

# Biochemical studies on some vitamins in Poultry feed additives

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The prime goal of this study is to investigate the effect of different dietary levels of vitamin A and E (deficient, optimum and excessive levels) on plasma vitamin A, E, calcium, phosphorus, lipid composition, liver function and growth of Hubbard broiler chicks. Also, the effect of dietary vitamin E levels on meat stability of broiler chicks. Beside that to study the effect of storage on stability of vitamin A and E in mixed feeds and premixes. The results could be summarized as follows:

- 1- Nutritional experiment:
  - 1.1. Plasma vitamin A and E concentrations were significantly increased corresponding to increasing their levels in the diet all over the experimental periods. Increasing dietary levels of vitamin E significantly enhanced plasma vitamin A concentration at all dietary vitamin A levels. Conversely, increasing dietary vitamin A levels significantly decreased plasma vitamin E concentrations. Plasma vitamin A and E levels were significantly decreased in all experimental groups by advancing age up to 8th week, after which remarkable increase at 9th week (end of experimental period).
  - 1.2. Increasing dietary levels of vitamin A had no significant effect ( $P > 0.05$ ) on plasma calcium and phosphorus concentrations. Conversely, increasing dietary levels of vitamin E significantly decreased ( $P < 0.01$ ) plasma total calcium and phosphorus concentrations at all vitamin A levels. Plasma calcium and phosphorus concentrations were significantly decreased ( $P < 0.01$ ) in all experimental groups by advancing age up to the end of experimental period.
  - 1.3. Dietary levels of vitamin A and E significantly affected ( $P < 0.01$ ) the plasma total lipids, triglycerides, phospholipids and cholesterol levels of Hubbard broiler chicks. Increasing dietary levels of vitamin A significantly increased ( $P < 0.01$ ) plasma total lipids, triglycerides, phospholipids and cholesterol at all dietary vitamin E levels all over the experimental period. Conversely, a significant decrease ( $P < 0.01$ ) of plasma total lipids, triglycerides, phospholipids and cholesterol with increasing dietary vitamin E levels were noticed. A significant decrease was found ( $P < 0.01$ ) in all experimental groups by advancing age up to 8th week, after which a remarkable increase at 9th week (end of the experimental period).
  - 1.4. Increasing dietary vitamin A levels had led to a significant increase ( $P < 0.01$ ) in plasma (GOT) activity all over the experimental period. Conversely, a significant decrease ( $P < 0.01$ ) in plasma (GOT) activity of Hubbard broiler chicks was recorded all over the experimental period with increasing dietary vitamin E levels. Plasma (GOT) showed a significant increase ( $P < 0.01$ ) with advancing age of Hubbard broiler chicks. Dietary vitamin A levels had no significant effect ( $P > 0.05$ ) on plasma (GPT) of Hubbard broiler chicks. On the other hand, increasing dietary vitamin E led to a significant decrease ( $P < 0.01$ ) on plasma (GPT) all over the experimental period. Plasma (GPT) tended to increase with advancing age.
  - 1.6. Increasing dietary vitamin A levels led to a significant decrease ( $P < 0.01$ ) of plasma (APA) of Hubbard broiler chicks. Conversely, increasing dietary vitamin E levels led to an increase of plasma (APA). Plasma (APA) showed a decrease with advancing age in all experimental groups.
  - 1.7. Increasing dietary vitamin E levels significantly improved ( $P < 0.01$ ) the stability of all tissues tested. Breast muscle was found to be more stable toward oxidation than thigh. Meat stability was significantly decreased ( $P < 0.01$ ) with increasing age of broilers after slaughtered. Oxidation of broilers meat increased with increasing time of storage.
  - 1.8. Increasing dietary vitamin A levels showed a significant effect ( $P < 0.01$ ) on average body weight. Broiler chicks fed on moderate or excessive vitamin A levels had significantly greater body weight than that of corresponding 2 broiler chicks fed deficient vitamin A levels. Body

weight of chicks significantly increased ( $P < 0.01$ ) by advancing age up to the end of experimental period in all experimental groups. Body weight gain of broiler chicks fed on vitamin A was significantly greater than that of corresponding broiler fed on vitamin A with vitamin E. While, increasing dietary vitamin E reduced body weight gain of broiler chicks at all dietary vitamin A levels.

1.9. Rate of growth of broilers fed on moderate and excessive vitamin A levels was significantly greater than that of corresponding broilers fed on deficient levels. The average growth rate of chicks gradually decreased with advancing age along the experimental period except during 6-7 week old period.

1.10. Feed consumption gradually and significantly ( $P < 0.01$ ) increased from the 3rd week up to the end of experimental period. Broilers fed on moderate or excessive vitamin A levels significantly consumed greater feed than that of corresponding broilers fed on deficient vitamin A levels. On the other hand, feed consumption of broilers fed on moderate levels of vitamin E was significantly lower than that of corresponding broiler fed on deficient levels.

1.11. Feed efficiency for broiler chicks which were fed on diet containing the lowest and highest levels of vitamin A without vitamin E was greater than that of corresponding broilers fed on the moderate level. Increasing dietary vitamin E reduced feed efficiency specially with the lowest level of vitamin A. However, increasing dietary vitamin E level with the moderate levels of vitamin A increased feed efficiency. Increasing dietary vitamin A resulted in greater mortality at low dietary vitamin E levels.

2. Storage of mixed feeds and premixes:

2.1. Acid value, iodine value, peroxide value and thiobarbituric acid (TBA) number of different mixed feeds and premixes significantly increased ( $P < 0.01$ ) from the initial level prior to the end of storage period.

2.2. Total saturated fatty acids of fats from different mixed feeds and premixes were significantly increased ( $P < 0.01$ ) by the end of 2nd month of storage with a further increase after 4th month of storage. On the other hand, the levels of total unsaturated fatty acids were significantly decreased ( $P < 0.01$ ) with storage. Palmitic acid which constitute the major percentage of saturated fatty acids gradually and significantly increased ( $P < 0.01$ ) after 2nd and 4th month of storage in different mixed feeds and premixes. On the other hand, oleic and linoleic acids, which constitute the major unsaturated fatty acids, were found to gradually and significantly decrease ( $P < 0.01$ ) with storage.

2.3. El-Kahera broiler starter and finishing mixed feeds were found to contain a lower level of vitamin A and E than different mixed feeds. Walid starter feed contained the highest amount of vitamin A and E. Results obtained showed that there was no specific standard rules to govern the vitamin contents of different feeds. On the other hand. Precinox broiler premix contained a significantly higher ( $P < 0.01$ ) concentration of vitamin A and E than Hendrix broiler premix. Vitamin A and E concentrations of different mixed feeds and premixes were gradually and significantly decreased ( $P < 0.01$ ) with storage.