

## The Relationship between Rectal Temperature, Respiration Rate and Body Weight in Rabbits.

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**H**ERITABILITY values for morning and afternoon body temperature and respiration rate calculated in Giza rabbits; at three months of age. The numbers used were 160 individuals, the progeny of 22 sires and 72 dams. Body weight was also recorded. The highest significant value of  $h^2$  was that of respiration rate at morning being 0.74. Body weight was negatively correlated with respiration rate, both  $r_p$  and  $r_g$  were high, significant and negative.

Body temperature is one of the main phenomena associated with the physiological reactions of body. Respiration rate is also a correlated phenomenon. Differences between breeds of poultry with respect to these two characters had been reported by Hillerman and Wilson (1955). Mostageer *et al.* (1975) reported differences between Friesian and Baffaloes in respiration rate. Genetic differences between individuals in these two traits had been studied in the Fayoumi breed in chicks by Obeidah *et al.* (1975).

This work has been done as a preliminary genetic study of body temperature and respiration rate in Giza rabbits. Body weight was taken as the production character.

### Material and Methods

A total number of 160 individuals, the progeny of 22 sires and 72 dams of Giza rabbits were produced in May and Kept till the age of three months (August) in the Poultry Breeding farm Faculty of Agric., Cairo University. Beside body weight (WT), rectal temperature (in °F) in the morning (T1) and in the afternoon (T2) and respiration rate in the morning (R1) and in the afternoon (R2) were recorded on each individual at three months of age. Measurements were taken between 6-8 o'clock in the morning when air temperature was about 18° C and between 3-5 o'clock in the afternoon when air temperature was about 34° C.

Differences between body temperature (DT) and of respiration rate (DR) were calculated. The variance analysis was carried out to give the combined estimates of heritability for the 7 for mentioned characters (T1, T2, R1, R2, DT, DR, and WT). Phenotypic correlations and the combined estimates of genetic correlations were also computed.

### Results and Discussion

Means, phenotypic and genetic variances and heritability estimates for the traits studied are presented in Table 1. The mean difference between T2 and T1 (DT) is 0.43° F. Respiration rate showed a higher value also in the difference reached the value of 20 beats per minute. A higher respiration rate can be an efficient means of increasing heat loss for short periods (Bianca 1965).

TABLE 1. Means, phenotypic variance (Vp), genetic variance (Vg) and combined estimate of heritability ( $\pm$  S.E.) for the traits studied

Characters	Means	Vp	Vg	h <sup>2</sup>
T 1 . . .	102.25*	56.25	6.53	0.116 $\pm$ 0.224
T 2 . . .	102.88*	27.23	12.91	0.474 $\pm$ 0.239
R 1 . . .	96.98**	1066.46	790.27	0.741 $\pm$ 0.242
R 2 . . .	117.49**	782.42	228.25	0.291 $\pm$ 0.245
DT . . .	0.43*	73.88	17.51	0.237 $\pm$ 0.249
DR . . .	20.28**	527.91	264.27	0.501 $\pm$ 0.231
WT . . .	889.91***	769.28	409.29	0.581 $\pm$ 0.241

\* in °F.

\*\* beats/minutes.

\*\*\* in grams

The amount of phenotypic variance of T2 is a bit less than half the comparing value attained for T1 while the genetic variance of T1 is half its comparing value T2. Thus the heritability value of T1 was one quarter of that of T2 (0.116 vs 0.474). With respect to respiration rate the amount of genetic variance decreased drastically in the afternoon compared to its value in the morning, the decrease in  $\sigma^2_p$  was of smaller magnitude. Thus the heritability value of respiration rate decreased from the highly significant value of 0.74 in the morning to 0.29 in the afternoon. Respiration rate in the morning seems to be a reasonably genetically determined character in rabbits and also in chickens (Obeidah *et al.* 1975) compared to body temperature. Body temperature seems to be more connected with fitness than respiration rate in these two species of animals. It can be seen also that the difference between respiration rate in the morning and in the afternoon has a higher heritability compared to the corresponding difference DT.

Genetic and phenotypic correlations between the traits studied are presented in Table 2. The genetic correlation between body weight and T1

TABLE 2. Genetic and phenotypic correlations ( $\pm$ S.E.) between traits

T 1	T 2	R 1	R 2	Dt	Dr	Wt
T1	0.123 $\pm$ 0.078	-0.053 $\pm$ 0.079	0.045 $\pm$ 0.079	-0.798 $\pm$ 0.029	-0.129 $\pm$ 0.078	0.256 $\pm$ 0.074
T2	0.105 $\pm$ 0.691	0.159 $\pm$ 0.079	0.202 $\pm$ 0.076	0.500 $\pm$ 0.059	0.019 $\pm$ 0.079	-0.039 $\pm$ 0.079
R1	-0.447 $\pm$ 0.449	0.278 $\pm$ 0.265	0.723 $\pm$ 0.038	0.142 $\pm$ 0.077	-0.541 $\pm$ 0.056	-0.290 $\pm$ 0.072
R2	-0.021 $\pm$ 0.889	0.459 $\pm$ 0.363	0.888 $\pm$ 0.078	0.084 $\pm$ 0.074	0.189 $\pm$ 0.076	-0.177 $\pm$ 0.077
Dt	-0.520 $\pm$ 0.708	0.794 $\pm$ 0.183	0.512 $\pm$ 0.295		-0.101 $\pm$ 0.078	-0.247 $\pm$ 0.074
Dr	0.753 $\pm$ 0.299	-0.054 $\pm$ 0.354	0.904 $\pm$ 0.052	-0.507 $\pm$ 0.266		0.197 $\pm$ 0.076
Wt	0.956 $\pm$ 0.055	-0.004 $\pm$ 0.326	-0.556 $\pm$ 0.180	-0.588 $\pm$ 0.296	0.253 $\pm$ 0.302	

Estimates above the diagonal are the phenotypic correlations.

was found to be very highly significant and positive (0.96). Significant negative correlations were noticed between body weight and both R1 and R2. The phenotypic correlations of T1, R1, and R2 with body weight are found also to be of considerable magnitudes, bearing the same higher on that of  $r_g$  though of much lower values. Such results are expected on physiological basis. However the present work gives a support on a genetic basis.

It is interesting to note that no significant correlation exists between T1 and T2 either genetically or phenotypically, while the values of  $r_g$  and  $r_p$  between R1 and R2 are high, positive highly significant. Body temperature in the morning explains about none of the genetic variance of T2, while the morning respiration rate explains about 80% of the variance of respiration rate in the afternoon.

#### References

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## العلاقة بين درجة حرارة الجسم والتنفس بوزن الجسم في أرانب الجيزة

على عبدة

قسم الانتاج الحيوانى ، كلية الزراعة ، جامعة القاهرة

أجرى هذا البحث بمزرعة كلية الزراعة جامعة القاهرة. قدر العمق الوراثى لدرجة حرارة الجسم والتنفس في أرانب الجيزة عند عمر ثلاثة أشهر \* . كانت الاعداد المستقلة ١٦٠ أرنب أبناء ٢٢ أب ، ٧٢ أم \* وقد سجل وزن الجسم في هذا العمر أيضا \* وكانت أعلى قيمة للعمق الوراثى معنوية هي للتنفس صباحا حيث كانت ٠.٧٤ ± ٠.٢٤ . كان معامل التلازم الوراثى والمظهرى لوزن الجسم مع معدل التنفس سواء صباحا أو مساءا سالبا ومعنوى عال .