

## HEREDITARY DETERMINATION OF CATTLE TO EXTREMITY DISEASES

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### SUMMARY

The role of inheritance in cattle extremity diseases is revealed. The inheritance coefficients of this character are 0.014 and 0.200. The suggestion has been put forward the polygene character in the inheritance of the extremity disease resistance. To improve breeding efficiency the complex evaluation of the gene pool in herds, families and sires is proposed. Phenotypic and genetic variation in the velocity of abrading hoof horn has been studied as well as its moisture absorbing capacity.

**Keywords:** dairy cattle, extremity diseases, heritabilities.

### INTRODUCTION

Health is an important prerequisite for the well-being and productivity of dairy cows. Extremity diseases is one of the most common diseases problems in milk production and may reduce milk yield, fertility, productive period (Esslemont, 1996). The disease average morbidity in dairy cows has been recorded to constitute 5-30% (Hung, 1995). It ranks third after mastitis and reproduction system diseases. The extremity diseases can be classified according to their origins: traumatic, systemic and infections (Politiek, 1986). The division into three main groups does not avoid some cases to get complicated due to different origin factors. There is also genetic component in etiology of the diseases, that is why in addition to veterinary measures in prophylactic and treatment of the extremity diseases it is necessary to study the role of heredity in their aetiology to find the opportunity to breed for cattle disease resistance.

### MATERIAL AND METHODS

The research was carried out in 1419 Black-and White cattle under conditions of West Siberia. According to the data of veterinary specialists and our own investigation of herds on the subject of cow extremity diseases we revealed 11% of animals to have been given the above diagnosis. Due to the great number of the extremity diseases animal general resistance and susceptibility to them were considered in breeding terms having the ones not differentiated.

Properties of hoof horn ( durability and moisture capacity ) were studied as a criteria to evaluate resistance to the extremity diseases.

### RESULTS AND DISCUSSIONS

Certain genetic resistance to diseases arose in some cattle breeds and species in the process of evolution. It could be observed in individual animals and relative groups. We studied the influence of acclimatisation on the frequency of the extremity diseases in animals imported from the European part of the country. Siberian cows are established

to have extremities less damaged (9.2%) than the imported ones (14.4%). Due to the aforesaid 64% of cows died while aboriginal animal mortality was twice less (32%). Besides, the animals originate from Denmark and Holland (imported and born in Siberia) took ill much more often in 30.4 and 21% of cases, respectively. These differences are to be due to heredity because the animals have been raised under the same conditions. It has been proved by the similar disease level on different farms.

True differences have not been revealed for the disease frequency in groups of animals with different levels of Holstein breediness. Differences have been identified for morbidity in cow families but no true ones have been revealed (9.2 - 12.1%) in lines. This may be due to the absence of artificial selection for this character, that is why the lines are not differentiated. Natural selection produces an equal pressure on the animals of all the lines.

Much greater genetic variability in the population was identified in sires for their daughters' resistance to the extremity diseases (0 - 23.4%) (table). Heritability of disease resistance calculated by a disperse method of intraclass correlation in different herds constituted 0.014 and 0.200. It is not efficient to carry out mass selection for resistance due to such low genetic variability of the character in the described population. That is why it is necessary to evaluate sires' genotypes for their daughters' morbidity. The character of bulls' normal distribution according to their daughters' extremity diseases, the absence of mothers' influence on daughters' resistance ( $r=0.02$ ) set forth the polygenic determination of this character (i.e. resistance is controlled by the great number of genes).

Table. The frequency of extremity diseases bulls progeny

Bull number	Number of daughters		Morbidity, %
	total	incl. sick	
1406	64	15	23.5 ± 5.3
937	41	8	19.5 ± 6.2
536	71	13	18.3 ± 4.6
119	118	17	14.4 ± 3.2
68777	80	11	13.8 ± 3.9
706	90	11	12.2 ± 3.4
493	55	5	9.1 ± 3.9
116030	69	2	2.9 ± 2.0

One of the indexes of dairy cattle resistance to extremity diseases is hoof horn abrading velocity and its moisture absorbing capacity. Phenotypic variability of abrading velocity constitutes 32.2% and the degree of moisture absorbing varies greatly in animals (from 16.8 to 30%). Correlation between the hoof horn abrading resistance and its moisture absorbing capacity has not been identified. It is obvious that the characters are determined by different genetic systems and the common part of genes is not great.

Hoof horns of sternal and vertebral extremities do not differ in the abrading resistance. Differences have been identified in the degree of hoof horn abrading and moisture absorbing of some sires' daughters and this is determined by heredity in many aspects. Inheritance coefficients ( $h^2$ ) of these characters were 0.05 and 0.18, respectively. The further search for marker characters of resistance to the extremity diseases is of great interest.

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