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J. Meyer, H. Busschmann, H. Krausslich

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Model experiments for selection on resistance to infection in mice and pigs

H. BUSCHMANN

*Institut f. Med. Mikrobiologie
Veterinärstr. 13, D - 8000 München 22*

There are three main possibilities to find out if an immunological trait has a genetic background : studies in twins, the demonstration of line and breed differences, and the results of selection experiments. All three methodological approaches were used in our studies. In our studies with mice, cattle, and pig it could be shown that the rate of phagocytosis, the conglutinin titre of the blood serum in cattle, and the antibody response to sheep erythrocytes and DNP hapten are genetically determined. There is a dissociation between the genetic control of humoral and cell-mediated immune response. The results of selection experiments show that the host defence system has been optimally adapted to the environment by natural selection. Any artificial selection confers to the animals not only advantages but also serious disadvantages.

Selection on antibody response in pigs

J. MEYER, H. BUSSCHMANN and H. KRÄUSSLICH

*Institut für Tierzucht u. Tierhygiene, Veterinärstr. 13
D - 8000 München 22*

A one-way selection experiment on antibody response in pigs is described. The only selection criterion is the immune response — anti hapten antibodies in the serum of growing pigs — after immunization with dinitrophenyl (DNP)-bovine-serum albumin.

The selection experiment is running in the 5th generation. In the 4th generation are 100 p. 100 responders in the selected line as compared to about 65 p. 100 non-responders in the basic population. In comparison to the basic population the mean response of the 4th generation has increased about ninefold.

Within each generation there are half-sib groups fathered by one to three boars. Thus selection can be done almost exclusively in the females. The control of the correlated response of selection with regard to breeding for resistance against diseases is beginning now.

Serum Immunoglobulin levels in cattle : genetic variation and relation to diseases

P. JENSEN *, P. MADSEN ** and N.E. JENSEN *

** State Veterinary Serum Laboratory, Bülowvej 27, 1870 Copenhagen V, Denmark*

*** National Institute of Animal Science, Rolighedsvej 25, 1958 Copenhagen V, Denmark*

Concentrations of IgA, IgM, IgG-1, IgG-2, albumin and total protein were determined in sera from 56 unselected sire groups comprising 1221 first-lactation cows in 67 dairy herds. Infections of the limbs, mastitis, respiratory infections, and diseases altogether were