4.13	4.00	4.75	3.95	3.90
52	79.0	64.9	63.2	4.90	4.00	4.00	4.64	3.90	3.90
53	78.0	64.0	63.4	4.90	4.00	3.90	4.66	3.90	3.75
54	77.0	63.5	63.6	4.80	4.10	3.85	4.50	3.80	3.70
55	76.0	62.5	63.7	4.70	4.00	3.70	4.40	3.90	3.60
56	75.0	61.2	61.7	4.70	4.00	3.70	4.40	3.90	3.55
57	75.0	60.1	59.0	4.60	3.80	3.75	4.40	3.80	3.45
58	74.0	59.2	59.1	4.60	3.70	3.68	4.30	3.50	3.30
59	74.0	58.1	58.0	4.60	3.70	3.70	4.30	3.60	3.30
Av. /w #	76.4	62.2	61.7	4.76	3.94	3.81	4.48	3.81	3.61
Diff ##	6.0	8.4	5.5	0.40	0.43	0. 30	0.45	0.45	0.60
Dic/w***	0.66	0.93	0.61	0.04	0.05	0.03	0.05	0.05	0.07

* F. St.: Farm Stander ** Al. S : Aluminum Silicate *** Dic/w: Average weekly decline.
\# Av../w: average weekly production. ## Diff: production of week 51- production of week 59.

Table (2) Fertility, hatchability and difference in-between, culls, marketable chicks/1000 in treated and control breeder chickens.

Treatment	Fertility %	hatchability %	Fert. – Hatch.	Culls %	Marketable Ch./1000
Farm stander	84.50	75.33	8.17	0.53	749.8
Al. S.	77.20	63.66	13.54	1.91	667.36
Control.	78.25	62.25	16.00	2.85	637.71

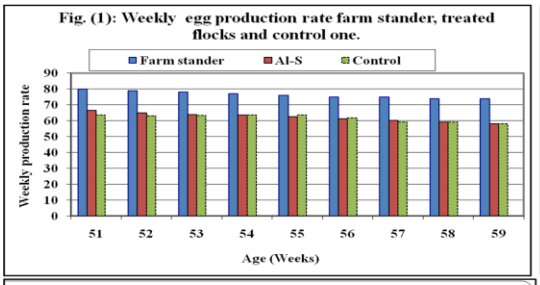

Fig. (1): Weekly egg production rate farm stander, treated flocks and control one.

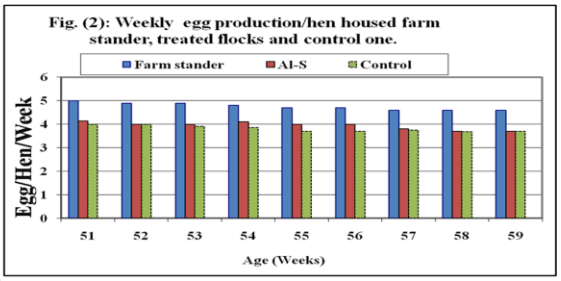

Fig. (2): Weekly egg production/hen housed farm stander, treated flocks and control one.

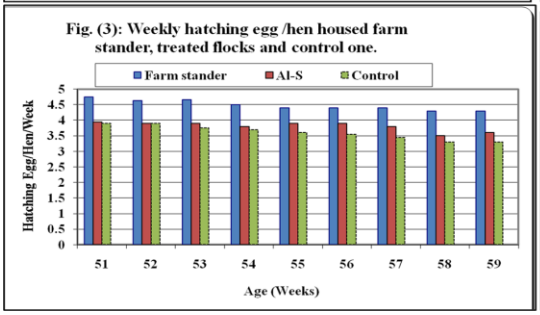

Fig. (3): Weekly hatching egg /hen housed farm stander, treated flocks and control one.

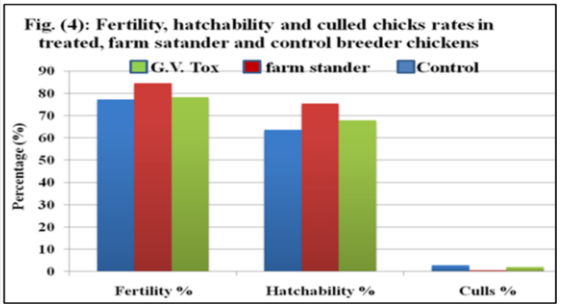

Fig. (4): Fertility, hatchability and culled chicks rates in treated, farm satander and control breeder chickens

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دراسة حقلية عن تأثير سلكات الألمنيوم كمجمع للسموم الفطرية على انتاجية أمهات دجاج التسمين عمر 51 اسبوع.

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المستخلص

فى دراسة حقلية لمدة 9 اسابيع على 14100 من امهات دجاج التسمين الروس عمر 51 اسبوع والمرباة فى عنبرين (6600 أم + 450 ديك فى كل عنبر) تتغزى على علائق واحدة. أضيفت سلكات الألمنيوم كمجمع للسموم القطرية (جيفى توكس) بمعدل 5 كيلو جرام/طن للعنبر الاول وأعتبر الثانى كضابط غير معالج, تم حساب معدلات الانتاج والتكاثر للمقارنة واستبيان تاثير سلكات الالمنبوم.

أظهر دجاج العنبر المعالج زيادة فى متوسط انتاج البيض بمتوسط أسبوعى 2, 62 % من العلاج بالمقرنة بالغير معالج 7, 61 % الا انهما ظلا دون الانتاجية العيارية للمزرعة 4, 76 % . كان معدل التحسن فى انتاج البيض واضحا فى الثلاث اسابيع الاولى من العلاج . كان الانخفاض فى الانتاج فى 9 اسابيع 8,4% فى المعالج 5,5% فى عير المعالج بينما العيارى 6 % بمتوسط اسبوعى 0,93% ،0, 61 ،0, 66; على التوالى. معدل الانخفاض فى الدجاج غير المعالج اقل من المعالج. متوسط انتاج البيض الاسبوعى وكذا البيض الصالح للتفريخ لكل دجاجة فى المعالج اعلى من غير المعالج واقل من العيارى.

تحسنت معدلات التفريخ فى الدجاج المعالج بسلكات الالمنيوم حيث كان معدل الاخصاب والفقس 2, 77 % و 66, 63 % اعلى من الغير معالج 1, 72 % و 25, 62 % ; على التوالى. وكذاانخفض معدل الكتاكيت الغير صالحة للبيع فى المعالج (91, 1 %) عن الغير معالج (5, 28 %) وكان الفرق بين ننسب الفقس والاخصاب 84, 10 % فى بيض الدجاج المعالج و 16 % فى غير معالج وبالتالى عدد الكتاكيت المباعة لكل الف دجاجة كان اعلى فى المعالج.

أوحت الدراسة ان اضافة سلكات الالمنيوم الى علف الامهات ادى الى تحسن فى الانتاجية وكذا معدلات التفريخ الا انها لم تصل بهما الى المستوى القياسى للمزرعة مما يوضح اننا مازلنا فى حاجة الى مستحضرات اكثر فاعلية لاستخدامها لمواجهة التسمم الفطري المزمن خاصة فى الامهات.