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THE EFFECT OF FEEDING SINGLE CELL PROTEIN (SCP) ON SOME PHYSIOLOGICAL ASPECTS IN BROILERS

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Soybean meal was replaced completely by ethanol yeast (SCP) at a rate of 10% in broiler diet at different stages of an 8-week experimental peroid namely, the first 4 weeks (group 2),last 4 weeks (group 4),and the entire peroid (group 3),while the control (group 1) did not receive the yeast. The effects of the yeast were studied on body weight,liver and heart weights as percentages of body weight, and the packed cell volume (PCV) :

1- Body weight increased slightly in groups (2,3,4) as compared with group (1). Whereas males were significantly higher than females ($P < 0.01$).
2- Relative weight of liver was higher in group (3) as compared with group (1) ($P < 0.01$),and females surpassed the males in this aspect ($P < 0.05$).
3- Relative weight of heart did not exhibit significant differences between the groups.But females had higher values than males ($P < 0.01$).
4- Group (3) had significantly higher (PCV) value than the groups (1 and 2).

INTRODUCTION

Single cell protiens (SCP) were recently accepted widely as a protein supplement in poultry diets.The literature reveals contrary results as to the effect of (SCP) on body weight.The factors influencing such effects include the kind of (SCP) used, (Plavnik et al.1981; Bornstein et al.1981),its content in the diet and the time of its application (Alwash et al.1984; Cmunt and Ruzicka,1977). Studies carried out by Dimello and Acamovic (1976) have shown reduction in liver weight as a result of feeding methanol grown bacterial protein.Though the treatment had no significant effect on the relative weight of liver (% of body weight) on the other hand, Bornstein et al.(1981) claimed contrary results pertaining to the effect on the relative weight of liver.As the studies on the effects of (SCP) on blood constituent. and particularly packed cell volume and heart weight are very limited,the present work was undertaken to investigate the effects of the ethanol yeast in the diet of broilers upon the body,liver and heart weights and packed cell volume in broilers.

MATERIALS AND METHODS

An investigation was carried out at the Poultry Farm,Technical Agricultural Institute,Baghdad.It included (80) (ISA) broiler chicks at one day old,and reared till 8 weeks of age.Broilers were divided into four equal groups (1,2,3,4) each of which was divided into tow sub-groups (based on sex),and each of these sub-groups was divided into tow replicates of five broilers each.All broilers were reared in pens (10 broilers/m^2).The components of the diet and its content of crude protein and metabolizable energy are shown in table (1).Diets given to various experimental groups were adjusted to have approximately equal caloric and protein contents. The ethanol yeast* was incorporated to fully replace soybean meal in the diet and at a

rate of 10%. Groups (2,4) and (3) received the yeast in their diets during the first 4 weeks,the last 4 weeks and the entire 8 weeks of the feeding trial respectively. While group (1) received no yeast in its diet.Both feed and water were provided ad libitum.Broilers were reared in closed house under optimum conditions,where infrared brooders were used and temperatures did not exceed 32,29 and 26°C during the first,second and third weeks respectively.Thereafter it kept constant at 23°C. Continuous light was used.All broilers were vaccinated against Newcastle disease at 7 and 21 days of age.No mortality was observed during the entire experimental period, at the end of which blood was taken from the combs of broilers by heparanized capillary tubes.** Backed cell volume of the blood was determine by the method recomended by Johnson (1955),after that the broilers were individully weighed and killed by cervicall dislocation.Livers and hearts were removed and weighed.The data were analysed by the complete randomized design (CRD) (Steel and Torrie 1971),and Duncan's new multiple rang test (1955) was applied to test the significant differences between means.

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RESULTS AND DISCUSSION

As it can be seen from table 2 males in groups 2,3 and 4 displayed non-significant increases in their weights over the controls (group 1).Although females in groups 3 and 4 were heavier and those in group 2 were lighter than the controls in their weights, the differences,however,were not significant.Such results are in agreement with those found by Rowland and Baker (1977),Cmunt and Ruzicka (1977).Hence,they used the same source of protein utilized in the present investigation,namely ethanol yeast instead of soybean meal. Such non-significant changes in live weight due to feeding ethanol yeast instead of soybean meal may be attributed to the lacking effect [illegible] feed conversion efficiency of the birds(Bornstein,1981).

Results obtained also reveal that males were significantly heavier than females in each experimental group($P < 0.01$). Such finding confirms those attained by Wattes et al (1973). Whereas,neither treatments nor the sex X treatment interaction affected the weight of birds significantly (tables 2,3 and 4). Absolute and relative (in relation to live weight) weights of liver are given in tables 2 and 3 respectively. It can be seen from these tables that the effect of sex on relative weight of liver was significant and in favor of the females ($P < 0.05$)(tables 3 and 4). Whereas,the effect of treatment in group 3 attributed to a highly significant increase over the controls in the relative weight of liver. Such increase could be due to feeding the ethanol yeast over the entire 8 weeks of the trial,on the other hand,groups 2 and 4 displayed negligible differences from the control in relative weight of liver. These findings, however,are in agreement with those reported by Bornstein et al.(1981).

Similarly,weight of heart was affected by sex in treatments and in favor of the females($P < 0.01$). Whereas, differences between treatments in this aspect lacked significance (tables 3 and 4). Since the present investigation was carried out befor the experimental animals attained sexual maturity, the effect of sex on (PCV) value was not significant. Hence,(PCV) values are appreciably influenced by the male sex hormone (Gilbert,1969). On the other hand, group 3 exhibited a significant increase in the (PCV) value over the controls($P < 0.05$).

Results obtained here suggest that ethanol yeast may be used as a good source of protein in broiler diets and at of 10% without detrimental effects on body weight, liver and heart weights and (PCV).

REFERENCES

-Alwash,A.H.,I.I.Al-Azawi;A.A.Mekki and B.A.Al-Tikriti,1984.Single cell proteins(SCP) replacing soybean meal in broiler rations.World Rev.Anim.Prod.In press.

-Bornstein.S.;I.Plavnik and Bianka Lipstein,1981.Evaluation of methanol-grown bacteria and hydrocarbon-grown yeast as sources of protein for poultry:performance of broilers during the finishing period;Brit.Poult.Sci.,22:141-152.

-Cmunt,F.and B.Ruzicka,1977.Replacement of protein feeds by yeast nonagricultural raw materials.Tierernahrung and Futterung 10:224-229 (Nut.Abs.&Rev.Series-B,1980. 50:No.3842).
-Dimello,J.P.F.,1973.The use of methane-utilizing bacteria as a source of protein for young chicks,.Brit.Poult.Sci.14:291-301.
-Duncan,D.B.,1955.Multiple range and multiple F tests,Biometrics.II:1-42.
-Gilbert,A.B.,1969.The erythrocyte sedimentation rate and packed cell volume in the domestic fowl with respect to age and sex.Br.Poult.Sci.,10:109-113.
-Johnson,P.M.,1955.Hematocrit values for the chick embryo at various ages.Am.J.Physio. 180:360-362.
-N.R.C.National Research Council.1971.Nutrient requirements of domestic animals,No 1. Nutrient requirement of poultry.National Academy of Science.Washington D.C.
-Plavnik,I.,S.Bornstein and S.Hurwitz,1981.Evaluation of methanol-grown bacteria and hydrocarbon-grown yeast as sources of protein for poultry:Studies with young chicks.,Brit.Poult.Sci.22:123-140.
-Rowland,R.D. and D.H.Baker,1977.The nutritive value of yeast single-cell protein (SCP) for chicks.Poult.Sci.56:1752 (Abst.).
-Steel,R.G.D. and Torrie,1960.Principle and procedures of statistics,Mc Graw-Hill Book Company,Ithaca,Newyork.
-Watts,A.B.,W.A.Johnson,D.G.Barnes and M.Griffith,1973.Protein requirements and growth rate for male and female broilers growth separately 52:2100 (Abst.).

TABLE 1-Diet used and their respective calculated composition (%)

Ingredients	Starter Diet		Finisher Diet	
	Control	Treatments	Control	Treatments
Maize	30.0	30.0	30.0	30.0
Wheat	27.6	27.6	25.6	25.6
Barley	3.0	3.0	3.0	3.0
Wheat Bran	4.0	4.0	4.0	4.0
Soybean Meal	26.0	16.0	28.0	18.0
Premix	8.0	8.0	8.0	8.0
Lime Stone	1.0	1.0	1.0	1.0
Common Salt	0.4	0.4	0.4	0.4
Ethanol Yeast	---	10.0	---	10.0

All diets were Isocaloric and Isonitrogenous,M.E 3200 (Kcal/Kg) diet, 23% Crude protien (C.P). The requirements were according to N.R.C.(1977)

TABLE 2- The effect of using ethanol yeast in the diet on the average body weight, liver, heart and packed cell volume

Character	Treatment[a] (M ± S.D)[b] 1	2	3	4	Mean
Body Weight (g)					
Male	1496[c] ± 66.5	1530 ± 88.6	1504 ± 68.5	1526 ± 90.5	1514
Female	1390 ± 97.6	1388 ± 100	1418 ± 34.6	1429 ± 61.5	1406
Liver Weight (g)					
Male	49.6 ± 9.1	48.5 ± 8.9	64.5 ± 7.9	60.0 ± 7.0	55.7
Female	48.5 ± 8.6	52.6 ± 9.5	59.9 ± 10.6	64.0 ± 5.9	56.3
Heart Weight (g)					
Male	9.1 ± 1.1	10.7 ± 2.0	9.7 ± 1.7	9.6 ± 1.9	9.8
Female	9.5 ± 1.0	9.0 ± 1.2	10.9 ± 2.0	9.4 ± 0.9	9.7
Packed Cell Volume(PCV)%					
Male	24.9 ± 3.6	23.6 ± 2.0	28.3 ± 3.8	26.6 ± 2.5	25.9
Female	24.4 ± 4.1	25.2 ± 5.1	26.9 ± 2.9	26.6 ± 4.0	25.8

[a] See materials and methods for treatment discreption

[b] Mean ± Standard deviation

[c] Ten broilers were used in each reading

TABLE 3- Analyses of variance for body weight (g), weights of liver, heart expressed as a percent from body weight and packed cell volume (PCV) %

Source of Variance	D.f	(M.S)[a] Body Weight (g)	Liver Weight (g)	Heart Weight (g)	(PCV)%
Total	79				
Sex(S)	1	232201.2**	1.14*	0.04**	0.08
Treat.(T)	3	3981.23	4.18**	0.02	47.90*
S X T	3	2941.27	0.35	0.03	7.84
Error	72	6215.69	0.28	0.01	13.27

[a] Mean square * $P < 0.05$, ** $P < 0.01$

TABLE 4- Effects of sex and treatments on body weight and relative[1] values of liver and heart, and packed cell volume

Character	Mean	Sex	Treatment			
			1	2	3	4
Body Weight (g)						
Male	1514[a]					
Female	1406[b]					
Liver Weight (g)						
Male	55.7	3.71[a]	3.41[b]	3.47[ab]	4.26[a]	4.19[ab]
Female	56.3	3.95[b]				
Heart Weight (g)						
Male	9.8	0.65[a]				
Female	9.7	0.69[b]				
Packed Cell Volume (PCV)%						
Male	25.9		24.68[b]	24.40[b]	27.60[a]	26.65[ab]
Female	25.8					

[1] In percent body weight

[2] Like superscripts within[a] classification indicate no significant difference between means, otherwise they differ significantly ($P < 0.05$)