

PERFORMANCE AND CARCASS QUALITY OF MUSCOVY DUCKLINGS FED SUPPLEMENTARY FATS BY AGE SEQUENCE DURING SUMMER SEASON

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SUMMARY

Sixty one-day old Muscovy ducklings were randomly distributed into four groups. The first group (control) received diet without fat supplement. Diets contained sunflower oil for group 2, tallow for group 3 and animal-vegetable fat blend for group 4. Fat from different sources was supplemented at level of 5% of diet dry matter during the first four weeks of age and 7.5% afterward till the slaughter weight at 12 weeks of age.

Feeding fat containing diets, in general, significantly increased live body weight at 4 and 8 weeks of age, decreased feed consumption, improved feed conversion and carcass characteristics. The average body weight at slaughter age was 2.903, 3.388, 3.243 and 3.621 Kg for the four groups, respectively. Neither abdominal fat nor the chemical composition of lean and liver was affected by added fat. Addition of vegetable oil containing high proportions of poly unsaturated fatty acids improved feed conversion at the early ages (0-8 weeks). However, an improvement in the utilization of tallow which contains poly saturated fatty acids was evident at late ages from 9-12 weeks.

Liver and abdominal fat weights were higher in birds fed sunflower oil in comparison with the other fat sources. However, feeding animal-vegetable fat blend was associated with the lowest feed consumption but the

highest carcass weight, heart and gizzard weight as well as dressing percentage which resulted in better growth performance and carcass quality of Muscovy duckling reared in summer season.

Keywords: Muscovy duckling, dietary fat, growth, carcass quality

INTRODUCTION

Although, there are numerous studies on the effects of including animal and vegetable fats in poultry diets, most of these reports deal with the use of fat for broiler chickens (Renner and Hill, 1960, Fuller and Rendon, 1977, Griffiths *et al.*, 1977, Sibbald, 1978, Coon *et al.*, 1981 and Hullan *et al.*, 1984) or turkeys (Salmon, 1974, Whitehead and Fisher, 1975, Sell and Owings, 1984). Limited comparison studies among fat sources or blends in their effects on the growth performance and carcass quality of ducks at different ages are available (Kamer *et al.*, 1989 and Farrel, 1991).

The efficiency of fat utilization is dependent on their fatty acids composition and age of animal. There is evidence that saturated fatty acids are less utilized than the unsaturated fatty acids (Corino and Dell'orto, 1980). However, the improvement in fat utilization was reported to be associated with age because the lipid absorption mechanism is not fully developed in young chick. Poly saturated fatty acid utilization was found to be highly utilized by the adult birds (Polin and Hussein 1982). Moreover, Potter *et al.* (1974) and Klaus De Albuquerque *et al.* (1978) reported that fat addition under high environmental temperature decreased feed consumption and improved feed efficiency.

The objectives of the present study were to evaluate the growth performance and feed efficiency of Muscovy duckling fed vegetable oil, tallow and animal vegetable fat blend at different ages and to study the effect of fat supplement on carcass quality and tissue composition.

MATERIALS AND METHODS

Sixty mixed sex one-day old Muscovy ducklings were

randomly allotted in four groups. Duckling were identified by leg-bands and housed in houses up to four weeks of age. At this age, ducklings were moved into larger pens which were open except for a shed-type shelter across one end of the yard. Straw litter was provided in the brooder house as well as under the open sheds. Continuous light was available. The experiment was carried out in summer season during June, July and August, 1992.

Duckling in the first group were fed control diet without fat supplement. Diets containing sunflower oil, tallow and animal-vegetable fat blend (50% oil- 50% tallow) were fed at level of 5% during the first four weeks and 7.5% afterward to group 2, 3 and 4, respectively. Diets were fed *ad. lib.* as dry mash and fresh drinking was available. Composition of the experimental diets is shown in Table 1.

Table 1. Ingredient and chemical composition of the experimental diets

Item	Control		Oil		Tallow		A-V blend	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Yellow corn	65	65	59	56	59	56	59	56
Soybean meal	25	25	26	26.5	26	26.5	26	26.5
Wheat bran	5	5	5	5	5	5	5	5
Concentrate Mix.	5	5	5	5	5	5	5	5
Fat	0	0	5	7.5	5	7.5	5	7.5
Dry matter (DM)	90.7	89.8	90.8	90.8	90.3	91.3	90.4	90.8
Dry matter composition								
CP	21.2	21.2	21.5	22.4	21.3	21.9	21.8	21.9
EE	4.0	4.1	9.0	11.7	9.7	10.9	9.7	10.9
CF	5.5	6.2	5.0	5.7	6.6	8.2	7.3	8.5
Ash	5.0	3.6	5.0	5.5	5.2	5.6	4.9	5.6

1st from 0-4 weeks of age

2nd from 5-12 weeks of age

Individual live body weight and feed intake per pen were weekly recorded for all birds (15 birds per group). Four birds from each group were randomly picked up at 12 week to be slaughtered for carcass quality study. Samples from the right lobe of liver, left breast and left thigh muscles were collected and stored at -20°C for chemical analysis for dry matter (DM), ether extract (EE), crude protein (CP) and ash according to A.O.A.C. (1980) method.

Data collected were statistically analyzed using GLM model of SAS (1990). Means were separated using Duncan's Multiple Range Test when the main effect of treatment was significant.

RESULTS AND DISCUSSION

Body weights (Kg), feed consumption (Kg/bird) and feed conversion at four intervals are shown in Table 2. Feeding sunflower oil or animal-vegetable fat blend resulted in significant heavier body weight during the first 8 weeks of age than those fed control or tallow supplemented diets. Feeding fat in comparison with the control resulted in an increase in body weight at 8 to 12 week-period by 0.66, 0.45 and 0.75 Kg/bird and a decrease in feed consumption by 1.05, 1.8 and 1.45 Kg DM/bird for sunflower oil, tallow and animal-vegetable fat blend. These differences however, were not statistically significantly proven due to the limited sample size, the economical value for the breeders may be highly considered.

Table 2. Body weight (Kg), Feed intake (Kg/bird) and feed conversion by Muscovy duckling fed diets containing oil, tallow or animal-vegetable fat blend

Item	Control	Oil	Tallow	A-V blend	SE
Body weight					
Initial	0.049	0.048	0.048	0.050	0.004
4 weeks	0.910 ^b	1.047 ^a	0.924 ^b	1.015 ^a	0.021
8 weeks	2.095 ^b	2.703 ^a	2.105 ^b	2.613 ^a	0.048
12 weeks	2.702	3.365	3.191	3.446	0.118
Feed consumption 1					
0-4 W	1.680	1.470	1.490	1.590	0.048
5-8 W	4.040	3.680	3.250	3.360	0.120
9-12W	4.220	3.740	3.400	3.540	0.360
0-12W	9.940	8.890	8.140	8.490	1.070
Feed conversion ratio					
0-4 W	1.950	1.470	1.700	1.650	
5-8 W	3.410	2.220	2.750	2.100	
9-12W	6.970	5.240	3.130	4.250	
0-12W	3.750	2.680	2.590	2.500	

SE was calculated between weeks within each interval
^{a,b} Means within a raw with different superscripts differ
(P<0.05).

The higher body weight and lower feed intake resulted in better feed conversion by birds fed fat supplemented diets specially for group fed animal-vegetable fat blend. This might indicate that ducklings fed fat containing diets during summer season were more efficient in nutrient utilization than those fed no fat supplement (Potter *et al.*, 1974; Klaus and De Albuquerque *et al.* (1978). Moreover, Storey and Murer (1986) found that ducklings utilized diets supplemented with fat more effectively and they related the lower feed intake by birds fed tallow supplemented diets to the less palatability of tallow. The results concerning the effect of fat supplement on body weight, feed intake and feed conversion agreed with those found by Storey and Murer (1986), Kamar *et al.* (1989) and Pinchasov and Nir (1992).

The utilization of fat by ducklings was dependent on the degree of fatty acids saturation as well as the age of birds. The improved feed conversion observed for duckling fed oil or animal-vegetable blend during the first 8 weeks of age might be due to the fact that poly unsaturated fatty acids are better utilized by young ducklings than the poly saturated fatty acids (Pinchasov and Nir 1992 and Renner and Hill 1960). However, the improved feed conversion by ducklings fed tallow or A-V blend during the period from 9-12 weeks of age might be due to the higher utilization of poly saturated fatty acids in tallow by elder ducklings (Storey and Murer, 1986).

Feeding fat insignificantly improved slaughter and eviscerate weights. Supplement of Animal-vegetable fat blend associated with the highest carcass weight, dressing percentage and weights of heart and gizzard as a percentage of body weight. However, feeding oil resulted in more abdominal fat and higher weight of liver (Table 3). Deaton *et al.* (1981) found that addition of 4 to 7% tallow resulted in significant increase in abdominal fat of broiler chickens. Comparable results were reported by Moran (1982) for turkey fed fat supplemented diets.

Dressing percentage as high as 74.3 to 76.5% was recorded for Muscovy ducks at age from 11 to 13 weeks of age (Ziegler, 1985; Torges 1986 and Ricard *et al.*, 1988)

No significant difference among treatments in chemical composition of breast and thigh muscles as well as liver tissue were detected (Table 4). This might indicate that

added fat was not utilized for fat deposition but it was used as energy source for growth since higher body weight was recorded for duckling fed fat containing diets (Table 2). This result was in good agreement with the findings of Coon *et al.* (1981), Donaldson (1985) and Yanovich (1986) that adding fat in diets of broiler chickens, ducks and turkey from soybean, sunflower, safflower and maize oil or tallow increased body weight gain and improved feed utilization and carcass quality and recently, Kern-Zvi *et al.* (1990) found that vegetable oil supplementation depressed body fat in broiler chickens and modified lipid in duck carcass (Farrel 1991).

Table 3. Carcass characteristics of Muscovy duckling fed diets containing oil, tallow or animal-vegetable fat blend

Item	Control	Oil	Tallow	A-V blend	SE
Body wt., Kg	2.903	3.388	3.243	3.621	0.238
Dressed wt., Kg	2.224	3.181	3.059	3.399	0.229
Eviscerated wt., Kg	2.088	2.375	2.263	2.633	0.176
Dressing %	77.2	75.5	74.2	77.3	1.5
Eviscerating %	71.8	70.3	69.5	72.2	1.7
% of body weight					
Abdominal fat	2.87	3.18	2.99	3.02	0.23
Liver	1.63	1.90	1.51	1.39	0.08
Gizzard	1.98	2.10	1.99	2.13	0.06
Heart	0.69	0.58	0.58	0.71	0.03

Table 4. Chemical composition (%) of breast muscle, thigh muscle and liver tissue of Muscovy duckling fed diets containing oil, tallow or animal-vegetable fat blend

Item	Control	Oil	Tallow	A-V blend	SE
Breast muscle					
DM	27.23	31.13	27.95	27.69	1.22
CP	22.73	25.82	23.10	22.88	1.05
EE	1.20	1.38	1.13	1.23	0.15
Ash	1.25	1.30	1.19	1.25	0.09
Thigh muscle					
DM	29.20	28.42	27.55	27.65	0.81
CP	24.10	23.35	22.34	22.34	0.51
EE	1.83	1.66	1.88	1.90	0.32
Ash	1.19	1.14	1.19	1.17	0.09
Liver tissue					
DM	36.90	38.35	37.55	34.36	1.18
CP	24.49	23.39	26.45	24.77	1.32
EE	10.49	13.37	9.74	8.25	1.53
Ash	1.62	1.59	1.36	1.35	0.03

It could be suggested that diets fed during early age till 8 weeks of age could be supplemented with vegetable oils. However, Supplement of animal-vegetable fat blend to diets of summer reared Muscovy duckling during the entire growth period of 12 weeks is beneficial to improve feed efficiency and body weight without an increase in fat deposition of the carcass.

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مظاهر النمو وجودة الذبيحة مع التدرج في العمر للبط المسكوفي المغذى على دهون بالعلائق اثناء فصل الصيف

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استخدم فى هذه الدراسة عدد 60 بطة مسكوفى عمر يوم قسمت عشوائيا الى اربع مجاميع • الاولى مجموعة ضابطة (كنترول) لم يضاف اليها دهن والثانية والثالثة والرابعة كانت تحتوى على زيت عباد شمس ، دهن بقرى وخليط من الدهن النباتى والحيوانى على التوالى • وكانت نسبة الدهن من المصادر المختلفة تمثل 5% من عمر يوم الى عمر 4 اسابيع ثم 7,5% من عمر 4 الى 12 اسبوع وكانت النتائج كالتالى :

- التغذية على الدهن بوجه عام ادت الى زيادة معنوية فى وزن الجسم على عمر 4 و 8 اسابيع • كما ادت الى نقص فى كمية الغذاء المأكول وحسنت الاستفادة من الغذاء وصفات الذبيحة •

- كان متوسط وزن الذبائح 2,903 - 3,388 - 3,243 - 3,621 كجم بالنسبة للاربع مجاميع بالترتيب •

- لم يتأثر التركيب الكيماوى للحم فى كل من الصدر والفخذ وايضا الكبد باستعمال الدهن فى العلائق •

- اضافة الزيت النباتى المحتوى على نسبة عالية من الاحماض الدهنية الغير مشبعة ادت الى تحسين كفاءة تحويل الغذاء فى الاعمار المبكرة بينما تحسنت الاستفادة من الدهن الحيوانى المحتوى على احماض دهنية مشبعة فى الاعمار المتأخرة من 9 الى 12 اسبوع •

- ارتفعت اوزان الكبد ودهن البطن فى الطيور المغذاه على زيت عباد الشمس بالمقارنة مع الطيور المغذاه على دهن حيوانى •

- التغذية على خليط من الدهن النباتى والحيوانى كانت مصحوبة باقل كمية للغذاء المأكول واعلى وزن للذبيحة والقلب والقونصة ونسبة التصافى مما نتج عنه تحسن فى النمو وجودة الذبيحة فى البط المسكوفى المربى اثناء فصل الصيف •