THE EFFECT OF FEED BULKINESS AND FIBER LEVEL ON THE DIGESTIVE TRACT OF THE CHICK

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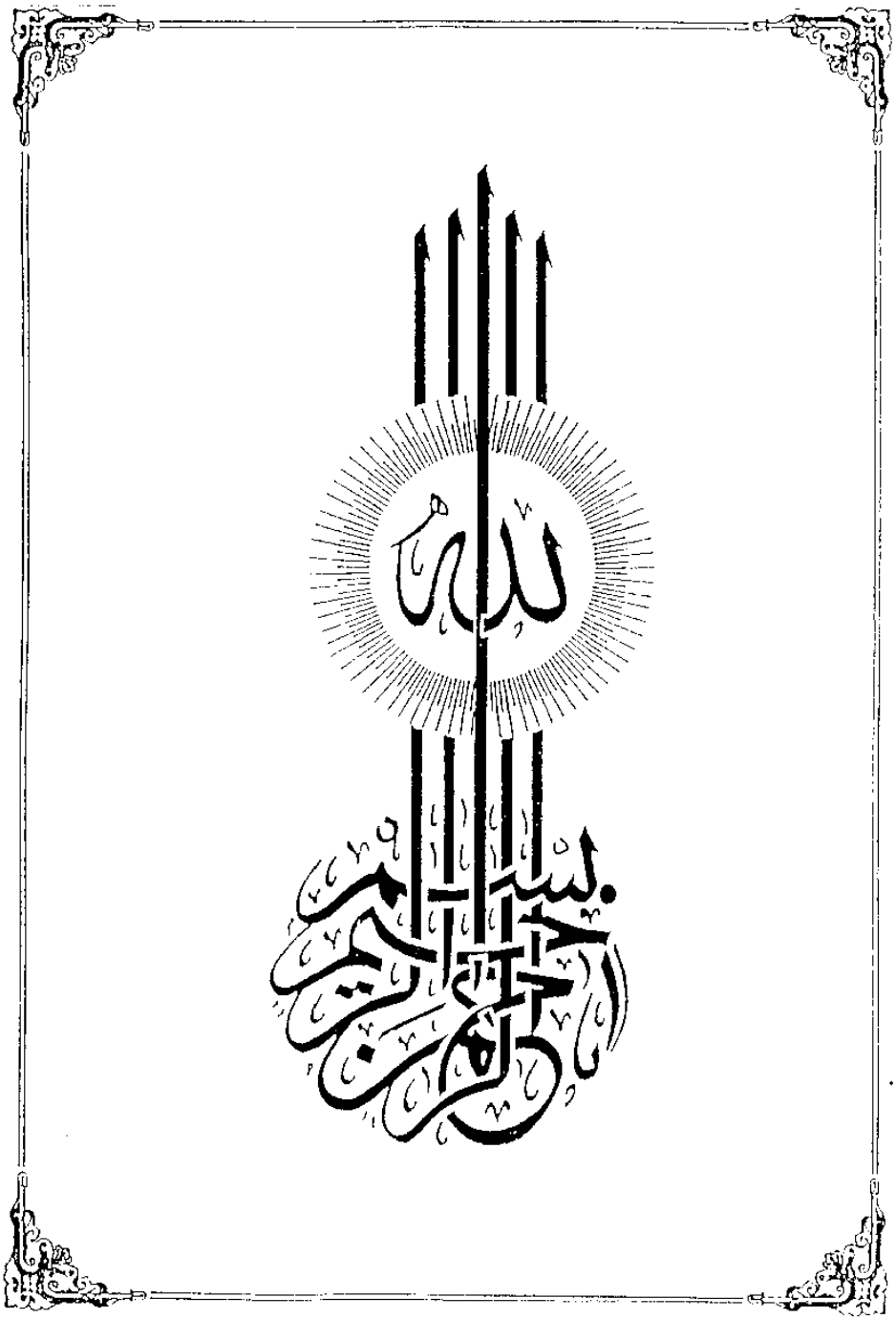

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C O N T E N T S

LIST OF TABLES

LIST OF FIGURES

APPENDIX TABLES

CHAPTER I

INTRODUCTION

In formulating chicken rations the poultrymen usually cared about the requirements of chicks for essential nutrients following the common standard allowances. They mainly try to cover the dietary requirements of protein, energy, vitamins and minerals. The volume of food (cc/gm) is not usually taken into consideration. Maintaining crude fiber content of the diet, which is considered as a diluent factor, at the proper level does not necessarily mean that the volume of the diet is proper.

Certain amount of bulk is considered important for the normal functioning of the digestive tract particularly in the elimination of feed residues since it has a laxative and stimulating effect on the peristaltic movement (Bolton 1961). Moreover, bulk in the food adds to the animal feeling of contentment and satisfies the bird's appetite, (Halnan and Garner, 1947). On the other hand, too much bulk lessens the consumption of digestible nutrients and causes retardation in growth of animals (Lenkeit, 1953). In other words, as have been pointed out by several investigators, nutrient densities decrease, and reduction in available

nutrients occurs at higher levels of bulk. Since the birds are unable to consume sufficient volumes of diluted feeds to compensate for their reduced nutrient concentration, growth, accordingly, decreases. Such results led Mraz et al. (1957) to suggest that feeds may be better evaluated by energy: volume ratio than energy: weight ratio.

Under the local conditions, formulating chicken rations differs from time to time according to the availability of feedstuffs. Generally, rice polich and wheat bran, which are considered bulky feedstuffs, are widely used in poultry nutrition, while concentrates such as corn and wheat are widely used in human foods. Moreover, these concentrates, from the economical point of view, are rather costly when used in poultry rations.

This work was conducted to study the effect of food volume on :

1- Chick performance.

2- Some morphological characteristics of the gastrointestinal tract.

CHAPTER II

REVIEW OF LITERATURE

Food Volume And Bulk :

The term "dietary volume" refers to the volume in millilitres of specific quantity of a diet (Gleaves et al. (1963). Generally speaking, feeds which have big volumes are considered bulky. Bulky feedstuffs are in general those which are high in crude fiber content, the air spaces between the particles also contribute to the bulk, (Maynard and Loosli, 1962).

1-Effect Of Food Volume On Food Consumption :

It has been suggested that the regulation of food intake is, in some way, related to energy needs (Kleiber, 1961). Robertson, et al. (1948) concluded that crude fiber increased the bulk of the ration and thus decreased the energy content per unit of volume and in this way regulated the amount of food consumed. Hill and Dansky (1951) found that when oat hulls were increased up to a level of 20 % , an increase in food consumption occured. The same authors (1954) used oat hulls up to a maximum of 50 %, increased food consumption was observed.

Couch and Isaacks (1957) was successfull in restricting the protein and energy intake in growing pullets by substituting 18.2 % of oat hulls for an equivalent amount of milo. While the fibrous bulk was restricting the total nutrient intake of these pullets, the attendant reduction of dietary energy level which accompanied the substitution of oat hulls for milo was causing an increase in feed consumption. Similar results were reported by Gleaves et al. (1968) who found that increase of dietary volume caused a linear decrease in intakes of protein and energy. Gleaves et al. (1963) suggested that dietary volume could be used to regulate nutrient intake.

A linear correlation between feed volume and feed consumption has been indicated (Gleaves et al., 1968). Peterson et al. (1954) reported that at high levels of bulk, the volume of feed consumed was high. Food intake increased to satisfy the energy needs at high levels of crude fiber. The effect of dietary bulk upon feed consumption was demonstrated by Fisher and Weiss (1956); their work indicated that more feed was required when bulk increased. They concluded that feed intake was controlled by the bulk and not solely by energy intake. Cellulose and Kaolin have been also used as bulky materials (Sibbald et al., 1960); birds

receiving diets diluted with cellulose and kaolin attempted to compensate for the reduced nutrients concentration by increased feed intake.

More recent results by Gleaves et al., (1971) are in line with those previously discussed and support the conclusion that dietary weight and volume exert a significant influence upon feed consumption.

2-Effect Of Food Volume On Chick Performance :

In general, as the volume of food increased body gain decreased. Robertson et al., (1948) reported that an increase in volume of a diet from 0.64 to 1.10 liters per pound of diet through the use of wheat by-products and oats lowered chick weight about 20 % at 4 weeks of age. Dansky and Hill (1951) reported that growth rate could be decreased by the addition of 20 % collophane, 20 % sugar cane pulp, or 40 % cellulose to a boiler ration. The reduction in growth rate was inversily related to the density of the ration. This effect was explained by the inability of the chicks to consume sufficient nutrients to promote growth. The same authors (1954) found that growth decreased when oat hulls were added up to a maximum of 50 %.

Peterson et al., (1954), used diets containing varying dietary levels of bulky materials (Wood-pulp and cellulose) to study their effects on growth of chicks. At the higher levels of bulk, the volume of feed consumed was high but the growth rate decreased. This decrease in growth rate was attributed to an energy deficiency caused by the dilution of the diet. Rand et al., (1956) fed chicks purified diets of varying protein content each supplemented with zero, ,10 and 19 % of added fiber. No differences in weight gains could be detected between the birds fed the control diet and plus 10 % of fiber. 19 % of added fiber reduced weight gains.

Mraz et al., (1956) found that the energy content of diets relatively constant in ration density exerted a greater influence on rate of growth than did fiber content. In further studies on the influence of the energy: volume ratio on the growth response of chickens, these same workers (1957) concluded that neither energy nor density alone proved to be satisfactory criterion for measuring the adequacy of a diet for supporting rapid growth. They found that single value representing the ratio between the energy content and the volume of the diet was a more satisfactory measurement for feed evaluation. Sibbald et al., (1960) found that replacement of 6 % of the basel diet by cellulose caused a small