

PROBLEMS OF BEHAVIOUR GENETICS IN FARM ANIMALS BREEDING

Fragen der Verhaltensgenetik zur Anwendung der Zuchtprogrammen

Problemas genéticos de conducta en los animales domésticos

J. CZAKO *

Nowadays, when almost in all branches of farm animal breeding the industrial-type keeping systems have become more and more general, the taking into consideration one of the newest area of population genetics seems to be necessary. This is the ecological genetics, analysing the inheritance and variability in the light of environment factors. Its subject includes the investigation of following problems: how the animals behave themselves among the changed large-scale production conditions, how they react upon the new living conditions by their production, health condition and by their multiplying ability.

The taking into consideration of behaviour factors, as one of the manifestations of physiological and psychological adaptation, is very important in the course of development of breeding programmes. It should be established that the animals, among industrialized keeping conditions, what sort of reaction ability have, what kind of is their behaviour in general, how much of it could be inheritent, and which are those factors inheritance value of them can be established, can be expressed and can be used in breeding activity.

The problem is complicated and our knowledgement on this area is fairly deficient. The explanation of interrelationships among behaviour characteristics and genes needs considerable work, in the future.

From the point of view of production, as regards the keeping system of farm animals, the fact, that a given population or a given group of animals within a population how react upon the employed technology, has the primary importance. The large-scale, industrial-type production can be realized only among determinated, identical keeping conditions. Among industrial keeping circumstances the standardization of keeping and feeding conditions reaches such level, where the satisfaction of individual requirements of animals is impossible and

* University of Agricultural Sciences, Gödöllő, Páter Károly u., Hungary 2103.

otherwise it can not be intended. Among such conditions the diversity of environmental influences, the so-called «paratype variance» is smaller because the number of variance—components bringing about by the environment, decreases. This type of production system, as regards the poultry and pig keeping, has been accomplished and on the field of cattle keeping the wide-ranging introduction of this system has been occurred, nowadays.

As the pheno-type of animals is based on interaction of their genotypes and para-types, the reduction of variance bringing about by environment is favourable to succes of geno-type variance. At the same time it should be taken into consideration, that the genetically similar or different individuals react in different way upon the industrial-type technologies, depending upon the fact how they can adapt themselves to the given environment. Thus the absence of realization of inheritance ability can be the higher, the more sensitive and more demanding the animal or population are, in consequence of standardized environment influences. It is obvious, that the importance of this influence, which is called as the interaction of genotype and environment, has greatly increased, among standardized keeping conditions.

On the field of poultry- and pig-breeding the development of production stock of identical genotype does not encounter any difficulties. The situation is quite different in the case of cattle keeping where the production and breeding can not be separated, as regards the female individuals. In this case the main purpose is the increase of genetical variation, and at the same time it is expected that the reaction of population, assembled from individuals of different genetical and physiological ability, would be unified upon the influence of industrial-type environment. In the meantime the satisfaction of individual requirements of animals necessarily is surpassed. From the above it can be concluded, that among industrial keeping conditions, from the point of view of improvement, those cattle-populations are appropriate, genetical variance of which is large as regards certain standards of value, and at the same time the reaction variance of which upon the environment—in spite of previous fact—is small. In this case the measurement of interaction of genotype and environment by the help of determination of behaviour components and the development of stock reacting in the same manner on the environment influences, is more and more necessary.

As it is well known in cattle breeding the improvement activity is based on male individuals. In consequence of this fact the knowledgement of behaviour of bulls, how their descendants react upon industrial environment, and what kind of consequences of interactions should be taken into consideration, cannot be indifferent. Such factors are for example: the time of lying and feeding. In the industrial type production technologies the time of feeding and resting is limited. For this reason those populations are appropriate lying and feeding period of which are approximately the same on phenotype base nevertheless there is no difficulty of development of variance as regards their milk production.

According to my investigations among the five red and white (simmenthaler) bull groups of cows as regards the trend of lying and feeding time there existe difference (Table 1). The descendant groups reacted in the same way by their production, while in different way by their behaviour upon the standardized environment in the progeny testing station. It would be desirable if the descen-

TABLE 1

Group of different P. T. bulls	Lying - Liegen Reposo		Feeding - Fressen Comida	
	Time of lying	Different to c. mean	Time of feeding	Different to c. mean
Nachkommenschafts- gruppen	Liegezeit	Differenz zu Dw.	Fresszeit	Differenz zu Dw.
Grupos de los toros según la prueba de la descendencia	Tiempo de reposo (min.)	Diferencia a la media ± %	Tiempo de ali- mentación (min.)	Diferencia a la media ± %
I	700.6	+ 2.8	261.0	+ 8.0 *
II	647.5	- 5.0 *	241.8	—
III	703.8	+ 3.3	226.0	- 8.1 *
IV	658.7	- 3.3	244.9	+ 1.3
V	695.6	+ 2.1	238.5	- 1.3
\bar{x}	681.3	—	241.7	—

* $P \% < 5$.

dant groups of different bulls reacted in the same way as regards their lying and feeding rhythm, and in different way by their production.

In adaption to lying and feeding time I have examined the body position, too, from that point of view, whether the descendant groups have been different from the whole population and whether the so-called usual lying position—when cows draw their hinder-leg closely beside body—how often occurs in different groups. Namely the lying position can be considered as an interaction of genotype and environment. For example in binded system the animals may disturb each other because of uncomfortable lying position or the wrong size of lying place. According to the data given in Table 2, among the descendant groups of bulls there are also differences in the shaping of comfortable lying place. As there is no relationship between occupying of comfortable position and stretching out legs in right angle, it is not unambiguous, that which factors play predominant role in occupying of comfortable position.

Naturally the fact, that the development of irritation, characterizing the species, is possibly only in that case, when the animal meet such environment or environment irritation which allow to prevail the inborn behaviour and activity dispositions, cannot leave out of consideration.

Investigating of behaviour characteristics it should be also established, that among existing production circumstances which characteristics are predominant (e.g. in binded system this is the sociological stress effect), which are inborn and which are trainedones.

Based on the research work done up now only the behaviour factors can be identified, and it is impossible to answer the question whether the behaviours of animal how can be modified, and which are the conservative behaviours and the changeable ones. Where is the limit of loading and technological tolerances? What sorts of differences do exist among the different species? And in the new

TABLE 2

Lying position Rubelage Posición de reposo	%	Different to c. mean Differenz zu Dw. Diferentes a la media	
		Number of groups	Different %
Lying side R Seitenlage R Posición de reposo D	31,43	5	> 10
Lying side L Seitenlage L Posición de reposo I	68,57	5	> 10
Position of foot Lage der Füße Postura de las patas	-	-	-
┌	39,06	3	> 10
└	49,51	2	> 10
∨	11,43	1	> 10

establishments, in the new environment, the new irritations contributed to the inborn behaviour characteristics, how become consolidated? Answering of these questions makes possible to decide that the technological tolerance of farm-animals how and in what extent can be influenced in steady and provisional environment.

In this short paper I want to direct your attention only to the importance of behaviour genetics and complication of the problem as well as to the necessity of taking into consideration of psychological feedback.

If the recognizing of components succeed the synthesis of symptoms will be easier task. In possession of this knowledgement the analysed combination ability, theoretically, can be controlled and put into the service of production. Although the problems and task being solved indicate a logical and chronological order they should be studied simultaneously because the development industrialized production activity is the task of our days.

SUMMARY

Farm animals with different genetics can react very different upon the industrial technology. The importance of the interaction of genotype and environment has increased among standardized keeping—conditions. The time of feeding and resting is limited in the industrial type production—technologies. For this reason those populations are appropriate, lying and feeding periods of which are approximately the same on phenotype base, nevertheless there is no difficulty of development of variance regarding their milk production.

According to my investigations among the five simmenthaler (red and white spotted) bull groups of cows, there exists a difference in the lying and feeding time and the lying position (Tables 1 and 2).

It would be desirable, if the groups of different bulls reacted in the same way as regards their lying and feeding time as well as the lying position, and in different way in their milk production.

Based on research work done up to now only the behaviour factors of the farm animals can be identified and it is impossible to answer, how their technological tolerances can be modified and where the limit is.

ZUSAMMENFASSUNG

Die verschiedene Genotypen von landwirtschaftlichen Nutztieren können verschiedene Reaction für die industriellen Technologien gehen. Die Genotype —Umwelt— Interaction hat eine grosse Bedeutung in der standardisierten Umwelt. In der industriemässigen Produktion möchte man durch die Technologien die Dauer des Liegen und Fressen einschränken. Deswegen sind die Populationen am besten geeignet, die in Liegen und Fressen sich gleichen und in der Milchproduktion grosse Variationen aufweisen können.

Die weibliche Nachkommenschaftsgruppen von den fünf geprüften Höhenfleckvieh Bullen haben einen signifikanten Unterschied in Liegen und Fressen und in dem Liegenform gegeben. In der industriemässigen Haltung wäre es wünschenswert, dass die Tiere in Liegen und Fressen wie auch in Liegenform gleichmässig reagieren.

Auf Grund der bisherigen Untersuchungen können wir nur die Verhaltensmerkmalen feststellen. Wo die Gränze der Anpassungsfähigkeit in der industriemässigen Haltung ist, können wir heute noch nicht beantworten.

RESUMEN

Los animales domésticos de genotipos diferentes pueden reaccionar también de manera muy distinta en relación con la tecnología industrial. La importancia de la interacción del genotipo con el medio ambiente ha aumentado bajo la acción de las condiciones de manejo unificadas. El tiempo destinado al reposo y a la alimentación viene reducido en la producción animal de tipo industrial

y tecnológica. Por esta razón las poblaciones animales van siendo adaptadas en su cuantía y adecuadas a la cifra necesaria.

De acuerdo con las investigaciones del autor sobre cinco grupos de vacas Simmenthal y berrendas en colorado, existen diferencias en los tiempos de reposo y alimentación (Tablas 1 y 2).

Sería de desear que los grupos de animales diferentes, si se quiere que reaccionen de la misma manera, dispongan de tiempos idénticos para comer y reposar, en forma que ello no afecte a la producción láctea.

Las investigaciones realizadas hasta ahora por el autor se han llevado a efecto sólo sobre los factores de conducta, no siendo posible prever si las tolerancias tecnológicas deberán ser modificadas y en qué manera.