and SAA could be used for assessing therapeutic efficacy of immune modulators and prognosis of endometritis in cows.

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Effect of Sublethal Dose of Citrinin and Aflatoxin on the Growth Rate of Broiler Chicken*

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Abstract

The present study was undertaken to find the individual and combined effects of citrinin (CTN) (5 ppm) and aflatoxin (AF) (0.5 ppm) on the growth rate of broiler chicken by feeding the mycotoxins from 0 to 6 weeks of age. Significant decrease in the body weight gain was observed from second week onwards in all mycotoxin fed groups. The AF and CTN+AF fed group showed significantly lower weight gain than the control and CTN groups. The AF and CTN+AF group consumed significantly ($P<0.05$) lower feed than the CTN group.

Key words: Citrinin, aflatoxin, broiler chicken, growth rate.

Considering the paucity of literature on the effect of Citrinin (CTN) and Aflatoxin (AF) at minimum dose level, the individual and combined effects of CTN at 5 ppm and AF at 0.5 ppm level in affecting the growth rate of broiler chicken were studied.

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Table I. Weekly body weights (g) of broiler chicken fed with control, CTN, AF and CTN+AF diets (Mean± SE)

Groups	Hatch weight (n=24)	1st week (n=24)	RBW	2nd week (n=24)	RBW	3rd week (n=24)	RBW	4th week (n=12)	RBW	5th week (n=12)	RBW	6th week (n=12)	RBW
Control	44.12 ± 0.76	152.21 ± 4.08	100	378.75^{a} ± 8.79	100	643.13^{a} ± 13.25	100	1037.00^{a} ± 33.53	100	1430.83^{a} ± 43.98	100	1749.17^{a} ± 32.83	100
CTN (5 ppm)	44.08 ± 0.75	136.67 ± 2.84	90	330.21^{b} ± 8.26	87	503.13^{b} ± 18.28	78	872.50^{b} ± 33.80	84	1190.83^{b} ± 49.95	83	1457.17^{b} ± 57.08	83
AF (0.5 ppm)	44.17 ± 0.71	139.50 ± 2.87	92	297.71^{c} ± 8.48	79	495.21^{b} ± 14.87	77	767.92^{bc} ± 30.42	74	1115.00^{bc} ± 64.95	78	1295.00^{c} ±75.11	74
CTN+ AF	44.17± 0.72	131.33 ± 2.72	87	267.50^{d} ± 7.45	71	443.54^{c} ± 13.20	69	695.00^{c} ± 39.13	67	1043.33^{c} ± 39.42	73	1248.33^{c} ± 44.77	71

Means with different superscripts within a column differ significantly (P<0.05); RBW-Relative body weigh; g- gram(s).

Table II. Weekly feed consumption in broiler chicken fed with control, CTN, AF and CTN+AF diets (Mean)

Groups	Feed consumption (g)						
	1st week (n= 24)	2nd week (n= 24)	3rd week (n= 24)	4th week (n= 12)	5th week (n= 12)	6th week (n= 12)	Overall feed consumption
Control	201.07	427.19	739.17	954.17	1033.32	1055.28	4,410.14^{a}
CTN (5 ppm)	158.18	350.80	690.21	920.84	973.34	895.72	3,929.08^{b}
AF (0.5 ppm)	155.72	332.85	678.00	883.00	929.84	823.93	3,803.62^{c}
CTN+ AF	131.79	318.93	630.00	875.00	921.67	844.04	3,727.42^{c}

Overall means with different superscripts differ significantly (P<0.05)

Materials and Methods

Citrinin was produced on the maize (Nelson *et al.*, 1980) and rice (Carlton *et al.*, 1974) using *Penicllium citrinum* NRRL 5907 and the AF was produced on the rice using *Aspergillus parasiticus* NRRL 2999 (Shotwell *et al.*, 1966). The toxin estimated powdered materials were mixed in diets for the two experimental trials conducted using 96 broiler chicks. In each trial, 48 newly hatched broiler chicks were randomly allotted to 4 groups of 12 birds each and fed control, CTN (5 ppm), AF (0.5 ppm) and CTN (5 ppm) + AF (0.5 ppm) diets from 0 to 6 weeks of age. Six birds from the each group were sacrificed at 3rd and 6th week of age. Body weights (g), feed consumption (g) and feed conversion were recorded at weekly intervals.

Results and Discussion

The weekly body weights, feed consumptions and feed conversions of broiler chicken fed control, CTN, AF and CTN+AF diets are shown in Table I-III (Mean ± SE) respectively. There was a significant (P<0.05) decrease in the body weight gain and over all feed consumption in all mycotoxin fed birds. The AF and CTN+AF groups consumed significantly (P<0.05) lesser feed than the CTN group. Though there was a decreased feed conversion ratio found in all mycotoxin treated groups when compared to the control, the overall mean difference was not significant.

The AF and CTN+AF gained significantly (P<0.05) lower weight than the CTN group. The respective relative body weights of the control CTN, AF and CTN+AF groups were 100, 83, 74 and 71 per cent at the end of sixth week. The numerical values revealed that the initial decrease in the CTN group was comparable to the AF group and at the later stages the birds

Table III. Weekly feed conversion in broiler chicken fed with control, CTN, AF and CTN+AF diets (Mean ±SE)

Groups	Feed conversion						
	1st week (n= 24)	2nd week (n= 24)	3rd week (n= 24)	4th week (n= 12)	5th week (n= 12)	6th week (n= 12)	Overall mean
Control	1.33 ± 0.03	1.68 ± 0.05	2.15 ± 0.05	2.25 ± 0.06	2.36 ± 0.08	2.58 ± 0.13	2.06 ± 0.19
CTN (5 ppm)	1.17 ± 0.02	1.57 ± 0.05	2.47 ± 0.10	2.49 ± 0.15	2.68 ± 0.18	2.75 ± 0.19	2.19 ± 0.27
AF (0.5 ppm)	1.13 ± 0.02	1.67 ± 0.05	2.24 ± 0.07	2.61 ± 0.12	2.77 ± 0.27	3.01 ± 0.23	2.24 ± 0.29
CTN+ AF	1.02 ± 0.04	1.72 ± 0.09	2.50 ± 0.09	2.97 ± 0.21	2.85 ± 0.18	3.12 ± 0.18	2.36 ± 0.34

tried to compensate by an increase in the body weight and therefore at the end of sixth week their weights were significantly higher than the AF group. However, the body weight gain remained significantly i.e., 17% lower in the CTN fed birds than the control.

Whereas in the AF group, the body weight was significantly higher when compared to the CTN+AF group in the initial three weeks but later they reached almost the same weights of CTN+AF. This indicated that on prolonged exposure or continued feeding, AF's role in reducing the body weight gain is more than the CTN. Significant reduction in the body weight gain in the CTN+AF group was observed in the second week and reached a comparable level of AF on the fourth to sixth week. This showed that apart from the lower feed consumption, CTN must have been a co-contributive factor for the initial poor body weight gain and later on the prolonged exposure of AF played a more significant role than CTN in reducing the body weight gain. The reduced weight gain observed in all the mycotoxin fed groups could be attributed to the inappetence and there by reduced feed consumption observed in this study.

Significant reduction in the growth rate and feed consumption but no significant effect in feed conversion in the CTN group have been reported by Uma and Reddy (1995) in broiler chicken fed CTN 125 and 250 ppm from 3 to 6 weeks of age, 150 and 300 ppm from 3 to 30 days (Ahamad, 1999) and 150 ppm for 28 days (Swaminathan, 2002). In this study, such reduction in the body weight was observed at a low dose level i.e., 25 times less than the dose employed by Uma and Reddy (*loc.cit.*) for CTN group. Significant reduction in the body weight gain and feed consumption concurred with the earlier reports in the broiler chicken fed 0.1 to 1.0 ppm AF for 3 to 8 weeks (Kumar and Balachandran, 2005; Tedisco *et al.*, 2004) and in layers (Gounalan, 2005). The significant reduction in the body weight and feed consumption with insignificant feed conversion of CTN+AF group agreed with the findings of Ahamad (*loc. cit.*), who recorded such reduction in the feed consumption when 150 ppm CTN and 0.5 ppm AF were fed to broiler chicks from 3 to 30 days of age.

Summary

Feeding citrinin (5 ppm) and aflatoxin (0.5ppm) to broiler chicken for 0-6 weeks of age significantly ($P<0.05$) decreased the body weight gain and overall feed consumption of broiler chicken. In the AF and CTN+AF fed groups it was significantly lower than the CTN group.

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Effect of Rearing System on the Hatching Performance of Guinea Fowl (*Numida meleagris*) in Humid Tropical Climate*

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Abstract

A study was conducted to find out the effect of rearing system on the hatching performance of guinea fowl. A total of 180 Guinea fowl birds were randomly divided into two treatment groups with three replicates of 30 birds (24 hen + 6 cock) each under deep litter and wire floor cage system were utilized for this study. Eggs were set at every four weeks interval from 28 weeks to 95 weeks of age. The birds raised on wire floor cage showed highly significant ($p<0.01$) improvement in fertile hatchability with significantly ($p<0.01$) lower embryonic mortality, though fertility was less compared to deep litter. Total hatchability did not vary between systems. Hence guinea fowl breeders can be reared under both deep litter and wire floor cage systems for commercial keet production.

Key words: Guinea fowl, hatching performance, strain.

In India Guinea fowls (*Numida meleagris*) are being reared in many states mainly for meat and egg production. Guinea fowls in the wild are essentially territorial, monogamous and seasonal in their reproductive habits. Fertility and hatchability of all eggs laid are serious problems in guinea fowl production (Ayorinde and Okaeme, 1984). The intensive system of Guinea fowl production is mainly practised in developed countries where specialized breeds of Guinea fowl have been developed and the production is commercialized (Embury, 2001). Research into its reproductive performance under different rearing systems will provide opportunities for increase in commercial production of the bird in India. Hence, a study was designed to find out the effect of rearing system on the hatching performance of guinea fowl.

Materials and Methods

The study was undertaken in Poultry Research Station, Chennai, Tamil Nadu to study the effect of rearing system on the hatching performance of guinea fowl (*Numida meleagris*). A total of 180 Guinea fowl birds of Pearl and White strains were randomly divided into two treatment groups (T1 and T2) with three replicates of 30 birds (24 hen + 6 cock) each under deep

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