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HERITABILITY OF DIGESTIBILITY OF FEED DRY MATTER AND CRUDE PROTEIN AND THEIR RELATIONSHIP WITH VARIOUS PRODUCTION TRAITS IN NEW ZEALAND WHITE RABBITS

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Introduction

The factors that have an impact on digestibility coefficients have already been investigated from the viewpoints of nutrition and physiology, but very few authors have approached the genetic aspects of this question. There are different opinions regarding the breed's effect on digestibility coefficients. According to Schurch (1969) and Warwick and Cobb (1975), the breed might play a modifying role, but it should be negligable. Similar statements have been made by Jentsch et al (1963). Fekete et al. (1981) have not found any significant differences between the digestibility coefficients of angora rabbits and White Pearl hybrids. Halga (1977), however, came to the conclusion that the digestibility coefficients are higher in the case of chinchilla than in the case of the Termonde white breed. More extended investigations form the basis of Lebas (1973)'s results. He is of the opinion that breed has no influence on digestibility coefficients during the growing period. The digestibility coefficients of dry matter and organic matter proved to be by 4 % better in the New Zealand White breed than in the Californian rabbits if they all were evaluated as adults. In their former research, Hullár and Gippert (1986) found lower digestibility between 6 and 12 weeks of age concerning dry matter and crude fiber, as an average of six weeks data, in Californian rabbits as compared to New Zealand White rabbits, by 1.2 % and 3.7 %, respectively. Maertens and De Groote (1982) did not find any differences between the digestion of Californian and New Zealand White breeds. However, parentage (family) had a slight effect on digestion.

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Material and method

Our experiment was conducted on the rabbit farm of the Research Center for Animal Feeding and Nutrition at Gödöllő. 248 growing rabbits, offspring of 13 bucks and 129 does were included in it. We measured the body weight of the rabbits at the age of 6, 9 and 12 weeks. At this latter age, we calculated the digestibility coefficients by the application of the method developed by Fekete and Gippert (1982). The laboratory analysis was conducted according to the Hungarian Standard. The animals were fed ad libitum concentrates which contained 10.2 % crude protein, 13.8 % crude fiber and 10.8 MJ/kg net energy. From the measured data, we calculated the ratio of feed conversion for the periods of 6 to 9, 6 to 12, and 9-12 weeks of age. The estimation of the genetic parameters was carried out using variance and covariance components between paternal half-sibs according to the method described by Tamássyné and Tóth (1974).

Results and discussion

The estimated heritability values are shown in Table 1. The heritability values of body weight at different ages are similar to those available in literature (Povjavdiev, 1974; Szendrő, 1986). Heritabilities of body weight gain and feed conversion coincide with those in literature as well. We consider these results essential because we had not found any data concerning the heritability of dry matter and protein digestibility coefficients in the relevant literature, but since the heritabilities of the other parameters examined in the experimental stock are confirm with the data in literature, it can be supposed that the values of these two parameters are not loaded with a big estimation error. The digestibility coefficients for dry matter and protein can be stated as of poorly heritable traits (h^2: 0.19 and 0.27, respectively), which is acceptable when considering how many factors digestibility is influenced by.
Figures in Table 2 represent the relationship between digestibility coefficients of dry matter and protein and other traits of growing rabbits. Low, positive correlation coefficients have been found in connection with body weight measured at different ages and weight gain in certain periods. Slightly negative values have been found in connection with feed conversion ratio. The strength of correlations were not affected by the age of the animals. The negative correlation values received in connection with

feed conversion ratio can be considered as positive ones from practical viewpoint, since better feed efficiency is associated with better digestibility coefficients of dry matter and protein.

Very close correlation has been detected between the digestibility coefficient of dry matter and that of protein (r = 0.88). Therefore, with the exception of extreme cases, such as extreme growing speed, digestibility coefficient of dry matter, which is faster and easier to determine, can be used for prediction in practice.

To give a summary of our results, we can draw the conclusion that digestibility coefficients are not worth being taken into account as points of selection because of their low heritability and weak correlation with other traits. Nevertheless, since rather big differences have been found among the groups of buck offspring, a result similar to that of Maertens and De Groote (1982), the reasons for these differences should be worthwhile examining in the future.

References

Fekete S. - Gippert T. (1981): Magyar Állatorvosok Lapja, 36. 484-488.

Halga M. (1977): Lucrari Stiintifice Institut Agronomic Ias; 2. 39-40.

Hullár I. - Gippert T. (1986): Állattenyésztés és Takarmányozás, 35. 4. 365-367.

Jentsch,W. - Schiemann,R. - Hoffman,L. - Neuring,K. (1963): Arch. Tierernähr., 13. 133-145.

Lebas,F. (1973): Annls. biol. anim. Biochem.Biophys., 13. 767.

Schürch,A. (1969): Paul Parey, Hamburg-Berlin, 272-297.

Szendrő Zs. (1986): Ph.D. Thesis

Maertens,L. - De Groote,G. (1982): Rev. Agric. 35. 2787

Summary

In an experiment, the authors determined the heritability values of the digestibility coefficients of the dry matter (h^2 = 0.19) and crude protein (h^2 = 0.27) in the diet fed to 248 growing rabbits of 12 week progeny from 13 bucks. Their correlation with different traits was also analysed. The heritability values were found low and also, their correlation with body weight at different ages, weight gain during the concerning periods and the feed conversion proved to be low.

Table 1

Heritability values of traits

	h^2
Body weight at 6 weeks of age	0.28
Body weight at 9 weeks of age	0.31
Body weight at 12 weeks of age	0.46
Daily weight gain between 6 to 9 weeks	0.23
Daily weight gain between 6 to 12 weeks	0.30
Daily weight gain between 9 to 12 weeks	0.26
Feed conversion between 6 to 9 weeks	0.26
Feed conversion between 6 to 12 weeks	0.35
Feed conversion between 9 to 12 weeks	0.29
Digestibility coefficient of dry matter	0.19
Digestibility coefficient of crude protein	0.27

Table 2

Correlation values between production traits and digestibility coefficients of growing rabbits

	Digestibility coefficient of	
	dry matter	crude protein
Body weight at 6 weeks of age	0.19	0.22
Body weight at 9 weeks of age	0.22	0.14
Body weight at 12 weeks of age	0.23	0.11
Body weight gain between 6 and 9 weeks	0.1	0.17
Body weight gain between 6 and 12 weeks	0.13	0.21
Body weight gain between 9 and 12 weeks	0.16	0.21
Feed conversion between 6 and 9 weeks	0.01	-0.11
Feed conversion between 6 and 12 weeks	-0.12	0.05
Feed conversion between 9 and 12 weeks	-0.18	-0.15
Digestibility coefficient crude protein		0.88