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COMPARATIVE EFFICACY OF *YUCCA SCHIDIGERA* EXTRACT AND FRUSEMIDE IN ASCITES OF BROILER CHICKS, UNDER FIELD CONDITIONS

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Abstract: Ascites is a condition with excess amount of ascitic fluid in the abdominal cavity. This study was conducted to evaluate the comparative efficacy of "*Yucca schidigera"* extract and "frusemide" in ascites of broiler chicks. Fifty broiler flocks affected from ascites were selected. From each broiler flock, one hundred and fifty birds were randomly selected and were divided into three groups A, B and C containing fifty birds in each group. The chicks of group "A" were given "*Yucca schidigera*" extract (1ml per 20L) and chicks of group "B" were given "frusemide" (1gm per liter), in drinking water for three days, while chicks of group "C" served as control. Feed intake, water intake, weight gain and reduction in amount of ascitic fluid were recorded before and after the treatment. "*Yucca schidigera*" treated birds gave better performance than "frusemide" treated as well as "control" group. From this study, it maybe concluded that the use of "*Yucca schidigera*" extract in ascites of broiler chicks is a better choice than frusemide.

Keywords: Ascites, broiler, frusemide, *Yucca schidigera*.

INTRODUCTION

Poultry industry is playing an important role in meeting animal protein requirements. Different diseases as well as managemental problems are major constrains in its development. Ascites is a condition that plays an important role in increasing poultry losses. In the World Broiler Ascites Survey [Maxwell and Robertson 1971], information on 18 countries from four continents showed that ascites affects 4.7% of live broilers worldwide. In Pakistan, ascites has been recorded in number of poultry farms with mortality reaching to 22.5% [Ahmad *et al*. 1986]. This increase coincides with ongoing genetic and nutritional improvements in the areas of growth rate and feed efficiency [Julian *et al*. 1986].

Ascites is a condition in which excess amount of ascitic fluid (a combination of lymph and blood plasma which has leaked from the liver) accumulates in the body cavity. Ascites in poultry is a type of congestive heart failure, which is also known as pulmonary hypertension syndrome. Ascites syndrome is associated with abnormally high blood pressure between heart and lungs (pulmonary hypertension) leading to right heart failure, increased blood pressure in the veins and excessive buildup of fluid in liver (passive liver congestion), which leaks into the body cavity,

leading to the common name of disease, “water belly”. Selection for rapid growth and efficient feed conversion in broilers has resulted in such a high rate of metabolism that its heart and lungs are barely capable of providing enough oxygen to sustain the body [Julian 1990]. Ascites is a metabolic disorder and several factors are known to influence the occurrence of ascites in broilers [Julian 1990, Schelle 1993]. At present different methods; like feed restriction [Albers *et al*. 1990, Classen *et al*. 1991, Shlosberg *et al*. 1991, Arce *et al*., 1992, Schelle 1993], use of antitoxin and diuretics [D'Amico *et al*. 1986, Gines *et al*. 1987, Stanley *et al*. 1989, Runyon 1994, Caldwell and Battle 1999] are used to control ascites.

In Pakistan, poultry industry is still in its developing stage; therefore, more research would have to be conducted in order to fully determine the real utility of different drugs. The present study was therefore undertaken to study the comparative efficacy of “*Yucca schidigera*” extract and “frusemide”, which are herbal and allopathic medicines respectively, as a treatment of ascites in broiler chicks under field conditions. Effects of these drugs on feed intake, water intake and weight gain of experimental birds were also studied.

MATERIALS AND METHODS

ISOLATION OF EXPERIMENTAL BIRDS

In order to perform the present study, eighty five flocks affected from ascites were visited and out of them fifty flocks were selected. From each affected flock, one hundred and eighty ascitic birds were isolated on the basis of clinical signs e.g. cyanosis of comb and wattles, gurgling sounds, distended abdomen (Fig. 1) reduce exercise tolerance [Julian 1993)]. Ascitic birds were randomly divided into three groups A, B and C, containing sixty birds in each group. To confirm the diagnosis by postmortem lesions (panting of breast muscle, swollen and congested liver, enlarged and flabby heart, dilated right ventricle, abundance of ascitic fluid (Fig. 2), pale and grayish lungs [Leeson *et al*. 1995], ten birds from each group were slaughtered, leaving fifty birds in each group.

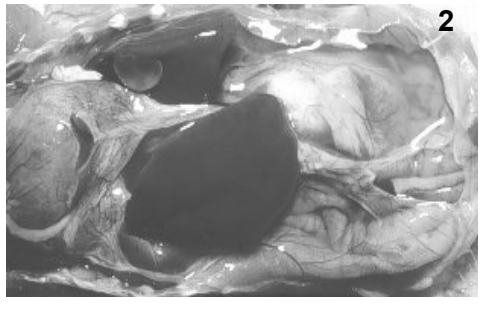

Fig. 1: An ascitic broiler carcass with excessive accumulation of fluid in the body cavity.
Fig. 2: Open abdominal cavity of an ascitic broiler chicken. Note the enlarged heart and the abundance of ascetic fluid.

PARACENTESIS

This diagnostic test was performed on ten slaughtered birds from each group, to evaluate the amount of ascitic fluid in the body of ascitic birds. Test was carried out by insertion of a needle, attached to a syringe, through the abdominal cavity of affected bird and filling up of syringe by negative pressure created by pulling the handle of syringe in backward direction.

HOUSING

The chicks of each group were kept under deep litter system using fresh dry sawdust litter material in individual pens. The size of pens was such that it provided 1.2 square feet floor space per chick. The affected birds were reared at room temperature (25°C). Twenty-four hours light was provided to all the experimental birds. The birds were fed *ad libitum.*

DRUGS

1) Norponin-200 that contained "*Yucca schidigera"* (200 mg), was provided to the ascitic birds of group "A" at dose rate of 1ml/ 20 liters of drinking water for three days (as recommended by manufacturer).
2) Frusicon that contained "frusemide" (200mg), was provided to the ascitic birds of group "B" at a dose rate of 1gm/liter of drinking water for three days (as recommended by manufacturer). The ascitic birds of group "C" were not treated and served as control.

OBSERVATIONS

The following observations were recorded during the conduction of experiment:

(1) Feed Intake
(2) Water Intake
(3) Weight gain
(4) Reduction of ascitic fluid

STATISTICAL ANALYSIS

The experiment was conducted according to "complete randomized design". The recorded data of feed intake, water intake, weight gain and reduction of ascitic fluid was subjected to analysis of variance and "least significant difference" was also applied to the recorded data [Sokal and Rohlf 1995].

RESULTS

DAILY FEED INTAKE OF EXPERIMENTAL BIRDS

In group "A" daily feed intake was 113.9gm ± 12.8gm per day and it ranged from 95gm-135gm per day. In group "B" it was 104.6gm ± 11.92gm per day and it ranged from 90gm-125gm per day. In group "C" it was 95.25gm ± l2.08gm per day and it ranged from 80gm-l20gm per day. Statistically, the amount of daily feed intake in the group "B" was significantly better ($P<0.05$) than group "C". The difference in amount of

feed intake of group “A” and group “C” was highly significant (P<0.01). Similarly, the difference between amount of daily feed intake in the treatment group “A” and “B” was also significant (P<0.05) as shown in Fig. 3.

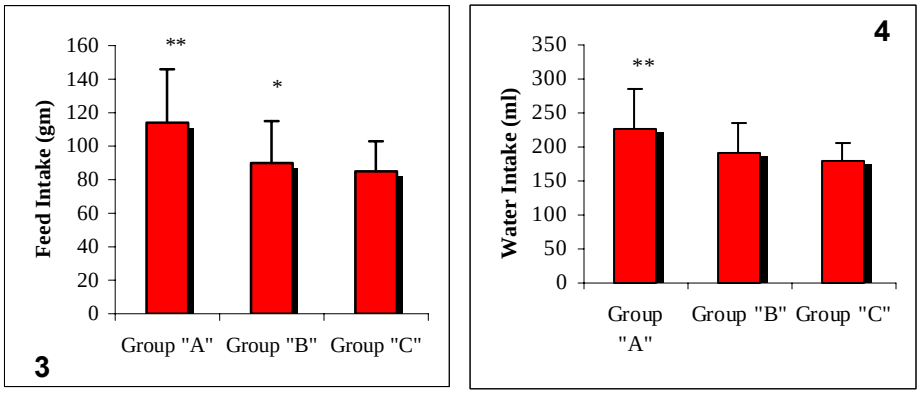

Fig. 3: Daily feed intake (gm) per bird in experimental flocks.
Fig. 4: Daily water intake (ml) per bird in experimental flocks.

DAILY WATER INTAKE OF EXPERIMENTAL BIRDS

In group “A” daily water intake was 227.8ml ± 25.7ml per day and it ranged from 190ml-270ml per day. In group “B” it was 209.25ml ± 23.85ml per day and it ranged from 180ml-250ml per day. In group “C” it was 190.5ml ± 24.16ml per day and it ranged from 160ml-240ml per day. Statistically, the amount of water intake in the group “A” was significantly better (P<0.05) than group “C”. Similarly, the difference in amount of water intake of group “A” and group “C” was highly significant (P<0.01). The difference in amount of water intake between the treatment group “B” and “C” was non significant (P>0.05) as shown in Fig. 4.

WEIGHTS OF EXPERIMENTAL BIRDS

At the end of experiment, average weight of the birds in group “A” was 1035gm ± 171.5gm and it ranged from 800gm-1270gm. In group “B” it was 780gm ± 164.6gm and it ranged from 600gm-960gm. In group “C” it was 775gm ± 155.62gm and it ranged from 600gm-950gm. Statistically, the difference in the weights of group “A” and group “B” was significant (P<0.05). Similarly, the difference in amount of weight gain between group “A” and group “C” was highly significant (P<0.01). The differences in weight gain between treatment groups “B” and “C” was non significant (P>0.05) as shown in Fig. 5.

REDUCTION OF ASCITIC FLUID OF EXPERIMENTAL BIRDS

At the end of experiment, all experimental birds were slaughtered to measure the amount of ascitic fluid by paracentesis. The reduction in amount of ascitic fluid in group “A” was 9.65ml ± 1.13ml and it ranged

from 8.5ml-10.8ml. In group “B” it was 10.45ml ± 0.92ml and it ranged from 9ml-11.8ml. In group “C” it was 1.09ml ± 0.12ml and it ranged from 1ml-l.4ml. Statistically, the difference in reduction of ascitic fluid between group “A” and group “B” was non significant (P>0.05). The difference in amount of reduction of ascitic fluid of group “A” and group “C” was significant (P<0.05). Similarly, the difference in amount of reduction of ascitic fluid in group “B” and ”C” was highly significant (P<0.05) as shown in Fig. 6.

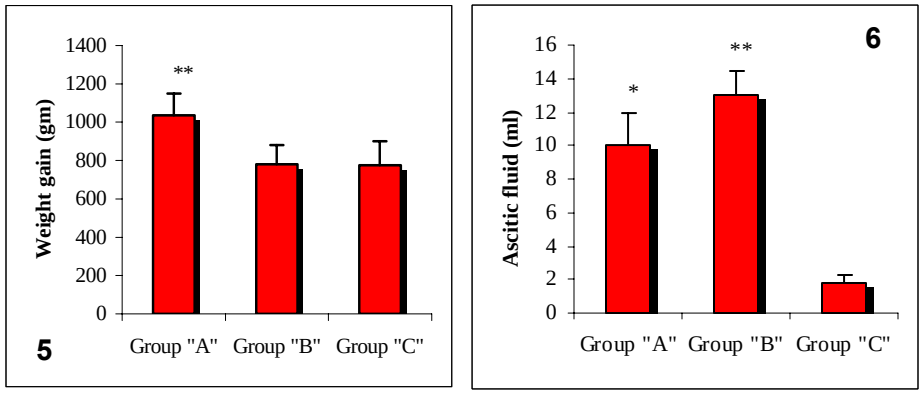

Fig. 5: Weight gain (gm) per bird in experimental flocks.
Fig. 6: Reduction of ascitic fluid (ml) in experimental birds.

DISCUSSION

Ascitic syndrome is characterized mainly by hypoxemia, followed by a cascade of events: increased cardiac output; development of pulmonary hypertension; right ventricle hypertrophy; right heart valve insufficiency; central venous congestion; fluid exudation, mainly to the peritoneal cavity and pericardium; and finally death [Maxwell *et al*. 1990, Julian 1993, Maxwell *et al*. 1995, Julian 1998, Olkowski and Classen 1998]. At present, different managemental as well as therapeuticall measures are used to control ascites of broiler chicks. *Yucca schidigera* is an endemic plant and occurs from coastal southern California and northern Mexico eastward into northwestern Arizona and southern Nevada [Wallace and Romney 1972, Keeley *et al*. 1985]. Yucca extracts are sold as herbal products within the nutraceutical industry for its purported benefits in ascites. Frusemide is a loop diuretic that works by encouraging the kidneys to filter out more sodium and potassium, drawing more water with them, relieving symptoms of fluid overload.

In this experiment we evaluated the comparative efficacy of “*Yucca schidigera*” extract and “frusemide”, in ascites of broiler chicks. The result indicated that the difference in amount of feed intake between “*Yucca schidigera*” treated group and “frusemide” treated group was significant (P< 0.05) which is in accordance to the previously reported study by Korol *et al.* [1995]. The difference in amount of water intake between “*Yucca*

schidigera" treated group and "frusemide" treated group was also significant (P< 0.05). Similarly, the difference in body weights between "*Yucca schidigera*" treated group and "frusemide" treated group was significant (P< 0.05) but the difference in reduction of ascitic fluid between "*Yucca schidigera*" treated group and "frusemide" treated group was non significant (P>0.05).

In "*Yucca schidigera*" treated birds, feed intake, water intake and weight gain was significantly better than that of "frusemide" treated birds. The difference in amount of reduction of ascitic fluid between "*Yucca schidigera*" treated birds and "frusemide" treated birds was non significant. This study indicates that "*Yucca schidigera*" extract is helpful in increasing feed intake, water intake, weight gain as well as reduction of ascitic fluid. From this, it might be concluded that use of "*Yucca schidigera*" extract in ascites of broiler chicks is a better choice than frusemide.

References

Ahmad, M.D., Irfan, M., Ashfaq, M. and Azam M. (**1986**) "The incidence of various diseases and cases of mortality in broiler flocks around Faisalabad", *Pak. Vet. J.,* 6(1), 4-7.

Albers, G., Barranor, A., Zurita, B. and Ortiz, C. (**1990**) "Corrected feed restriction prevents ascites", *Poult*., 6(2), 22-23.

Arce, J., Berger, M. and Coello, C.L. (**1992**) "Control of ascites by feed restriction techniques", *J. Appl. Poult. Res*., 1, 1-5.

Caldwell, S.H. and Battle, E.H. (**1999**) "Ascites and spontaneous bacterial peritonitis", In: E.R. Schiff, M.F. Sorrell, W.C. Maddrey (Eds.), *Schiff's Diseases of the Liver,* Philadelphia, Lippincott-Raven, pp. 503-544.

Classen, H.L., Riddell, C. and Robinson, F.E. (**1991**) "Effects of increasing photoperiod length on performance and health of broilers", *Br. Poultry Sci*., 32, 21-29.

D' Amico, G., Morabito, A. and Pagliaro, L. (**1986**) "Survival and prognostic indicators in compensated and decompensated cirrhosis", *Dig. Dis. Sci*., 31(5), 468-475.

Gines, P., Arroyo, V. and Quintero, E. (**1987**) "Comparison of paracentesis and diuretics in the treatment of cirrhosis with tense ascites. Results of a randomized study", *Gastroenterology,* 93, 234-241.

Julian, R.J. (**1990**) "Pulmonary hypertension: a cause of right heart failure, ascites in meat-type chickens", *Feedstuffs*, 22, 419-454.

Julian, R.J. (**1993**) "Ascites in poultry", *Avian. Pathol.,* 22, 419–454.

Julian, R.J. (**1998**) "Rapid growth problems: ascites and skeletal deformities in broilers", *Poult. Sci.*, 77, 1773–1780.

Julian, R.J., Summers, J. and Wilson, J.B. (**1986**) "Right ventricular failure and ascites in broiler chickens caused by phosphorous-deficient diets", *Avian Disi.*, 30, 453-459.

Keeley, J., Meyers, E. and Adriene, E. (**1985**) “Effect of heat on seed germination of southwestern Yucca species”, *Southwes. Naturalist*, 30(2), 303-304.

Korol, W., Adamczyk, M., Bogusz, G., Jaskiewicz, T., Niedzwiadek, T., Polonis, A. (**1995**) “Influence of factors limiting occurrence of sudden death syndrome and ascites on performance of broiler chickens”, *Biuletyn-Naukowy-Przemyslu-Paszowego,* 34(1), 21-32.

Leeson, S., Diaz, G. and Summers, J.D. (**1995**) “Poultry Metabolic Disorders and Mycotoxins”, University Books, Guelph, Ontario, Canada, pp. 29-50.

Maxwell, M.H. and Robertson, G.W. (**1997**) “World broiler ascites survey”.

Maxwell, M.H., Alexander, I.A., Robertson, G.W., Mitchell, M.A. and McCorquodale, C.C. (**1995**) “Identification of tissue hypoxia in the livers of ascitic and hypoxia-induced broilers using trypan blue”, *Br. Poult. Sci*., 36, 791–798.

Maxwell, M.H., Spence, S., Robertson, W.G. and Mitchel, M.A. (**1990**) “Hematological and morphological responses of broiler chickens to hypoxia”, *Avian Pathol*., 19, 23–40.

Olkowski, A.A. and Classen, H.L. (**1998**) “Progressive bradycardia, a possible factor in the pathogenesis of ascites in fast growing broiler chickens raised at low altitude”, *Br. Poult. Sci*., 39, 139–146.

Runyon, B.A. (**1994**) “Care of patients with ascites”, *N. Eng. J. Med*., 330, 337-342.

Schelle, C.W. (**1993**) “Effects of nutritional factors on the occurrence of ascites and heart failure syndrome”, In: *Proc. of the 9th Eur. Symp. on Poult. Nutri*., Sept. 5-9, Jelling Gore, Poland, 149-162.

Shlosberg, A., Berman, E., Bendheim, U. and Plavnik, I. (**1991**) “Controlled early feed restriction as a potential means of reducing the incidence of ascites in broilers”, *Avian Dis.,* 35, 681-684.

Sokal, R.R. and Rohlf, F.J (**1995**) “Biometry”, W.H. Freeman and Co., New York.

Stanley, M.M., Ochi, S., and Lee K.K. (**1989**) “Peritoneovenous shunting as compared with medical treatment in patients with alcoholic cirrhosis and massive ascites. Veterans Administration Cooperative Study on Treatment of Alcoholic Cirrhosis with Ascites”, *N. Engl. J. Med*., 321(24), 1632-1638.

Wallace, A. and Romney, E.M. (**1972**) “Radioecology and ecophysiology of desert plants at the Nevada Test Site”, In: Rep. U.S. Atomic Energy Commission, Office of Information Services, Washington, DC, p. 439.