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Effect of *Yucca schidigera* Extract (Norponin-S) on Health of Broiler Chickens

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Abstract

Broiler chicks receiving 2 and 4g Norponin-S (*Yucca schidigera* extract) /10 kg feed did not show any untoward clinical signs and gross or histological lesions in various organs. The weekly weight gain was significantly greater in Norponin-S treated broilers than the control ($P < 0.001$). Norponin-S had no significant influence on haemogram values of broilers. There was a general trend of lesser organ index for liver, proventriculus, gizzard, intestine, heart, testes and ovary but greater for pancreas and thyroid than the control. The study indicates that Norponin-S is a safe product for broilers and yielded better weight gain.

Introduction

Norponin-S (trade name of a commercial product of Nor-Feed Aps, Kanalholmen, Denmark) is a concentrated processed extract of *Yucca schidigera* plant. The active ingredients of *Yucca* extract are saponins. Norponin-S has been introduced in Pakistan for continuous use as a feed additive in poultry. The ammonia reducing capability of Norponin in poultry and pigs has been reported earlier (Johnston *et al.*, 1981; Mader Brumm, 1987) but little information is available on effect of Norponin-S on health of broilers. This study, therefore, investigates the effect of Norponin-S on weight gain, blood picture and organ weights of broilers.

Materials and Methods

Seventy-five, day-old, broiler chicks were procured from a commercial hatchery (Saandal Chicks, Faisalabad) and randomly divided in three equal groups each having 25 chicks. All the chicks were given a commercial feed (Ani Feed Ltd., Gujranwala) and water *ad libitum*. At second day of age, chicks in two groups were given Norponin-S (Nor-Feed Aps, Kanalholmen, Denmark), at the rate of 2.00 and 4.00 g/kg feed, while third group served as control.

Live body weight of chicks in each group was recorded weekly and weight gain was calculated. Blood was collected at 43 days post-treatment from wing vein using EDTA as an anticoagulant at the rate of 1 mg/mL blood following Benjamin (1978). It was processed for determination of erythrocytes, haemoglobin and packed cell volume following standard procedures (Natt & Herrick, 1952; Benjamin 1978). Ten birds were slaughtered from each group at 43 days of age for ascertaining any effect of the Norponin-S on internal organs of the body. Since organ weight is directly related to body weight, per cent weight of these organs to the body weight (i.e., organ index) was calculated to create uniformity and avoid influence of variation in body weight.

Organ index = (Organ weight/Live body weight) x 100

Clinical signs were recorded during the experiment. Gross lesions were recorded at post-mortem at 43 days post-

treatment. Samples of various organs were taken from each bird at necropsy for histopathology and fixed in 10 per cent buffered formalin. These were processed for paraffin sectioning and staining with Haematoxylin and Eosin stains following procedures described by Anjum (1980).

Results

Clinical appearance and postmortem examination: Broiler chicks receiving 2 or 4g of Norponin-S per kg in feed did not show significant difference from the control in clinical appearance and mortality. Mortality in broilers receiving Norponin-S, 2 and 4 g/10 kg feed, respectively, was 3/25 and 2/25 compared with 3/25 in the control. The difference in mortality between treatments was statistically non-significant (Chi-square value 0.28, df 2).

Live body weight and weekly weight gain: Live body weight of Norponin-S treated birds was relatively greater than the control broilers as shown in Table 1, however, the difference was statistically non-significant. Average weekly weight gain in experimental broilers was significantly greater in Norponin-S treated broilers than the control broilers (Table 2, $P < 0.001$). Total weight gain during six weeks was 1200.3 g and 1205.7 g, respectively, in broilers given 2 and 4g Norponin-S/10 kg feed compared with 1143.7 g in the control broilers.

Table 1: Effect of Norponin-S on weekly live body weight (g) of broilers.

Duration (weeks)	Control	Norponin-S dose (g/10 kg feed)	
		2	4
1	67.3 ± 02.5	69.6 ± 02.34	68.1 ± 02.8
2	155.4 ± 06.04	166.9 ± 06.17	162.3 ± 05.0
3	325.6 ± 11.9	341.9 ± 10.80	340.9 ± 09.5
4	619.4 ± 50.8	650.7 ± 28.30	647.2 ± 27.3
5	876.1 ± 40.2	916.8 ± 37.70	921.4 ± 36.0
6	1178.4 ± 60.2	1235.0 ± 47.60	1240.4 ± 45.5

Each figure represents mean ± standard error of the mean of 10 birds. Day-old (starting) weight was 34.7 ± 1.8 g per chick. Analysis of variance showed non-significant differences between treatments.

Table 2: Effect of Norponin-S on weekly weight gain (g) of broilers.

Duration (Weeks)	Norponin-S dose (g/10 kg feed)		
	Control	2	4
2	87.70	90.50	89.01
3	170.62	182.41	181.58
4	293.78	353.76	379.16
5	256.70	254.40	242.70
6	302.30	349.80	364.30
Total	-	5.35	5.69
P value	-	0.007	0.006

Data subjected to paired t-test revealed significant difference in weight gain between the treatments ($P < 0.01$).

Table 3: Effect of Norponin-S on haemogram of broilers.

Parameters	Norponin-S dose (g/10Kg feed)		
	Control	2	4
Erythrocyte count ($10^9/\mu\text{L}$)	2.71 ± 0.04	3.00 ± 0.06	2.90 ± 0.06
Hb (g/dL)	8.51 ± 0.32	9.17 ± 0.29	8.94 ± 0.22
PCV (%)	29.5 ± 0.58	33.2 ± 0.64	31.40 ± 0.61
MCHC (%)	28.8	27.62	28.47
MCV (Cuu)	108.6	110.63	108.13

Each figure represents mean \pm standard error of the mean of 10 birds at 43 days of treatment. Data subjected to analysis of variance revealed non-significant difference between treatments.

Table 4: Effect of Norponin-S on visceral organ indices of broilers.

Organ	Norponin-S dose(g/10 kg feed)		
	Control	2	4
Liver	2.75 ± 0.113	2.62 ± 0.172	2.31 ± 0.077
Proventriculus	0.64 ± 0.055	0.57 ± 0.012	0.58 ± 0.023
Gizzard	1.87 ± 0.044	1.72 ± 0.159	1.78 ± 0.082
Intestine	3.95 ± 0.167	3.07 ± 0.015	3.74 ± 0.102
Heart	0.61 ± 0.055	0.55 ± 0.043	0.55 ± 0.016
Pancreas	0.24 ± 0.016	0.25 ± 0.019	0.26 ± 0.013
Thyroid	0.01 ± 0.002	0.01 ± 0.000	0.02 ± 0.001
Testes	0.02 ± 0.003	0.01 ± 0.002	0.02 ± 0.004
Ovary	0.04 ± 0.004	0.03 ± 0.036	0.03 ± 0.002

Each figure represents mean \pm standard error of the mean of 10 birds. Data subjected to analysis of variance revealed non-significant difference between treatments.

Haemogram: Haemogram values are given in Table 3. Erythrocyte count and PCV were relatively greater in Norponin-S treated than the control broilers but the difference was statistically non-significant. Haemoglobin, Mean corpuscular volume and mean corpuscular haemoglobin concentration did not differ significantly between treatments.

Organ weights: Table 4 shows organ weights in experimental broilers. There was a general trend of lesser organ index for liver, proventriculus, gizzard, intestine, heart, testes and ovary but greater for pancreas and thyroid than the control. However, these differences were statistically non-significant.

Gross lesions and histological changes: No gross lesions were observed in broilers receiving 2 or 4g of Norponin-S per kg feed. Histologically, there was no difference in liver, kidneys, heart and spleen between the Norponin-S treated and the control broilers.

Discussion

The product "Norponin-S" is used mainly as an ammonia inhibitor (Glimp & Tillman, 1965; Rowland *et al.*, 1976; Grobner *et al.*, 1985; Mader & Brumm, 1987; Headon & Daeson, 1990; Headon *et al.*, 1991). A relatively better growth in Norponin-S treated broiler chickens (Table 1) indicates the growth promoting activity of Norponin-S. The growth-promoting effect of Norponin-S on live body weight is augmented by significantly greater weekly weight gain in Norponin-S treated broilers than the control broilers (Table 2). This study confirms growth promoting activity of *Yucca schidigera* extract as reported by other workers previously (Goodall & Matsushima, 1978; Goodall *et al.*, 1979; Johnston *et al.*, 1981; Johnston *et al.*, 1982; Foster, 1983; Brumm *et al.*, 1985). Lack of any significant influence of Norponin-S on erythrocytes, haemoglobin concentration, packed cell volume, mean corpuscular haemoglobin concentration and mean corpuscular volume indicates that the treatment had no ill effect on blood formation.

Norponin-S seems to have some effect on organs of the digestive tract (Table 4). A general trend of lesser weight of liver, proventriculus, gizzard, intestine and heart was interesting. It must be remembered that liver and pancreas are the two major organs involved in digestion of food substances. Ideally, one would like least weight of offal and viscera in relation to the musculature. The significance of the changes in organ indices, however, needs further investigation.

In conclusion, Norponin-S had no ill effect of health of broilers. It rather had growth promoting activity with a tendency to reduce weight of visceral organs.

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