

Research Report<sup>1</sup>

GENETIC SELECTION FOR PROTEIN IN THE DAIRY COW

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Major selection emphasis has been placed on milk yield in recent years, and rightfully so under present pricing systems. A few years ago geneticists from a number of U.S. experiment stations started gathering data on the protein content of milk so that a definitive genetic study of milk composition could be made. A large volume of data from many areas of the country was analyzed. The world is short of high quality protein such as that found in milk. The humanitarian question posed the geneticist was how could the dairy cow be changed genetically to increase the protein supply. We determined the necessary heritabilities, variabilities and other statistics to design an efficient selection program for each breed. These will, of course, give us a good idea of what has already happened, at least during the previous few years, and also tell us what could be done in the future.

Estimates of direct and correlated response from selection were made. Using a reasonable program of sire selection and culling of females, one considerably less than maximum, we could get an increase in the Holstein breed of 607 pounds of milk per lactation in one generation if we selected for milk yield and ignored other traits. With this we also would get an additional 23 pounds of fat and 14 pounds of protein as correlated responses. Fat percentage would decrease by a trivial amount as would protein percentage. It became obvious that maximum change in protein yield would result from direct selection for protein yield, or a highly correlated trait such as SNF or total solids yield. Selection to increase protein percentage would result in only a very slight gain in protein yield, and perhaps even a slight loss. Yet selection for milk yield, with protein being ignored completely, would result in about as much increase (95%) as would selection for protein yield. Our past selection for milk yield has doubtless appreciably increased protein yield, and a continued program should have the same results for several generations at least. Present economic and humanitarian objectives are, therefore, nearly perfectly compatible.

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