

GENETICS OF CATTLE RESISTANCE TO TUBERCULOSIS

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SUMMARY

Tuberculosis in cattle has been recorded in some populations of West Siberia for many years. TB average morbidity constituted 20.8% in the researched population. Tuberculosis frequency in families and bulls' offspring's ranged from 0-6.36% to 9.1-51.7%, respectively. The coefficients of tuberculosis resistance heritability were 0.06-0.08. Tuberculosis concordance constituted 60.0%. The hypothesis of polygenic inheritance of relative resistance to tuberculosis is proposed.

Keywords: Tuberculosis, Russia, cattle, bulls, families, heritability.

INTRODUCTION

Tuberculosis (TB) morbidity in man and animal has increased in many regions of Russia in recent years. It is Russia that has the highest index of human mortality in Europe. In 1971- 1975 there were 79-92 cattle farms unfavourable in TB terms in Novosibirsk region. These years tuberculosis incidence went up from 1.0 to 1.3%. In 1993 and 1997 diseased cattle constituted 0.36 and 0.71%, respectively. Man and animal TB epidemic spread is a global danger for all mankind (Cook, 1996). Little data is available on heredity determination of cattle resistance to TB (Gabris, 1972). The positive correlations have been revealed between TB and leucosis frequency as well as between leucosis and TB frequency in parents and their progeny (Kulikova and Petukhov, 1994).

MATERIALS AND METHODS

TB morbidity was investigated in 1757 daughters from 79 Black-and-White bulls on farms of Novosibirsk region. Tuberculosis was diagnosed by clinical, allergic and histological methods. The influence of the lines and 72 families on TB morbidity was studied in the progeny. The research was carried out in healthy and diseased cows (before infestation) of 793 mother-daughter pairs and 111 granddaughters.

RESULTS AND DISCUSSION

TB average morbidity constituted 20.8% in the researched populations. It was established that TB frequency in animals of different families varied from 0 to 63.6% (table). In some families the disease was recorded in 4 generations. By the method of dispersive analysis true influence of the families on TB morbidity was identified constitute 25.2%. In two populations 15.2 and 29% of families were revealed to have 15 and over 40% morbidity, respectively. The conditions of health of mothers and grandmothers slightly influenced TB morbidity of daughters and granddaughters. Diseased mothers produced by 3% more diseased daughters on the average as compared to healthy mothers. Both healthy and TB cows yielded the same quantity of milk (4164 and 4225 kg in first lactation; 4937

and 5162 kg in third lactation, respectively). The influence of bull genotype on TB susceptibility and resistance in daughters was shown. TB morbidity in the progeny of some bulls varied from 9.1 to 51.7%. No bulls with the sufficient number of TB free daughters were not found. It testifies to relative hereditary resistance to the disease. The force of father genotype influence on progeny morbidity is equal to 6%. The lines were less different in resistance than the individual bulls. Morbidity frequency in animals of different lines ranged from 15.2 to 36.4%.

Table. Tuberculosis frequency in bull progenies and families

Bulls number	Total number	Sick %	Family number	Total number	Sick %
19615	29	51.7±9.3	3734	11	63.6±14.5
106	79	43.0±5.6	4909	13	61.5±13.5
16481	33	15.1±6.2	350	16	31.2±11.6
2029	22	9.1±6.1	4865	13	15.4±10.0
			3657	6	0

Fathers with 22 and 32.6% average morbidity produced sons whose daughters morbidity constituted 25.7 and 27.3%, respectively. Progenies from the fathers and their sons had the same morbidity that testifies to the absence of selection for this character.

The coefficient of resistance heritability determined for the coefficient of mother-daughter correlation was equal to 0.06. h^2 determined for the fathers constituted 0.08.

TB concordance is 60%. TB frequency has been identified to have normal distribution among the families and bulls. TB resistance and susceptibility is proposed to be inherited polygenously. In populations with high frequency of the disease there is genetic resistance variation in animals. In TB unfavourable areas it is reasonable to evaluate bull genotype for the characters of productivity and TB resistance. It is possible to increase TB relative resistance by breeding methods.

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