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EFFECT OF CARBAMIDE ON SERUM BIOCHEMICAL ASPECTS OF CHICK

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ABSTRACT
Impact of carbamide/Urea on Body weight, Total protein, Amino acids and Protease activity was studied in Gallus domesticus (Vanaraja) by exposing to 4.9% of carbamide dissolved in water for 15 and 30 days. carbamide showed differential effect on all parameters analysed. carbamide caused significant decrease in total body weight and serum total protein content, but an increase in Amino acid levels and neutral protease activity. The study indicates carbamide has negative impact on protein metabolism of chicken.

INTRODUCTION

Usage of carbamide to improve the quality and nitrogen content of meat and egg production in poultry feed formulation is not a new practice (Das *et al.* ,1997). Not only in monogastric animals urea is also used as protein supplement in polygastric animals (Briggs, 1967), in fish (Rajyasree, 1989, 2007). Trakulchang and Belloun (1975), Chandra *et al.* (1984) reported that urea is utilized as feed additive and its toxic effects in chicken. Karasawa (1988a, 1988b), Karasawa and Maeda (1992) reported that chickens were able to derive nutritional benefit from this non protein nitrogen compound. However the role of urea as a source of non protein nitrogen in the diet of monogastric animals including the extent of its use and mode of action still remains to be elucidated. Not much literature is available on biochemical parameters of chicken exposed to carbamide/urea, keeping this in mind an attempt has been made to study the effect of urea on protein metabolism of *Gallus domesticus* (Vanaraja).

MATERIALS AND METHODS

Gallus domesticus (Vanaraja) of 6 weeks old weighing approximately 650g - 700g were obtained from a standard reputed poultry farm of Rajendranagar, Hyderabad. Three different groups of six chickens in each group were maintained as group I control and group II and III as experimental exposed to 4.9% (w/v) urea (dissolved in water) for 15 and 30 days. The birds were housed in deep litter system under laboratory condition in a controlled environment. The birds were kept $30^{o} \pm 2^{o}C$ temperature and 50% relative humidity with perfect conditions of aeration and ventilation. The lighting arrangements were effectively maintained. Blood was collected from the branchial vein at the end of the stipulated period from both experimental and control birds. Blood without anticoagulant (heparin) was allowed to clot at room temperature, the clot was removed and the straw colored liquid was centrifuged at 3000r.p.m for 15 minutes. Serum was used to estimate the biochemical parameters. Total serum protein was estimated by the method of Lowry *et al.* (1951). Serum protease was estimated by the method of Davis and Smith (1955) with slight modification. Free amino acids levels were estimated by the method of Moore and Stein (1954).

Statistical treatment of data**:** The readings were generally taken as mean of six observations. The standard deviations and students "t" test, and other calculations were done by following the methods of Pillai and Sinha (1968).

RESULTS AND DISCUSSION

In the present investigation the birds were exposed to 4.9% carbamide for different periods (15 and 30 days). Total body weight, serum total protein, amino acid and protease data are represented in (Table 1). In the present investigation there was marked decrease in total body weight and serum total protein in all the time periods of exposure. Whereas analysis of free amino acids and neutral protease showed increase over control. Inorganic fertilizers due to their potential toxicity produce biochemical changes in the tissues and organs of animals. During toxicant exposure, organisms undergo a shift in all the metabolic processes to counteract the toxic effects as a protective measure. Stress leads to changes in biochemical and physiological aspects of an organism. Under certain

Table 1: Changes in the body weight (g/bird) serum total protein (mg/dl) free amino acid and protease content (μ moles of tyrosine equivalents/ dl) in serum of broiler chicken Gallus domesticus on exposure to 4.9% of carbamide for 15 & 30 days.

	15 Days Control	Experimental	30 Days Control	Experimental
Body weight	448 ± 1.60	387 ± 7.10 (-14.956%)	654 ± 1.37	595 ± 2.80 (-9.01%)
Serum total	13.1 ± 0.450	10.7 ± 0.479 (-18.321%)	12.4 ± 0.365	8.37 ± 0.782 (-32.50%)
Amino acid	0.514 ± 0.97*	0.674 ± 0.085* (31.128%)	0.463 ± 0.033	0.557 ± 0.056 (20.302%)
Protease	0.412 ± 0.048*	0.528 ± 0.052 (28.155%)	0.561 ± 0.058*	0.673 ± 0.011 (19.964%)

All the values are Mean ± SD of six observation, figures in parenthesis are percent increase (+) decrease (-ve) over control. Values are significant at $p < 0.0001$. *$p > 0.0001$.

physiological and pathological conditions proteins and amino acids are degraded for the production of energy.

During 4.9% urea exposure, the birds exhibited inactiveness, excessive salivation, bloody stools, oral respiration, defeathering, and the signs were worst during prolonged period *i.e.,* 30 days and feed intake of exposed birds was apparently decreased when compared to control.

Decrease in body weight and protein suggests that birds do not posse the capability to utilize nitrogen components. Similar reports were given by Javed *et al*. (2002) where he found the broiler fed with urea exhibited lower values in the live mass significantly. Parvez *et al*. (1994) reported, on feeding 1% urea through commercial feed revealed an increase in live mass and carcass mass of broilers, he also found broilers revealed decreased feed consumption at higher dose of urea.

A marked fall in the serum protein level indicates rapid breakdown of protein to meet energy demands during toxic stress and mobilization of protein as suggested by Kabir Ahmed *et al*. (1978). The decrease in protein fraction and elevation of amino acid may be due to their degradation and possible hydrolysis. Kagan and Balloun (1976b) reported urea as a protein substitute does not enhance the value of conventional broiler diet. Das *et al*. (1997) reported serum protein levels was decreased significantly when fed 1% urea or more urea in diet. The increase in free amino acid levels suggests increased proteolytic or fixation of ammonia on keto acid activity under toxic stress. Increased free amino acid is for energy production and other synthetic process. Featherston *et al*. (1969), reported influence of various diets on the concentration of amino acids and growth rate in chicks. Addition of urea nitrogen in the diets resulted in increase in the concentration of total dispensable amino acids. He observed urea above 4g/per kg wt. in the diet resulted low consumption of food, decreased growth rate and amino acids levels. Increase in proteolytic activities is a regulatory step towards increased proteolysis. Neutral proteases or physiological protease are involved in breakdown of proteins ready for the formation of free amino acids.

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