

## ADAPTATION AND MILK PRODUCTION OF HOLSTEIN CATTLE IN WESTERN SIBERIA, USSR

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### SUMMARY

The problems of cattle adaptation in Western Siberia are reviewed. Recently a large number of Holsteins has been imported to the USSR. Therefore the understanding of the physiological and immunological factors controlling the susceptibility of the cow to diseases will lead to more rational approaches to selection and control. The results of several studies indicate that disease incidence and the cost of the breeding program increase with selection for milk yield (Nonnecke and Harp, 1989; Shook, 1989). In this paper, we describe the first results of our 6 year studies on the improvement of milk production and disease resistance of Russian Black and White cattle and Holsteins.

### INTRODUCTION

The USSR is known to have the biggest population of dairy cattle, 42 million of them being milking cows. More than 35% of these are Black and White cattle having a level of milk production of 3,027 kg per cow. The dairy industry is going down in the USSR because of feed shortages in many regions of the country. There are two different kinds of animal farms in the Soviet Union, pedigree farms and commercial farms. The best dairy cattle are kept on the pedigree farms where the level of milk production is over 4,000 kg.

Twenty years ago we began to import Holstein heifers and semen from Canada, West Germany and the USA, for improving Russian Black and White cattle. At present the population of crossbred animals consists of cows and calves with 50, 75 and 87.5% Holstein genes. Thus it is important to know what is the influence of Holsteins on the production and resistance of native cattle and how Holsteins have adapted to Siberian conditions.

### MATERIAL AND METHODS

We have kept under observation a population of Holsteins, crossbreds and Black and White Russian animals, their number being more than 4000 per year. Growth rate, body conformation and milk production have been studied. We also have looked at non-specific immune mechanisms including phagocytic leucocytes and some humoral factors such as antibacterial beta-lysin and lysozyme activity of blood and milk. The components of the specific or adaptive immune system consisted of leucocytes (T- and B-lymphocytes) and immunoglobulins. All data have been analysed by computer.

### RESULTS

Table 1 shows the advantage of Holsteins and crossbreds compared with Russian Black and White cattle. In 1984 we had just F<sub>1</sub> and F<sub>2</sub> crossbreds and they improved native cattle by 411 and 685 kg of milk, and 9.0 and 17.6 kg of milk fat, respectively. In 1989 these advantages increased. Generally I should say Holsteins and crossbreds had the better level of milk production and milk fat compared with native cattle, but crossing reduced the percentage of fat in milk. It is possible to find from the

table that the level of production increased by 1483 kg of milk and 51.1 kg of milk fat. It happened because of the sire's effect and improvement of management.

**Table 1.** Milk Production of Holsteins, Crossbreds and Russian Black and White Cattle.

Groups of cattle	1984			1989		
	Milk yield kg	Fat, %	Fat, kg	Milk yield kg	Fat, %	Fat, kg
R. Black & White	3 946	4.14	162.5	5 050	4.00	202.0
Holstein	-	-	-	5 935	3.78	224
F <sub>1</sub>	4 357	2.95	171.5	5 843	3.82	223
F <sub>2</sub>	4 631	3.89	180.1	6 004	3.88	234
F <sub>3</sub>	-	-	-	5 734	3.82	219
Average	4 215	4.02	169.4	5 698	3.87	220.5

At the same time we found out that Holstein sires had a positive influence on the mechanisms of immune system of progeny - crossbreds with different quantity of Holstein genes had the same level of immune traits as Russian Black and White calves and cows. The observation of cows resistance to mastitis showed that 1/2 and 1/4 crossbreds were better than 3/4 crossbreds and Russian cattle. For example, the percentage of mastitis in the 1/2 crossbred group was 16%, 1/4 - 17%, but in 3/4 crossbreds 21% and Black and Whites 29%. The crossbreds with different genotypes had higher levels of lysozyme and immunoglobulin in colostrum and milk than the Black and White cows.

#### DISCUSSION

Holstein cattle have a very good possibility of adaptation to the Western Siberian climate because all immunological traits which we observed during our experiment had a high enough level. We also could mention that Holstein sires had a good transmissibility of milk production to their progeny. The Holstein cows and crossbreds were much better than native cattle as far as milk yield and fat is concerned. That is why a wide spread of Holsteins around Siberia will have a positive influence on the condition of animal husbandry.

#### REFERENCES

- NONNECKE, B.J. and HARP, J.A. 1989. J. Dairy Sci. 72: 1313-1327.  
SHOOK, G.E. 1989. J. Dairy Sci. 72: 1349-1362