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Studies on Fatty Liver Production from Aged Geese and Ducks I, Serum Protein, Glucose and Cholesterol

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A TOTAL of fifty one aged male and female birds from three preeds, *i.e.* Pekin, Saudani and Geese were divided at random into two treatment groups. The first group was force-fed dry maize for a period of 28 days, the second group was fed *ad libitum* for the same duration. The object being to test the response of aged ducks and geese to force feeding for fatty liver production.

Results obtained showed no significant differences among force feeding and *ad libitum* feeding in serum protein level, glucose and cholesterol. Sex and species exerted a significant effect ($P<0.01$) on serum, total proteins and glucose. Cholesterol was significantly affected by species.

Force feeding of broiler geese and ducks was the subject of numerous studies. The cramming period used in several studies ranged between 11 to 42 days (Forenbacher *et al.*, 1963; Forenbacher *et al.*, 1965; Bielinski *et al.*, 1966; Yamani *et al.*, 1973 and Marai and Yamani, 1974). The average amount of maize used during cramming period ranging from 4 to 5 weeks was about 20 kg. per geese (Nir and Perek, 1971). Yamani *et al.* (1973) used 17 kg maize per geese for 28 days cramming period.

The weight of liver after the course of force feeding ranged between 101 and 297 g for ducks and between 205 and 653 g for geese (Bielinski *et al.* 1966; Stasko and Pobis, 1972; Nir *et al.*, 1972 and Marai and Yamani, 1974).

Still less is known about the suitability of aged geese and ducks for producing fatty liver. Therefore, this study has been undertaken to determine how suitable the aged geese and ducks to be force fed for fatty liver production.

Material and Methods

The stock used included Pekin ducks, Saudani ducks and Egyptian geese. Fifty one male and female birds derived from the poultry Research Farm of the Faculty of Agriculture, Cairo University were used in this study. The birds were nearly the same in their body weight at the beginning of the experiment. Birds of each species were divided at random into two treatment groups. Those of the first group were force-fed while those occured in second group were fed *ad lib.* to serve as control.

Birds were wing-banded and were individually housed in wire cages fitted in wire wooden pens. Cages were supplied by waterers.

Feeding of birds were carried out for 4 weeks in both treatment groups using maize only . Force feeding was done by hand twice daily at 9.00 a.m. and 3.00 p.m. Daily amount of maize used was recorded. Before feeding, maize was dipped in water and was fed till oesophagi was full. For the *ad Libitum* group known amounts were supplied. Maize amount unconsumed was weighed once a week.

By the end of the feeding trials birds were slaughtered. During slaughter, a clean sample of blood was collected, left till coagulation was completed, and centrifuged for 20 minutes at 3000 r.p.m. Sera were separated and freezed till used chemical analysis. The determination of serum total proteins was carried out after Concan and Soltess (1973), Serum glucose was assayed according to the method of Huggett and Nixon (1956) and Cholesterol was determined according to Watson (1961).

The statistical analysis was carried out according Snedecor and Cochran (1967).

Results and Discussion

The values for serum total protein (Table 1) were higher in force fed group as compared to the *ad Libitum* group. The data indicate a significant effect of sex and species of birds upon the serum total protein ($P<0.01$) with higher values for females and geese. Yamani *et al.* 1974 have reported lower values (4%) for serum total protein of force fed geese at the fourth week of cramming. While Nir *et al.*, 1972 reported a value of 6%.

TABLE 1. **Total serum protein and glucose level as influenced by feeding, sex and species.**

	No. of Birds	Total serum protein (g/100ml)+S.E.	Glucose level mg/100ml + S.E.
Forco Fed . .	23	7.15 + 0.20	92.92 + 5.1
Ad Libitum .	28	6.99 + 0.24	94.61 + 3.7
Males	28	6.62 + 0.19	99.24 + 2.73*
Females . . .	23	7.53 + 0.24	88.29 + 5.61*
Pekin	17	6.73 + 0.25 a	74.43 + 6.61 a**
Saudani. . . .	15	6.65 + 0.26 a	105.70 + 1.70 b**
Geese	19	7.84 + 0.22 b	101.20 + 2.63 a**

a,b the same letters differ from each other non-significantly, otherwise, they differ at P 0.01

* $P < 0.05$
** $P < 0.01$

The serum glucose values as mg / 100 ml are shown in Table 1. Males indicated the highest glucose concentration in their sera at the end of the feeding period. Birds which were force fed exhibited higher glucose concentration compared to those *ad Libitum* group. However, the differences among the two groups were not significant ($P < 0.05$). Sex and species exerted a significant difference in serum glucose level ($P < 0.01$). The values given in this study are lower than those given by Nir *et al.* (1972)

Serum cholesterol values demonstrate differences between the birds force fed and birds fed *Libitum* and fed the same diet (Table 2). Serum cholesterol in females was slightly higher. However, there was a 35% to 100% increase in the cholesterol content of the serum of geese as compared to pekin ducks and saudani ducks.

TABLE 2. **Serum cholesterol level as influenced by sex, treatment and species.**

Classification	Number	Mean + S.E. (mg/100 ml)
Overall mean . .	51	257.81 + 15.83
Females . . .	23	260.06 + 24.00
Males	28	255.57 + 21.40
Force-Fed. . . .	23	252.36 + 19.79
Ad-Lib	28	263.27 + 24.15
Pekin	17	256.52 + 22.65 a
Saudani	15	171.52 + 22.13 b
Geese	19	345.40 + 19.23 c

a, b, c within species differ from each other at P 0.01

The overall mean for serum cholesterol level was 257.81 mg/100 ml. Sex and treatment affected the character non-significantly. On the other hand species exerted a significant effect on serum cholesterol level. Nir *et al.* (1972) found that serum cholesterol level in force-fed geese was about 350 mg/100 ml. Yamani *et al.* (1973) working with three types of geese found that serum cholesterol level in force-fed Rhenish, Italian and Landes was 157.7, 244.2 and 165.0 mg/100 ml respectively.

In general the present study showed that cramming versus and Libitum feeding of aged geese and ducks did not affect significantly the parameters investigated.

More work now is underway to clarify the response of aged geese and ducks for fatty liver production.

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انتاج الكبد المسمن من البط والأوز المسمن

١ ـ بروتين السيرم ، الجلوكوز والكرلسترول ٠

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استعمل فى هذه التجربة ٥١ طيرا من الذكور والاناث المسمنه والتى انتهت حياتها الانتاجية ٠ تضمنت الطيور المستعملة البط البكينى والسودانى والاوز المصرى ٠

وقسمت الطيور الى قسمين غذيت طيور القسم الاول تغذية قسرية يدوية (التزغيط باليد) لمدة ٢٨ يوما على الذرة بينما غذيت طيور القسم الثانى تغذية حرة حتى الشبع ولنفس المدة ٠ وبقياس التغيرات الدموية التى قد تنجم عن التزغيط وجد انه لم يؤثر تأثيرا معنويا على مستويات البروتين والجلوكوز والكوليسترول لسيرم الدم ٠ وكانت هذه التقديرات على التوالى فى حالة الطيور المسمنه هى ١٥ر٧ / ، ٩٢ر٩٢ مجم/ ١٠٠ مل ، ٣٦ر٢٥٢ مجم ١٠٠ مل بينما كانت هذه التقديرات على التوالى بالنسبة للطيور المغذاة حرة هى ٩٩ر٦ / ٦١ر٩٤ مجم/١٠٠ مل ، ٢٧ر٢٦٣ مجم/١٠٠ مل ٠