

Tallow Supplementation in Poultry Nutrition

Sabbah M. Allam, M.A.M. Kicks

and O.M. El-Hussieny

Cairo University, Faculty of Agriculture, Egypt.

FEEDING experiment was carried out to study the effect of supplementing the commercial broiler ration (C.R.) with 5% tallow on the performance and body composition of Fayoumi chicks.

Hundred and forty day-old chick were divided into two groups. Group I was fed C.R. while group II received the C.R. supplemented with 5% tallow. Chicks were fed and watered *ad libitum* up to the age of 16 weeks.

The results obtained are summarized as follows :

1. Supplementation of tallow increased the body gain, decreased the feed consumption, improved the feed efficiency and increased the dressing carcass percentage.

2. The male chicks were higher in the percentage of dressing carcass. The male's carcass was slightly higher in fat percentage than that of females.

3. Fat percentage in the carcass increased by adding tallow to the diet.

During the past few years a remarkable interest has been directed to establish the broiler industry in A.R.E. Broilers can offer a substantial part of the animal protein requirement for human nutrition. The production of broilers may be considered as a main solution for the shortage of animal proteins as it can be produced at a relatively shorter time.

Many investigators have reported growth stimulation, improving feed efficiency and reducing feed intake due to using ration containing relatively high amount of fat as an excellent source of energy.

Vermeersch and Vanschoubriek (1968), reported that the addition of *purum* fat to growing chicks ration decreased feed intake and improved the efficiency of feed utilization. Mickelberry *et al.* (1966), observed better feed utilization by incorporating fat into the diet.

The objective of this study is to determine the effect of tallow supplementation on the performance and body composition of Fayoumi broiler chicks.

Material and Methods

The experimental work was carried out at the poultry Farm, Animal production Department, Faculty of Agriculture, Cairo University. The analytical work was performed at the laboratories of the same department.

A number of 140 day-old Fayoumi chicks was divided in to two groups, similar in number and nearly equal in average weight. Birds in group I received commercial ration (C.R.)*. Chicks in the second group were fed the C.R. (Tab 1) supplemented with 5% tallow. The birds received feed and water *ad libitum* for 16 weeks. Chicks were weighed at 4 weekly intervals. Feed consumption was recorded, body gain and feed efficiency were calculated.

Two males and two females were slaughtered from each group at the age of 12 and 16 weeks.

Chemical analysis was carried out using the conventional methods of the A.O.A.C. (1970).

Statistical analysis was made according to Snedecor (1956).

Results and Discussion

Average body weight of chicks

The average live weight of the experimental chicks was nearly equal at the beginning of the experiment (Table 2). From this table and Fig 1 it could be seen that the average live weight of the chick in group II (supplemented with 5% tallow) was nearly higher 23.1 and 61.1 and 72.7 and 87.4 g than that of the chicks in group I at age of 4 and 8 and 12 and 16 weeks respectively.

The differences in average live weight was statistically insignificant at the age of 4 weeks, after that it was significant ($P < 0.05$) *i.e.* at 8 and 12 weeks of old. At the end of the experiment the average live body weight for the chick in group II was highly significant ($p < 0.01$) than that in group I. Hence it could be concluded that chicks which received tallow grow better than those fed C.R. without tallow supplementation.

Applying regression analysis methods (Snedecor, 1956), it was found that the linear regression of the weight on age during the whole experimental period, was highly significant ($P < 0.01$) as shown in the following:

Group	Linear regression	Calculated "t"
I	$y = 45.3 \times -25.9$	8.06**
II	$Y = 50.9 \times -21.9$	8.09**

The previous equations indicate that the slope for group II is higher than that for group I *i.e.* growth rate is the highest for chicks fed on C.R. supplemented with tallow. This conclusion agrees quite well with the previous findings based on body weight data.

* Production of Mourana Co.

TABLE 1 Percentage composition of commercial ration.

Ingredients	C.R.	C.R. +tallow
Yellow Corn	56.0	53.2
Soyabean meal	15.0	14.2
Fish meal	10.0	9.5
Decorticated C.S.C.	5.0	4.7
Extracted rice bran	9.0	8.5
Tallow	—	5.0
Limestone.	2.5	2.4
Steamed bone meal	2.0	1.9
Sodium chloride	0.5	0.4
Starch vaue (S.V.)	67.2	72.5
Crude protein (C,P.)	21.7	20.6
Metabolizable energy (M.E.)	2813	3036
K Cal/kg die		

Vitamin and mineral mixture :
 Vit. A 500 0000 i.u., Vit. D₃ 1000 000 i.u., Vit. K₃ 1500 mg
 Vit. B₁ 3000 mg, Vit. B₆ 1000 mg, Vit. E 3500 mg Fe, 20 g
 and En 60 g and I 3 g and Cu 3 g and Zn, 30 g

TABLE 2. Average live body weight and average live weight gain (g) of chicks for different treatments at different ages.

Age in weeks	Group			
	I		II	
	Live body weight	Weight gain	Live body weight	Weight gain
0	41.2± 0.6	—	41.5± 0.5	—
4	122.2± 3.7	81.0± 2.9	145.3± 3.3	103.8± 3.1**
8	258.6± 7.5	217.4± 6.9	319.7± 8.1*	278.2± 7.8**
12	504.2±11.8	463.0± 8.6	576.9±10.9*	535.4± 9.4**
16	756.2±16.6	715.0±16.3	843.6±13.3**	802.1±12.9**

* = P < 0.05

** = P<0.01

Results obtained in this experiment are in good agreement with those obtained by Arcott and Sather (1958), who found that rations of 3 or 6% tallow significantly improved growth. Mickelberry *et al.* (1966), showed that incorporation of fat into the diet stimulate growth, Fisher *et al.* (1959), reported that the tallow (10%) diets were responsible for significantly heavier body weight in both pullets and older hens. Abd-El-Hady (1977), indicated that the addition of fat to the rations of broiler chicks increased the body weight.

Average body weight gain of chicks

The total average body weight gain of the chick in group II was 103.8 and 278.2 and 535.4 and 802.1 g at the age 4 and 8 and 12 and 16 weeks respectively. Less corresponding figures are observed for chicks fed no tallow (Table 2). Statistical analysis revealed highly significant difference between groups I and II. Differences in absolute body gain between the chicks, which received tallow and the other group increased in the successive intervals. It may be due to the increasing of the ability to absorb the tallow. This conclusion is in agreement with those reported by Fedde *et al.* (1960), who found that the absorbability of feed tallow increased from 53% at the first week of age to 80% at the 12th week.

This result is in a good agreement with the results of Vermeerch and Vanschoubriek (1968), who revealed that the addition of animal fats to growing chicks improved the weight gain.

Feed consumption

The total feed consumed per chick of group fed ration supplemented with tallow was 2661g while it was 3070 g. for group I during the whole experimental period. Assuming that the feed consumed per bird within group I as 100, it would be 96, 94, 89 and 81 for second group at different intervals of age.

TABLE 3. Feed consumption (g) and feed efficiency (Per interval)

Age, weeks	Feed consumption			Feed efficiency*	
	Group I	Group II	Assuming group I as 100	Group I	Group II
0-4	323	311	96	2.68	2.17
4-8	502	471	94	2.47	1.96
8-12	876	783	89	2.39	2.20
12-16	1349	1096	81	3.59	2.98
0-16	3070	2661	89	2.88	2.40

*The amount of S.V. consumed / kg gain

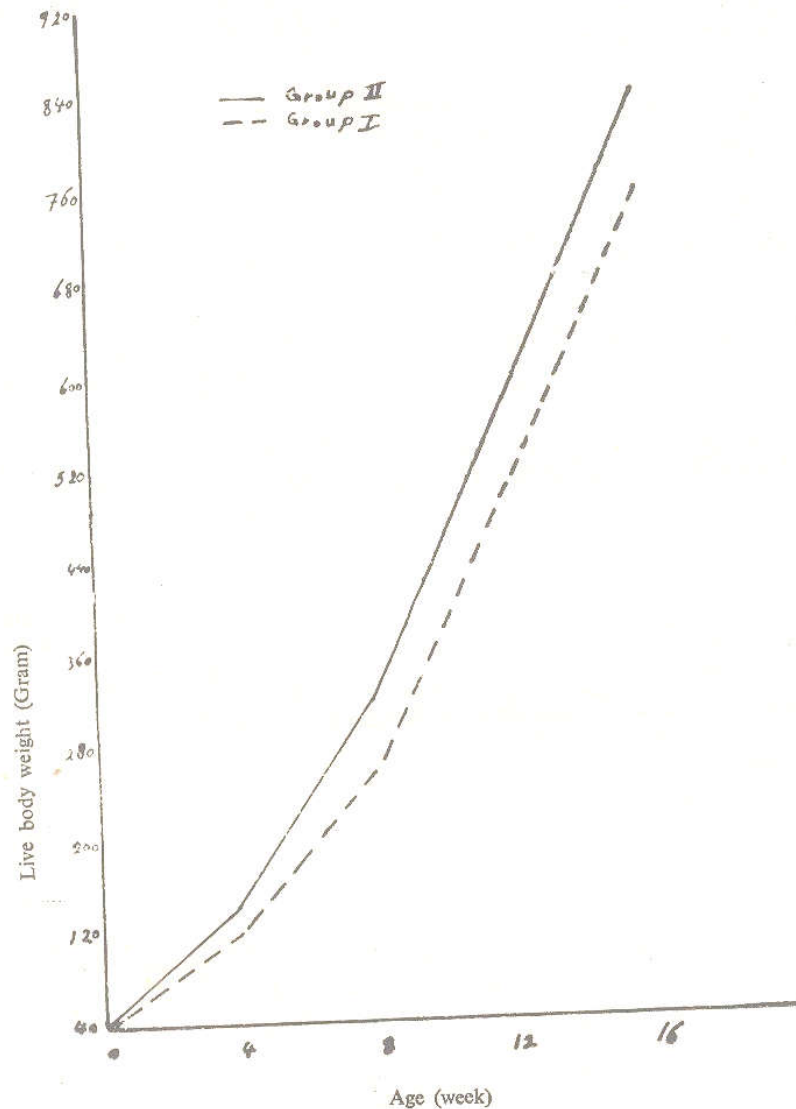


Fig. 1 Average live body weight for different treatments at different ages.

It could be seen that birds which were fed tallow consumed 4% less amount of ration at four weeks age than the chicks of the first group. As the birds advanced in age the differences increased, it was about 19% less feed consumed at the age from 12 to 16 weeks. This may be due to the increasing

of the utilization of tallow *i.e.* the increasing of the available energy. Therefore, it could be concluded that the addition of tallow decreased the amount of feed consumption

This result coincided the findings obtained by Abd El-Hady (1977).

Feed efficiency (F.E.)

Results in Table 3 indicated that birds which were fed tallow showed a better feed efficiency than the chicks which received C.R. without supplementation with fat during the whole experimental period.

The range of F. E. is (1.96—298) and (2.39—3.59) for second and first group chicks respectively. It could be seen that birds which were fed tallow consumed (17%) less amount of S.V./kg gain than the chicks of the first group at the end of the experiment.

This result is in agreement with that of Abd-El-Hady (1977), who found that the addition of fat in the ration of broilers increased feed efficiency.

Mortality rate

During the whole experimental period 10 chicks died from group I (14.2%). Less Mortality rate was observed in the group II (8.5%). These figures indicate that supplementing Fayoumi chicks ration with 5% tallow had no ill effects on mortality rate.

TABLE 4. Dressing carcass and edible portion percentage and edible parts for different treatments at different ages.

Age week	Treatment	Sex	Dressing %	Edible %	Heart (g)	Liver (g)	Gizzard (g)
12	1	♂	61.4	79.5	4.0	19.1	14.9
		♀	59.4	77.5	3.4	17.2	15.8
	2	♂	65.5	80.3	3.5	20.0	14.7
		♀	65.0	79.9	2.1	17.1	13.3
16	1	♂	67.2	82.1	3.6	23.9	18.2
		♀	63.1	81.3	2.7	18.6	17.2
	2	♂	70.8	84.4	3.5	26.7	20.7
		♀	66.0	83.5	2.9	24.3	19.7

*Slaughter tests*1. *Dressing carcass and edible portion percentage*

Results in Table 4 show higher dressing and edible portion percentages with chicks which received tallow than those fed only C.R at 12 and 16 weeks of age. It can be seen that dressing and edible parts percentage increased with the advancing in age. This increase was due to the fat deposition as indicated by the chemical analysis in Table 5.

These results are in a good agreement with those obtained by Abd El-Hady (1977), who found that adding 8% fat showed a significant effect on improving carcass weight.

TABLE 5. Chemical analysis of carcass for different treatments in different ages.

Age (week) :	Items	Treat- ment	♂		♀	
			breast	Femoral	breast	Femoral
12	Moisture %	1	79.02	77.10	78.30	76.95
		2	78.07	76.91	78.04	76.64
	Analysis on D.M. basis :					
	Protein %	1	85.14	81.37	84.09	82.18
		2	83.82	80.00	83.18	81.03
	Fat %	1	10.89	14.42	10.56	13.85
		2	12.88	16.00	12.00	15.06
	Minerals %	1	3.97	4.21	5.35	3.97
		2	3.30	4.00	4.82	3.97
	Moisture %	1	77.16	76.49	76.16	75.46
16		2	75.85	76.60	76.09	75.29
	Analysis on D.M. basis :					
	Protein %	1	83.22	80.39	82.81	79.20
		2	82.23	78.56	81.22	76.65
	Fat %	1	11.65	15.18	11.93	15.64
		2	13.13	17.84	13.00	18.66
	Minerals %	1	5.13	4.43	5.26	5.16
		2	4.64	3.70	5.78	4.69

At the age of 12 — 16 weeks the dressing percentage in male chicks was higher than in females. These results are in agreement with those obtained by Badr El-Din *et al.* (1961), and Afifi and Rasheed (1966), who found that the dressed carcass in males was higher than in females.

2. Chemical analysis of carcass

Table 5 show that moisture percentage of the chicks fed tallow was slightly lower than the other group received only C.R. These results are in agreement with those of Miller *et al.* (1962). It would be seen that moisture % in the carcass was decreased with advancing in age. Moisture in the carcass of male chicks was slightly higher than that of female birds.

Values of protein and fat analysis on dry matter basis show that protein percentage decreased with advancing in age but on the opposite was the percentage of fat, which increased with advancing in age. Protein content in females was lower than in male chicks. On the other hand fat percentage was high in females. Fat deposition in femoral parts was higher than that in breast.

Increasing dietary fat slightly decreased carcass protein percentage and noticeably increased fat percentage at both 12 and 16 weeks age.

These results are in agreement with the data obtained by Summers *et al.* (1965), who found that increasing the levels of dietary energy resulted in decreased carcass protein and increased carcass fat.

Generally the data of this experiment could be summarized as follows :

1. Supplementation of the C.R. Fayoumi chicks with 5% tallow increased their live body weight, gain in weight, feed efficiency and fat percentage.
2. Feed consumption, moisture and protein percentage in the carcass decreased by adding tallow to the diet.

References

- Abd El-Hady, A.A. (1977) Effect of fats source and level on the body composition of broilers and laying hens and the cholesterol content of egg and plasma. *Ph. D. Thesis*, Novi Sad University Faculty of Agriculture, Yugoslavia.
- Afifi, M.A. and Rasheed, A.A. (1966) Slaughter and carcass studies on 12-weeks old Fayoumi and Rhode Island Red birds. *Poultry Sci.* 45, 801.
- Arcott, G. H. and Sather, L.A. (1958) Performance data and flavor evaluation of broilers fed diets containing varying amounts of animal fat. *Poultry Sci.* 37, 844.
- Association of Official Agricultural Chemists (1970) "Official Methods of Analysis of the A.O.A.C." 11th Ed., Washington D.C.
- Badreldin, A.L., El-Itriby, A.A. Kamar, G.A.R. and Mostageer A. (1961). Effect of crossing on some productive characters in chickens. *World's Poultry Sci. J.* 17, 178.

- Fedde, M.R., Waibel, P.E. and Burger, R.E. (1960) Factors affecting the absorpability of certain dietary fats in the chick. *J. Nutr.* 70, 447.
- Fisher, H., Feigenbaum, A. Leveille, G.A. Weiss, H.S. and Griminger, P. (1959) Biochemical observations on aortas of chickens, effect of different fats and varying levels of protein, fat and cholesterol. *J. Nutr.* 69, 163.
- Mickelberry, W.C., Rogler, J.C. and Stadelman, W.J. (1966) The influence of dietary fat and environmental temperature upon chick growth and carcass composition. *Poultry Sci.* 45, 313.
- Miller, E.C. and Denton, C.A. (1962) Serum and egg yolk cholesterol of hens fed dried egg yolk. *Poultry Sci.* 41, 335.
- Snedecor, G.M. (1956) "Statistical Methods", Iowa state press, Ames, Iowa.
- Summers, J.D., Slinger, S.J. and Ashoton, G.C. (1965) The effect of dietary energy and protein on carcass composition with a note on a method for estimating carcass composition. *Poultry Sci.* 44, 501.
- Vermeersch, G. and Vanschoubriek, F. (1968) The quantification of the effect of increasing levels of various fats on body weight gain, efficiency of food conversion and food intake of growin chicks. *Poultry Sci.* 9, 13,

اضافة الدهن الحيواني لملائق الدواجن

صباح محمود علام ، مختار عبد الفتاح قيقة واسامة محمد الحسني
كلية الزراعة - جامعة القاهرة

صممت هذه التجربة لدراسة تأثير اضافة ٥% من الدهن الحيواني الى علائق الكتاكيت الفيومي على النمو ومكونات الجسم *

قسم ١٤٠ كتكوت عمر يوم الى مجموعتين * المجموعة الاولى غذيت على العليقة العادية (كنترول) أما المجموعة الثانية فقد غذيت على العليقة السابقة مع اضافة ٥% من الدهن الحيواني واستمرت التجربة لمدة ١٦ اسبوعا وكانت النتائج كما يلي :

١ - اضافة الدهن الحيواني أدى الى زيادة وزن الجسم ، انخفاض كمية الغذاء المستهلك ، رفع الكفاءة التحويلية وزيادة نسبة الأجزاء المأكولة في الذبيحة *

٢ - نسبة الدهن في الذبيحة زادت باضافة الدهن الحيواني الى العليقة *

٣ - نسبة الأجزاء المأكولة والدهن في الذبيحة كانت عالية في الذكور عن الإناث *