

## **SOME CHARACTERISTICS OF BEHAVIOUR IN FINE-WOOLLED SHEEP AND THEIR CORRELATION WITH REPRODUCTIVE FEATURES**

**Quelques caractéristiques de conduite chez les ovins à laines fines  
et leur corrélation avec des traits reproductives**

**Algunas características de la conducta de los ovinos de lana fina y su  
correlación con los rasgos de su reproducción**

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One of the authors of this paper (BELYAEV, D. K., 1962-1973) has developed an idea that some features and functions characteristic of the ancestors of modern domestic animals were rearranged in the process of domestication mainly by means of selection for behaviour traits. Selection has led to formation of animals with domesticated behaviour which were resistant to the stressing factors of breeding under the man's control. Due to correlation between behaviour and reproductive function, the selection for behaviour during domestication brought about drastic changes in some features of reproduction (shift of breeding season, loss of monoestrusness and appearance of polyestrusness, increase of fertility, etc.).

Experimental studies of this problem were carried out in our laboratory in comparative aspect, taking into account the species and the degree of domesticatedness of animals.

We worked out a method of evaluation of individual behaviour of sheep in the stock, on the basis of some characteristics of food, passive defensive and exploratory reaction under changing feeding stereotype. By means of this method, we could discover some behavioural polymorphism and intra-stock behaviour organization, which are based on individual behaviour of sheep within a stock.

The object of the study were fine-wooled Altai sheep. Evaluation of behaviour was carried out under usual farming conditions on large groups (500-700 animals) of different age (from 1 to 7 years).

As the feeding stereotype changes, the behavioural characteristics of the sheep are manifested quite distinctly, so that one can distinguish three basic types of individual behaviour. In the sheep of behaviour type I, the change of feeding stereo-

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type does not exert any visible stress, their exploratory behaviour goes over to a state feeding behaviour; these sheep are found usually at the head of the stock. Two other behaviour type are represented by cautious and timid animals; the change in feeding stereotype exerts stress on them, especially on the type III. They keep behind the sheep of the type I, get used to new conditions with difficulty and usually try to avoid them in some or other way; their exploratory behaviour is usually succeeded by passive defensive one. It is quite natural that the type I is represented by the most domesticated animals, while the types II and specially III are at a lower level of behavioural domestication and still preserve some traits of behaviour characteristic of wild animals.

These three types of behaviour are found, in different proportions, in the groups of yearlings and among adult ewes and rams. In the groups of yearlings there prevail the sheep of types II and III, but with age the proportions of behavioural types changes due to relative increase in the number of animals of type I and corresponding decrease of types II and III. Therefore, the manifestations of passive defensive behaviour in sheep decrease sharply with age.

Estimation of correlation between the behaviour type of mothers and daughters by means of calculation of tetrachoric correlation index shows a quite significant value of 0.34 which witnesses for the hereditary nature of behaviour type in sheep.

An analysis of distribution of behaviour types depending on breeding qualities of sheeps demonstrates that in the groups of elite yearlings 45-52 % of animals belong to type I and 23-28 % to types II and III, while in the groups of young individuals of the first class animals of the two latter types prevail. In other words, a half of animals of the best, elite part of yearlings belongs to behaviour type I.

An experimental study of regularities of appearance of sexual activity in lactating sheep during winter (February-March) lambing demonstrated that the estral activity in some ewes of type I appears still before weaning, between April, 1 and June, 30, while in the sheep of other behavioural types, the first heat after lambing was recorded only on July 15. Before the beginning of mating season, as much as 34 % of sheep of type I only 14 % of type II and III were in heat. Because of this, in sheep of type I the seasonal anoestrus was shorter by 16 days, on the average.

The results of our study allow us to consider behavioural characteristics as an important factor which determines the individual peculiarities of seasonal anoestrus in fine-woolled sheep. The peculiarities of seasonal anoestrus characteristic of each behavioural type has a high age repeatability which witnesses for a high stability of this feature. It is important that in the progeny of mothers of type I, most sheep have short anoestrus. So, the dependence of oestral activity on behavioural type in the sheep seems to be controlled genetically.

One of the most essential characteristics of reproductive function in sheep is the total index of reproductive capacity, or number of lambs per ewe by the time of weaning. The data of our study show that for several years, the sheep of type I have given the largest number of lambs. Thus, in a group of young sheep of two years of age, at first lambing, 115-127 % of lambs by weaning time were obtained from mothers of type I, 105-122 % from type II, and 92-103 % from type III. These typological differences were established on selected healthy fema-

les with good productive qualities under the conditions of high breeding culture, good feeding and keeping. Such sheep gave birth to healthy, viable lambs with high live weight at birth.

Milk yield is a factor directly connected with reproductive capacity of sheep. The Altai sheep have a good milk yield already at the first lactation, the yield in type I exceeding to different degrees, but constantly, that in other types. For example, at the first lambing the milk yield in a ewe having two lambs, was, depending on the year, in mothers of type I, 1.63-1.92 Kg of milk a day; in type II, 1.28-1.41 Kg. On the average, the milk yield in females of type I was higher, in ewes having one lamb, by 14.5, and in ewes having two lambs, by 24.5 %. The repeatability of milk yield from year to year is high in the same sheep: correlation coefficient between the value of milk yield between the first and the second lactation was 0.70; between the second and the third, 0.73, and between the first and the third, 0.77.

So, in fine-woolled sheep, behavioural features correlate with reproduction. The higher the level of behavioral domesticatedness of sheep, the greater are the shifts of the time of breeding season and the higher are the indices of their reproductive capacity. This correlation is demonstrated with high degree of significance in the determination of type of behaviour at the age of 1 year when the animals are in the groups of yearlings, and is preserved in older animals.

The data of this work witness for the fact that the behavioural domestication of animals which correlates with their reproductive capacity, has been carried out on the basis of genetically determined behaviour polymorphism of these animals. In spite of many centuries of breeding under the control of man, this polymorphism is preserved in high productive stocks under the conditions of high zootechnical and economical culture.

#### SUMMARY

On the basis of studies of exploratory feeding behaviour in sheep by a special method, there was found a genetically determined variability in the degree of domesticatedness of animals. The animals of type I are characterized by the greatest, of type II, by intermediate, and of type III, by the least manifestation of domestication effect on behaviour. It is established that estrous activity in the sheep of type I appears earlier, and their fertility and milk yield are significantly higher than in sheep of types II and especially III.

#### RESUME

Sur la base d'études de conduite d'alimentation exploratoire chez les brebis par un méthode spéciale, fut trouvée une variabilité génétiquement déterminée dans la quantité de domesticité des animaux. Les animaux de type I sont caractérisés par la plus grande domesticité, ceux du type II, par une domesticité moyenne, et ceux du type III par la plus petite manifestation d'effet de domesticité sur la conduite. Il est établi qu'une activité (estrous) chez les brebis du type I apparait plus tôt, et leur fertilité et production laitière sont significativement plus hauts que chez les brebis du type II et spécialement du type III.

## RESUMEN

Sobre la base de estudios acerca de la conducta exploratoria de alimentación por un método especial, se encontró una variabilidad determinada genéticamente en el grado de domesticidad de animales. Los animales del tipo I se caracterizan por tener el máximo, los del tipo II son intermedios y los del III tienen el mínimo de manifestación del efecto de domesticación en la conducta. Se ha demostrado que la actividad estral en el ovino del tipo I aparece antes, y que su fertilidad y producción lechera son considerablemente mayores que los del tipo II y aun más que los del III.