دراسة تأثير فيتامين أ على معدل مرور الطعام فى الدواجن الفيومى بواسطة الأشعة السينية

ف٠ع٠سليمان ، م٠ ص٠ صالح ، ع٠ ع٠ سيف النصر ، ح٠ أ٠ حسن

الملخص العربى

أجرى فحص بالأشعة السينية الملونة بكبريتات الباريوم على ثلاثة مجاميع من الأفراخ الفيومى بعد فترة تربية مدتها ثمانية أسابيع كانت علائق الأفراخ خلالها كالآتى :

١ ـ المجموعة الأولى قدمت لها عليقة تحتوى على نسبة عالية من فيتامين أ٠

٢ ـ المجموعة الثانية كانت عليقتها متوازنة ٠

٣ ـ المجموعة الثالثة أعطيت عليقة فقيرة فى نسبة فيتامين أ٠

وقد دلت النتائج على أن زيادة فيتامين أ ٠ أو نقصه فى عليقة الأفراخ يؤخر فى معدل مرور الطعام فى القناة الهضمية مما يترتب عليه تأخر معدل نموها الطبيعى ٠ وقد نوقشت الأسباب التى ترتب عليها هذا التأخر فى معدل النمو ٠

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RADIOLOGICAL STUDIES ON THE EFFECT OF VITAMIN A ON THE RATE OF FOOD PASSAGE IN FAYOUMI CHICKEN

(With one table and 3 figures)

By

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SUMMARY

Three groups of one-day-old chicken were raised for a period of 8 weeks on a ration which differed only in the level of Vit. A content. At the end of this period the rate of passage of food along the alimentary tract of the birds were investigated radiologically using barium sulphate as a radioopaque substance. It was found that hyper-as well as hypovitaminosis A both lead to retardation of the rate of passage of food along the digestive tract with consequent retardation of the growth. The reasons for such retardation have been discussed.

INTRODUCTION

The rate of food passage along the alimentary tract has been used as an indicator of its physiological and pathological condition. Among the physiological factors which influence the rate of food passage in chicken are the consistency and quantity of ration, quantity of water as well as the birds condition wheather fasting or not (IHNEN, 1928 ; HENERY et al, 1933; VORNK et al., 1946; HALNAN, 1949) and EL - MOUGY, 1969).

Vitamin A was proved to be essential for normal growth of chicken as well as for the maintenance of their mucous membrane in a healthy condition (HART et al, 1925; ELVEHJEM and NEU, 1932; HEYWANG and TITUS, 1932; KLEINE et al., 1932; SCOTT and NORIS , 1959; HENK, 1966: and HASSAN, 1974). since the availlable literature does not contain any information about the effect of vitamin A on the rate of transmission of food along the digestive system of the fowl, it is worthwhile to investigate this physiologically interesting point.

MATERIAL AND METHODS

A total of thirty one- day - old Fayoumy chicken were divided into three equal groups. The bitrds were raised a pertiod of 8 weeks on the same ration which differed only in the level of vit. A by the different groups.

The first group (controls) recieved 20, 000 i. u. of vitamin A palmitate (pfeizer) per kilogram of the ration, which represented 100% of the nutritional requirement as recommended by the National Research Council (1966) *. The second group received a ration containing 40.000 i.u. of vit. A per kilogram of the ration, which represented 100% of the nutritional requirement of the birds. The third group received a ration to which no vitamin A palmitate was added and was considered as a vitamin A deficient ration (HASSAN, 1974). The components of the bassl ration used (ground maize, ground soya beans, ground beans and casein) were washed with petrolium ether twice after being soaked in it overnight. This was done to extract the fat content together with the fat soluble vitamins. The fat added to the ration was hydrogenated oil, which was exposed to a hot air current to destroy its carotenoid contents.

On the day of the radiological investigation plain radiographs of the alimentary tract of the birds were taken early in the morning before offering the ration Ten ml, of barium suspension were then given by a suitable gummy catheter directly into the crop. The chicken were kept after that in their cages and the corresponding ration and water were offered ad libitum. The contrast radiographic exposures of the alimentary tract were taken 1/4, 1, 2 and 3 hours respectively after giving the radioopaque substance. All radiographs were performed in the lateral recumbent position of the chicken and the potentials used were 55 KV an d20 mAs.

RESULTS

The radiographs obtained after 15 minutes from giving the contrast substance revealed that the crop was still filled in all birds of the three groups. However, the crops of both groups having vit. A deficiency and hypervitamnosis A were more distended with food when compared with those of the controls. Also the gizzard and small intestine of the foermentioned groups were poorly filled with contrast substance as compared with those of the controls. In all three groups no contrast could be detected in the large intestine .

After 1 *hour* : More evacuation of the contents of the crop took place in the controls than in the other two groups. Consequently the gizzard and small intestine of the controls gave a relatively stronger shaddow in the radiographs indicating good filling. The large intestine was still radiolucent in all birds of the three groups.

* Nutritional requirements of poultry. National academy of Science, 5 *th* ed., Washington, 1966.

After 2 *hours* : The crop of the controls showed advanced evacuation, whereas the crop in both other groups were relatively more distended. The gizzard of all the chicken of the three groups showed good filling. The small intestine and the large intestine of the controls were adequatly filled and showed a good tone, when compared with those of the other two groups.

After 3 *nours* : The radiographic findings of the three groups at this time interval are demonstrated in the following table and radiographic reprints

TABLE 1. **Radiological findings after 3 hours from adminstration of the contrast substance and ration.**

segment of alimentary tract	Controls (Fig. 1)	Hypervit.A (Fig. 2)	Hypovit.A (Fig. 3)
Crop	Decreased in size only traces of barium are present	Moderatly distended with food content	Still over filled and dilated (atony?)
Gizzard . . .	Moderatly filled		
Small intestine	Good filling	good filling	Slight filling
Large intestine	Very good filling cloaca is distended (defecation)	Moderate filling	Not yet filled

DISCUSSION

The total duration of time needed for the transport of food through the digestive tract which lies between the administration of the radioopaque substance and the beginning of its elimination through defecation were found to be less than three hours in the group of the controls. This finding is in agreement with the results obtained by DANSKY and HILI (1952) and FERRANDE et al. (1961) who found that the normal rate of food passage in the chicken is about two hours and half.

The rate of passage of food along the alimentary tract of birds raised on the diet deficient in Vit .A as well as those raised on a diet containing a higher dose of this vitamin was clearly retarded. The ration taken by these birds stayed a longer period in the crop when compared with the group of controls. This may be considered as a manifestation of an atony of the wall of the crop . Also the relatively long time stagnation of the ingesta in the rest of the alimentary tract may be attributed to histopathological changes

in the wall of the gut caused by both increase or decrease in the level of vit. A than the normal nutritional requirement. Such changes were observed by HASSAN (1974) , who noticed epithelial metaplasia and degeneration of the plain muscles of the intestine of chicken raised on vit. A-dificient ration. In birds raised on diet containing 200% of the vit. A requirement HASSAN (1974) observed that the surface epithelium became smooth and the villi became close to each other . Both conditions may lead to interference with the absorption from the intestine and hence retardation of the rate of passage of the intestinal contents.

It is therefore recommended to adjust the dose of vit. A. in the ration to meet the nutritional requirement when dealing with growing chicken either for breeding or for experimental purposes. Any deviation in both directions over or under the recommended requirement acts unfavourably on the rate of transmission of food along the digestive tract. Overdistention of the crop for a long time may lead to decreased food intake by the birds than normal which can be consequently considered as an additionnal factor causing retardation of the growth of the chicken. This concept supports the previous findings that vitamin A deficiency (FERRANDE and VULLIERME, 1958) as well as hypervitaminosis A (WOLBACH and HEGSTED, 1953 and BACKER *et. al.*, 1967) both are responsible for retardation of growth in chicken.

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Fig. 1. Radiograph of control Fayumi chicken, after three hours. Notice the evacuation of the crop coutent and that greatest amount of contrast material appeared in the large intestine and cloaca.

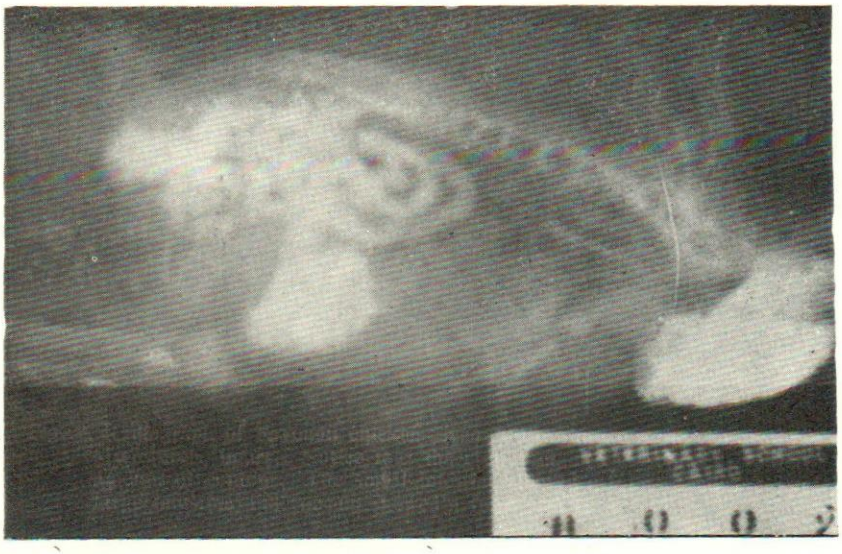

Fig. 2. Radiograph of Fayoumi chicken iven 200% vitamin A in the ration, after three hours. Notice that the crop contained a relatively great amount of contour. The small intestine showed a faint shadow. The large intestine and coecum showed a faint contrast.

Fig. 3. Radiograph of Fayomi chicken given the vitamin A deficient ration, after three hours. Notice that the barium meal remained in the crop and gizzard. The intestine contained a small amount of the contrast material.