



and 22% respectively thereafter.

Chicks of each major group were divided into three major subgroups each of 70 chicks receiving 1.0%, 1.3% and 1.9% dietary Calcium levels, respectively. Chicks of each calcium level were Provided with either 2200 or 5120 I.U. vitamin D (each of 35 chicks).

Chicks of the second experiment were grouped into two main groups each of 105, receiving diet containing 23:20% and 23:18% total dietary protein, respectively. Each group was then subdivided into three subgroups (each of 35 chicks) receiving 5 and 2% of their dietary total protein from fish meal, yeast and a mixture of the both, respectively.

Body weight was weekly and individually recorded to the nearest gramm along the experimental period. Weight gain and rate of growth between two succassive weeks were individually calculated. Feed comsumed by all chicks of each treatment was daily recorded, averaged and expressed in grams per day per chick. Feed efficiency was then calculated as a ratio between gain weight (gm) and feed intake (gm). Shank and keel lengths were weekly and individually measured to the nearest (mm) after the end of the first week and then weekly up to the end of the experimental period.

Slaughtering and carcass quality measured at 56th day of age. Water holding capacity in meat samples were

measured for chicks of the second experiment only.

Total protein, plasma albumen, calcium and inorganic phosphorus were determined in the first experiment, while total protein, plasma albumen and plasma and tissues uric acid were measured in the second experiment. In addition, at the end of the first experimental period calcium absorption rate for each intestinal part was determined in vivo in the form of total calcium absorption and absorption per (cm) intestinal length and per (gm) intestinal dry weight.

Correlations between amount of calcium absorption per (cm) length and total of each intestinal part and between amount of calcium absorption per (gm) dry matter and total dry matter weight of each intestinal part were also calculated.

Results obtained could be summerized as follows:

First experiment.

1. Traits of growth parameters.

1 - Body weight.

a - Average body weight at the 7th week of chicks age was 168.13 and 370.51 gm higher in birds fed 24% dietary protein than those fed 22 or 20% protein, respectively. Significant differences in averages of body weight between chicks of different dietary protein levels all over the different periods of estimation.

b - Dietary calcium level was found to have significant effect on body weight of chicks all over the experimental period except at the 2nd and 4th weeks. Applying 1.0% dietary calcium level mostly improved the average body weight of broiler chicks while increasing its level reduced this average.

c - Chicks fed 2200 I.U. / kg ration of vit.D had the highest average of body weight especially at 2nd, 3th, 5th and 6th weeks of age than those fed 5120 I.U. of vit. D which had the highest average of body weight at 1st, 4th and 7th wks of age.

2 - Body weight gain.

a - Chicks fed on 24% protein showed the highest weight gain averages from the 2nd to 7th wk, while the lowest weight gain averages were observed in chicks fed 20% protein.

b - Calcium level of 1.0% showed the highest body weight gain averages followed by 1.3 and 1.9% levels, respectively.

c - No significant variation in weight gain average was found due to vit. D supplementation except during the last week.

3 - Rate of growth.

a - Birds fed 24% protein had the highest growth rate all over the experimental period (grand average 47.40%) followed by those of chicks fed 22 and 20%

levels of protein, respectively.

b - Variation in growth rate due to dietary calcium level was found to be significant during the periods of 0 -1, 1 - 2 and 3 - 4 wks only. Chicks fed 1.0% dietary calcium had the highest rate of growth followed by those fed 1.3 and 1.9% dietary calcium content, respectively.

c - Vit. D level showed no significant effect on the rate of growth at all experimental period except at 0 -1 and 6 - 7 wks age.

4 - Keel and shank lengths.

a - Chicks fed diet containing 24% protein showed the highest keel and shank lengths when compared with those fed on either 22 or 20% protein diets, respectively.

b - Dietary calcium level was found to have significant effect on keel and shank lengths along the experimental period.

c - Insignificant effect was found in keel and shank lengths due to dietary vit. D supplementation in all estimation periods except at 1st, 6th and 7th weeks for keel length and at 2nd, 6th and 7th weeks for shank length. At these ages, 5120 I.U. vit. D. supplementation increased average keel and shank lengths when compared with 2200 I.U. supplementation.

II - Feed consumption and efficiency :

a - Feed consumption average per chick per day all over the experimental period was lower (54.58 gm) in chicks fed 20% dietary protein, while this average was similar in chicks fed either 22 or 24% dietary protein (approximately 56.35 gm). Dietary protein level was found to have significant effect on these trait along the experimental period.

b - Vit. D had no significant effect on the amount of feed consumption except at the 7th week.

c - Feeding chicks 1.0% dietary calcium level resulted in increasing the average of feed consumption (57.96 gm/ chick /day) followed by those fed 1.3 and 1.9% dietary calcium, which had average of feed consumption of 55.10 gm and 54.13 gm, respectively.

d-Dietary protein level was only the factor that affect feed efficiency. Chicks fed diet containing 24% dietary protein showed the highest averages (0.475) of feed efficiency than those fed 22 and 20% dietary protein, which showed 0.423 and 0.371 respectively.

III - Carcass quality measurements :

a -Birds fed 24% dietary protein had the highest absolute and proportional weights of blood, feathers and inedible meat followed by those fed 22 then by 20% dietary protein.

b - Feeding chicks diets containing 1.9% calcium decreased the absolute and proportional weight of both feathers and inedible parts of carcass while it increased the absolute and proportional weight of blood.

c - Vit.D at a rate of 5120 I.U.increased the proportional blood weight and absolute and proportional weight of feather, it decreased the absolute weight of blood and the absolute and relative weights of inedible parts of carcass. However, analysis of variance did not show a significant effect due to any factor under study or the interaction between them, except in case of absolute weight of inedible part of carcass which showed significant response to the effect of the dietary protein.

d - Chicks fed 24% dietary protein had the highest average of absolute weight of carcass and giblets, however the lowest averages were observed in those fed 20 and 22% dietary protein, respectively. Low dietary protein content decreased absolute total edible meat while it increased its proportional weight.

e - Feeding broiler chicks diet containing 1.3% calcium resulted in increasing absolute and proportional weights of total edible meat, carcass and giblets, while a low percentage of dietary calcium mostly decreased these weights. Significant effect of dietary

calcium was found on the absolute weight of carcass only.

f - Variation in all studied parameters due to vit.D supplementation were not significant.

VI - Serum blood parameters :

a - Serum calcium content was significantly affected with dietary calcium level, while no significant variations in this trait were observed due to dietary protein level or vit. D supplementation.

b - No significant variation in serum inorganic phosphorus level were found due to any factor studied.

c - Average of plasma total protein level was higher (3.41 mg/100 ml) in chicks fed 24% dietary protein followed by those fed 22 (3.28). Analysis of variance for data showed significant effect due to dietary protein content on plasma total protein level.

d - Birds fed 1.3% dietary calcium had the highest total protein level (3.33 mg/100 ml), followed by those fed 1.9% dietary calcium (3.29 mg/100 ml).

e - Chicks fed 5120 I.U./kg ration vit.D had relatively the higher average of plasma total protein (3.33 mg/100 ml) followed by those fed 2200 I.U.. However, analysis of variance showed insignificant effect of either dietary calcium content and vit. D. supplementation.

f - No significant variation in serum albumen content were found due to any factor studied or due to the interaction between them on this trait.

VII - Parameters of calcium absorption rate :

a - Ileum had always the higher average of both total calcium absorption, calcium absorption/cm length/hr or per gm dry matter.

b - Dietary protein level showed significant effect on the total calcium absorption only.

On the other hand, dietary calcium level showed significant effect on the absorbed amount/cm length/hr only.

c - Vit.D supplementation showed no significant effect in all parameters of calcium absorption rate.

b - Values of the correlation coefficient between the rate of calcium absorption per either 1 cm intestinal length or per 1 gm intestinal dry weight and total lengths or total dry weights of different intestinal regions differed in their magnitude according to either intestinal part or the protein level. However, they were all of high and positive value.

Second experiment :

1. Parameters of growth performance :

1. Body weight.

a - Highest body weight average (1262.12 gm) was

found in chicks fed fish meal as a source of animal protein.

b - Dietary protein levels and source had significant effect on the average of body weight from the 4th wk (in case of protein source) or from the 3rd wk (in case of protein level) up to the end of the experimental period.

2. Weight gain :

Dietary protein source showed significant effect on average body weight gain at 4th and 5th wks of chicks age, while the effect of protein level was significant from the 3rd wk up to the end of experimental period.

3. Rate of growth.

Significant variation in average growth rate was found, during 2 - 3, 3 - 4 and 4 - 5 wks of age due to dietary protein source. However, dietary protein level was found to have insignificant effect on the rate of growth along the experimental period except during 2-3 wk of chick's age.

4. Keel and shank lengths :

a - Dietary protein source affected keel length at all ages except at 1st and 6th weeks. However, variation in shank length due to this treatment was observed all over the experimental period except at 1st, 3rd and 4th weeks of chicks age.

b - Dietary protein level significantly affected average of keel length during the period from the 1st wk to the 5th wk of chicks age.

II Feed consumption and efficiency:

Feed consumption varied significantly at 6th wk according to dietary protein source, while significant effect was found at 2nd and 5th wks for dietary protein level. No significant variation in feed efficiency could be detected due to either dietary protein sources or levels.

III - Parameters of carcass quality :

a - No significant effect was found due to dietary protein levels or source and the interaction between them on various traits of killing, dressing and eviscerating losses except the absolute weight of blood which showed significant response to dietary protein substitution.

b - Significant variations due to dietary protein source were found in absolute weights of edible meat. Variations in all traits (except in proportional weights of total edible meat and carcass) due to dietary protein level were significant.

c - No significant variation in water holding capacity due to either dietary protein level, source or the interaction between them.

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