

Effect of vitamin E and selenium composition, vitamin B complex and multi vitamin electrolyte on suddenly death syndrome in broiler chickens

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ABSTRACT

The aim of this study is the effect of vitamin E and selenium composition, B complex and multi vitamin electrolyte in sudden death syndromes of broilers. One hundred and twenty eight 1-d-old Ross 308 broiler chickens were randomly assigned in 4 treatments, each group including 8 chickens. The first group treated with no vitamin, the second group treated with vitamin B complex, the third group treated with the composition of vitamin E and selenium, and the fourth group treated with multi vitamin electrolyte. In the period from 0 to 42 day, the mortality due to SDS in all groups was recorded. The carcass related to SDS examined according to physical changes. After 30 minutes of death and in end of period, blood samples were taken and blood factors such as NA, K, and Mg were measured. In the first group the mortality were 4 and the level of the serum was significantly different comparing to the group with B complex, multi vitamin electrolyte and vitamin E and selenium composition ($p < 0.05$). Regarding the results of the study using the vitamin E and selenium, B complex and multi vitamin electrolyte are significantly effective in prevention and control of sudden death syndromes of broilers.

Key words: chicken, sudden death syndromes, vitamin E and selenium composition, B complex, multi vitamin electrolyte.

INTRODUCTION

The condition which became known as the sudden death syndrome (SDS) of broiler breeders emerged in the late seventies [9], but became a disease of major economic importance in Australia during 1980 [5]. The condition has also been recorded in commercial layers [4]. The SDS of broiler breeders has been reproduced [6]; however this was executed by feeding commercial diets identical to those fed to birds which experienced high mortality rates due to the SDS in the field. It was hypothesized that the etiology of the SDS was intimately related to changes in mineral metabolism which occur at the onset of sexual maturity and to dietary concentrations of elements including potassium and phosphorus. The diet used previously to reproduce the SDS included 6.5% meat and bone meal as part of its protein source [7]. The inclusion of meat and bone meal in experimental diets creates a major problem due to the heterogeneity of this ingredient and in particular the variability in the phosphorus concentration. The purpose of this trial was to develop an experimental ration composed of protein derived from plant sources which could be consistently reproduced and which was capable of inducing the development of the SDS in relatively small groups of broiler breeders at point of lay. Such a ration could be supplemented with elements such as potassium, Magnesium and Sodium in subsequent experiments, to determine the roles of these, singly or in combination, in the etiology of the SDS. The previous studies showed that dying from sudden death syndrome is due to heart failure. This failure is due to the lack of balance in electrolytes such as sodium and potassium. In respect, it is due to the alkaline and acid deficiency and because 93% of serum alkaline is related to sodium, so intensive reduction of sodium causes the sudden death syndrome [10]. And considering that magnesium deficiency causes irritability and

muscle cramps of the heart. So, the result of the level of serum magnesium is significant in the groups. Different studies showed that potassium plays a crucial role in normal operation of heart and increasing of its activities, so the level of serum sodium decreases in sudden death syndromes [8].

MATERIALS AND METHODS

The aim of this study is the effect of vitamin E and selenium composition, B complex and multi vitamin electrolyte in sudden death syndromes of broilers. One hundred and twenty eight 1-d-old Ross 308 broiler chickens were randomly assigned in 4 treatments, each group including 8 broilers. The first group treated by no vitamin, the second group treated by vitamin B complex with 1kg in 1000kg of diet, the third group treated by the vitamin E and selenium composition with 1kg in 2000kg of diet, and the fourth group treated by multi vitamin electrolyte with 2kg in 1000kg of diet. All groups were in similar breeding substrate and similar environment. The diet in three period considered as Starter (CP=22% ME=2950kcal/kg), grower (CP=20% ME=3050kcal/kg) and Finisher (CP=19% ME=35150kcal/kg). In the period from 0 to 42 day, the mortality was recorded due to SDS in all groups with symptoms including rapid and good growth, empty gall bladder and also the congested lungs. The carcass related to SDS examined according to physical changes including the color and shape of heart, kidney, and liver. After 30 minutes of death of broilers, blood samples were taken and blood factors such as NA, K, and Mg were measured. At the end of breeding period from each group 2 broilers selected randomly and mentioned blood factors and physical change of organs examined.

Sampling and analytical procedures:

From each group, 8 chickens were selected randomly in end of breeding period from live birds and 30 minutes after death from all of dead birds, blood samples were collected. Blood samples were collected from the brachial vein, immediately transferred to heparinised blood bottles, gently mixed, and centrifuged at 4,000 g for 10 min in the order of collection. The plasma was separated and frozen at -17°C. Blood samples were collected during the 0-42 days. Serum potassium, Magnesium and Sodium concentrations were measured on a flame photometer (Corning model 435, Corning, Halstead, England).

Statistical analysis:

Results were analyzed using SPSS-X (Statistical Package for Social Sciences) Release 2, utilizing analysis of variance with further analysis by Tukey's honest significant difference (HSD).

RESULTS

In this experiment (0-42 day) mortality of sudden death syndrome observed in control group but not in other groups. Serum magnesium concentrations significantly increased ($p < 0.05$) in the death cases of control group comparing to the other groups. Also the serum sodium and potassium concentrations significantly decreased ($p < 0.05$) in the death cases of control group comparing to the other groups. The necropsy of the heart, kidney and liver of dead broilers revealed that ventricles shrunk, the heart became smaller, and atriums expanded, and in some cases rupture of atriums and clot around heart were observed. Also kidneys were pale and inflated and bleeding observed. The liver also was pale and expanded; its consistency was more fragile. Serum magnesium, sodium and potassium concentrations were compared with together in end of production period in all of groups (table 1).

Table 1. Mean \pm SEM of potassium, Magnesium and Sodium Levels (mmol/l) and mortality due to the SDS

	Mortality	Control	Vit B complex	Vit E and selenium	Multi vitamin electrolyte
Potassium	3.37 \pm 0.35b	4.01 \pm 0.73ab	4.87 \pm 0.51a	4.50 \pm 0.80ab	4.50 \pm 1.11ab
Magnesium	5.15 \pm 0.20a	2.50 \pm 0.59b	2.12 \pm 0.28b	2.05 \pm 0.36b	2.28 \pm 0.60b
Sodium	91.25 \pm 5.37c	141.75 \pm 1.79b	156.75 \pm 6.22a	154.50 \pm 7.93a	153.12 \pm 3.30a

Groups sharing the same superscript do not differ significantly ($p < 0.05$)

DISCUSSION

The previous studies showed that dying from sudden death syndrome is due to heart failure. This failure is due to the lack of balance in electrolytes such as sodium and potassium. In respect, it is due to the alkaline and acid deficiency and because 93% of serum alkaline is related to sodium, so intensive reduction of sodium causes the sudden death syndrome [10]. As far as this study is focus on that, the lack of the balance of the electrolytes causes sudden death syndromes [10], it could be claimed that the level of serum sodium cannot be constant comparing to healthy birds and it seems that the level of serum sodium decreases in sudden death syndromes. The studies revealed that in dead broilers due to the sudden death syndromes ventricles shrunk and clot around heart were observed [3]. And

considering that magnesium deficiency causes irritability and muscle cramps of the heart. So, the result of the level of serum magnesium is significant in the groups. Different studies showed that potassium plays a crucial role in normal operation of heart and increasing of its activities, so the level of serum sodium decreases in sudden death syndromes [8], and the result of study are as same as this ongoing study. Other studies point out that the balance of sodium electrolytes, potassium and color in diet is related with sudden death syndromes. The balance less than 200 equivalent/kg results the increasing of sudden death syndromes and findings show that increasing the level of potassium results in decreasing the sudden death syndromes [1]. Other studies reported that adding 0.25% Potassium carbonate in the diet of broilers is effective in prevention of sudden death syndromes because results in increasing of the level of potassium [2].

CONCLUSION

The aim of the ongoing study is to control or prevention of sudden death syndromes by adding vitamin E and selenium composition, B complex and multi vitamin electrolyte in diet of broilers.

REFERENCES

- [1]Bowes, B.A.; R.K. Julian; S. Lesson and T. Stirtzinger, **1988**, 67, 1102
- [2]Cave, N.A, *Journal of Poultry Science*, **1981**, 60, 956
- [3]Hula. H.W., F.G. Proud foot and K.B.M. Macrae, **1980**, 59,927.
- [4]Hopkinson, W.I. PhD thesis, Murdoch University, Western Australia. (Murdoch, **1989**)
- [5]Hopkinson, W.I., Griffiths, G.L., Jessop, D. & Williams, W. *Australian Veterinary Journal*, **1983**, 60, 192
- [6]Hopkinson, W.I., Williams, W., Griffiths, G.L., Jessop, Peters, S.M., *Avian Diseases*, **1984**, 28, 352
- [7]Hopkinson, W.I., Jessop, D., Pass, D.A. & Pethick, D.W. *Avian Pathology*, **1990**, 19, 607.
- [8]Imaeda, N., *Journal of Poultry Science*, **1999**, 78, 66.
- [9]Jones, H.G.R., Randall, C.J. & Mills, C.P.J. *Avian Pathology*, **1978**, 7, 619.
- [10]Riddell, C. and J.P. Orr, *Journal of Poultry Science*, **1980**, 24,751.