قســـــم : الصحـــة - كلية الطب البيطرى - جامعة أسيوط
رئيس القسم : أ.د / على يوسف لطفى

تقدير التركيب الكيماوى لجسم الأرانب عن طريق الحقن بمحلول الانتيبيرين

نبيلة جـــازيه ، حســن عبد الحفيـظ

أجريت هذه الدراسة على عدد ١٧ أرنب عمرها حوالى ٧ شهور تم حقنها فى القلب بمقدار ٣ سم^{3} من محلول مخفف من الانتيبيرين لتقدير نسبة الماء فى الأرنب الحى ثم قتلت بعد ذلك بالكلوروفورم وتم تحليلها كيماويا بعد تخفيفها وكانت نتيجة هذه الدراسة :

١- ترتبط نسبة الرطوبة المقدرة باستخدام الانتيبيرين ارتباطا موجبا ومؤكدا بنسبة الرطوبة المقدرة بطريقة التجفيف (بعد القتل) .

ويمكن استخدام الأخيرة من الاولى باضافة معامل تصحيح قدره ٠ر٩١ ٪ .

٢- ترتبط نسبة الدهن ارتباطا عكسيا ومؤكدا بالنسبة للرطوبة المحسوبة باضافة معامل التصحيح ويمكن استخراج نسبة الدهن من المعادلة :

نسبة الدهن = ٢٨٣٣ - ٠٨٨٢ر

٣- يمكن تقدير نسبة البروتين بضرب المادة الجافة الحالية من الدهن فى نسبة ثابتة وهى ٧٦ر٣٣ أو من المعادلة :

نسبة البروتين فى المادة الجافة ٧٨ر٤٧٣٨ - ٠ر٨١٢٩

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ESTIMATION OF BODY COMPOSION IN MATURE RABBITS BY APPLICATION OF ANTIPYRINE DILUTION TECHNIQUE

(With 4 Tables)

By

NABILA GAZIA and H.M. ABDEL-HAFEEZ

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SUMMARY

Seventeen adult rabbits of 7 months old were injected, by heart puncture, each with 3 ml of antipyrine saline solution (50 mg/1 ml 0.9 saline solution). Samples of blood were taken after half and one hour from the injection. Then the rabbits were killed by chloroform inhalation and their bodies were chemically analysed for moisture, protein, fat and ash contents. The results were as follows:

1. The estimated water values using the dilution technique were highly correlated with those determined by the whole body analysis (r=0.730) and showed a high degree of accuracy after adding a correction factor averaged 0.91% of the estimated one.
2. Fat content was inversely correlated with water content (r= 0.611), and it could be estimated by using the regression equation: y = 8.2833-0.0882 x.
3. The body protein content could be estimated either by using its constant percentage in the fat-free dry carcass (76.33%) or by the linear regression equation of protein content as expressed by the equation: y = 78.4738 - 0.8129 x.

INTRODUCTION

The present study comes along series of experiments, done at our department, using the dilution technique for the estimation of gross body composition in fowl and small animals. The data on body composition provide more specific information on its developmental stage and nutritional status, not obtained by merely weighing the animal. Thus the laborious slaughter and chemical analysis techniques are frequently employed in most of the feeding experiments. Many studies have, therefore, been done to examine the relationships among the major chemical components and finding the more simple technique and system for the estimation of body composition.

With the advent of simplified dilution techniques, in vivo estimation of body composition has become more common especially in cattle, sheep, dogs, and swines.

BENDER and MILLER, (1953) demonstrated that body N: H_2O of the rat was related to age and only carcass water content was required to determine the net protein value of a feeding stuff. SUMMERS and FISHER (1961), and SUMMERS et al. (1965) showed that the method of BE DER and MILLER, to estimate carcass nitrogen from carcass water content, may be used with a high degree of accuracy in the growing chicks. COMBS and ROBEL (1962), experimenting on chicks of 13-24 day age, found, that H_2O/N ratio were slightly affected by the energy intake (average, 23.8:1). Also SUMMERS et al. (1965) found that if the combined quantity of fat and protein in the carcasse is expressed as a ratio of dry carcass weight, a relatively constant value is obtained which can be used for the estimation fo carcass fat.

REID and COWORKERS (1955) gave an equation for calculating body fat from the measured water in living cattle, using the dilution technique and based on the recognition that a highly predictable inverse relationship exists between water and fat content in the body. The protein and ash contents were calculated after determining the percentage of the protein and ash in the fat free dry carcass.

Moreover, HAROLD (1958) mentioned a modified method for the application of the antipyrine dilution technique (50 mgm/1 ml 0.9% saline solution) in the poultry and calculated the percent of body fat from estimated body water and fat content

ABDEL-HAFEEZ et al (1976 & 1979), and NABILA GAZIA et al. (1979) stated that, estimated moisture values from blood samples 1 hour after amino-benzene (10%) injection in fowls, showed a high degree of accuracy with the determined one. Also, they found that results confirmed the inverse relationship between fat and water, and the estimation of body protein using its relatively constant percentage in the fat free dry carcass.

This study was undertaken to examine the relationships existing among the major chemical components of the rabbit carcass and making use of these relationships for the estimation of body composition using the antipyrine dilution technique.

EXPERIMENTAL

This study was experimented on 17 adult rabbits of about 7 months old. They were fed ad-lib. on a dry ration composed in percentage, of crushed white corn, 35; crushed horse beans, 32; decorticated cottenseed meal. 20 "the meal is treated by 3.4% ferrous sulfate as mentioned by ABDEL-HAFEEZ (1979)"; wheat bran, 13; mineral mixture, 2.5 "Pfizer preparation", and vit. AD_3, 0.4%.

Rabbits were individually injected, by heart puncture, 3 ml. of antipyrine saline solution (50 mgm/1 ml 0.9% saline solution), then one ml of blood was taken after half and one hour from injection and the HAROLD method (1958) was used to determine the antipyrine in the blood. The body water content was calculated according to the equation:

$$\frac{\text{mgm of antipyrine injected}}{\text{mgm \% of antipyrine in the blood sample}} \times 100$$

The antipyrine in the blood sample was adjusted according to SCHALM (1978), who considered that the blood of rabbit contains 86.5%, water Rabbits were deprived of food for a period of 12 hours and killed using chloroform inhalation, then they were weighed immediately to obtain the fresh body weight. Each carcass was dried in hot air oven at 105°C to the degree of easy grinding. The carcasses were finely ground in an electric mill, and representative samples were taken for final drying at 105°C., and the total moisture content was calculated.

Duplicate samples were taken and analysed for the protein, fat and ash content according to the methods described in the A.O.A.C (1970). The results were statisticaly analysed using SNEDECOR and COCHRAN (1967) methods.

RESULTS and DISCUSSION

Chemical analysis of the carcasses showed that the average content of the major components were as showed in Table (1).

Table (1): The average percentage, of the major chemical components in the body of rabbits

Chemical components	%
Water	77.3 ± 0.354
Protein	16.23 ± 0.448
Fat	1.47 ± 0.082
Ash	3.61 ± 0.128

Statistical analysis of the moisture data showed that the estimated moisture values (using the antipyrine dilution technique) were positively correlated with the determined one (using the drying method) especially when blood samples were taken after one hour from injection. This agreed with what was found by ABDEL-HAFEEZ et al. (1976 & 1979) and NABILA GAZIA (1979) in poultry.

The estimated values for blood samples taken 1 hour after injection were relatively lower than the determined ones and it was found that as an adjustment for the estimated values, it must be increased by 0.91% as a correction factor Table (2) shows the comparison between the different values.

Table (2): A comparison between the determined and estimated moisture content after ½ & 1 hour from injection of antipyrine.

	D*	E ½ h**	E 1 h**	Cal***
Mean	77.3	75.11	76.57	77.27
SD	2.35	1.40	1.46	1.46
SE	0.570	0.338	0.354	0.354
r		0.68	0.73	

* D: determined moisture.

** E: estimated values using the antipyrine dilution technique.

*** Cal: calculated values using the correction factor 0.91% and moisture data of E 1.

They body fat content was found to be ranged from 0.95 to 2.2 with an average of 1.47%. It was noted that the higher values of fat content were associated with lower values of moisture (Table 3). Statistical analysis showed that this relationship was significant (r = 0.611) and the fat content showed a significant linear regression on moisture content expressed by the regression dquation:

$$y = 8.2833 \quad 0.0882\ x$$

where y = percentage of fat and x = percentage of water

Thus, the determined or the calculated moisture values could be used for the estimation of fat content These results, confirm what was found by REID and COWORKERS (1955), HAROLD (1958), SCOTT (1972), ABDEL-HAFEEZ et al. (1976 & 1979) and NABILA GAZIA et al (1979)

Table (3): A comparison between the determined (E) and calculated (C) fat content (%) on wet basis using the regression equation and the calculated moisture content

	D	C
Mean	1.74	1.529
SD	0.339	0.130
SE	0.082	0.032
r		0.657

The values in the aforementioned table were found to be significantly correlated as it is shown from the correlation coefficient.

The total body protein was found to be ranged from 13.32 to 20.10% with an agerage of 16.23% (Table 4). Statistically, it was found that there was a negative correlation (r = - 0.642) between moisture and protein values (on wet basis). This coincides with our findings, NABILA GAZIA et al. (1979) in poultry at one and two months of age, while ABDEL-HAFEEZ (1976) found no correlation at one year old cocks. This means that what was mentioned by SUMMERS and FISHER (1961), COMB and ROBEL (1962), and SUMMERS et al. (1965) regarding the constancy of H_2O : N ratio is not reliable in mature rabbits or fowl.

The linear regression of protein content (on wet basis) can be expressed by the equation:

$$y = 78.4738 - 0.8129\ x$$

were y = estimated protein content of the wet carcass,

and x = Water content of the carcass.

The calculated protein values using the regression equation showed a high degree of accuracy with the determined ones, a finding that confirms the method mentioned by REID et al. (1955) for protein estimation.

Table (4): Comparison between the determined and calculated protein (wet basis)

	D	D_1*	C_2**
Mean	16.23	16.23	16.24
SD	1.848	1.188	1.6
SE	0.448	0.288	0.388

* C_1 : calculated protein content using the regression equation.

** C_2 : calculated protein content using its relatively constant percentage in the fat-free dry carcass.

The statistical analysis showed that there is no correlation between water content and protein content of the dry carcass while a negative correlation was found by ABDEL-HAFEEZ (1976) in fowl at 4 months of age and positive correlation at 2 months of age (NABILA GAZIA, 1979) and one year old cocks (ABDEL HAFEEZ et al. 1979).

Also the protein percentage of the fat free dry carcass was calculated and found to be relatively constant (76.33 ± 0.5) as that found with poultry at 4 & 12 months of age (ABDEL HAFEEZ et al. 1976 & 1979). This value could be used for the estimation of protein content (using the calculated values for moisture and fat). The ash percentage in the fat-free dry body was found to be relatively constant and everaged 17.02 ± 0.42.

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