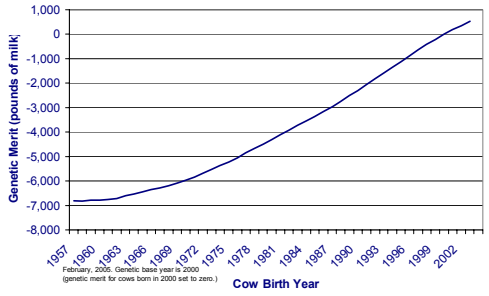
How can we genetically improve dairy cattle health?

John B. Cole, Ph.D., Animal Improvement Programs Laboratory, Agricultural Research Service, USDA, Beltsville, MD

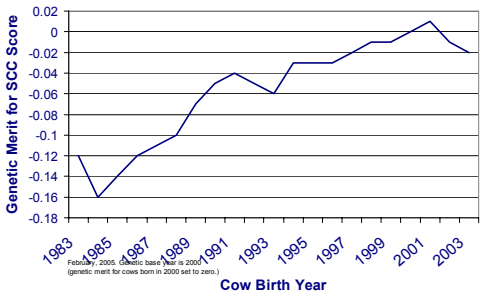
The dairy industry has been extraordinarily successful in improving genetic merit for yield (Figure 1), however success has come at the cost of fitness traits such as udder health (Figure 2, lower values more desirable) and fertility (Figure 3). The antagonistic relationships among these traits demonstrate the danger of single-trait selection programs. Genetically improving the health of the national dairy herd is the target of current research on evaluation procedures. Before any useful evaluation tools can be developed challenges including a lack of standardization in disease recording and the absence of a national health database must be overcome.

Figure 1. Trend in Holstein genetic merit for milk



Scientists at The Animal Improvement Programs Laboratory (AIPL) of USDA, in conjunction with industry partners and veterinary experts, have used field data to develop an exchange format for transferring data from on-farm recordkeeping systems (PC-DART, DairyComp 305, etc.) to a national database. A key feature of this format is a standardized set of codes for commonly occurring diseases. Important concerns about data privacy and confidentiality must be resolved with the help of industry leaders before data can be routinely collected.

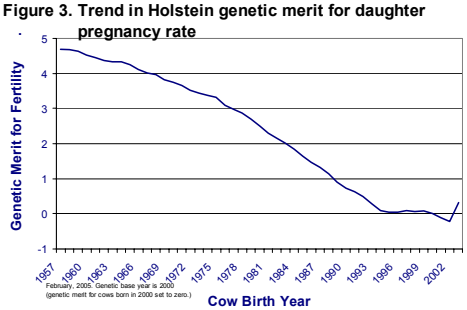
Figure 2. Trend in Holstein genetic merit for SCC



What can you do to help this project succeed?

Record Keeping. Computerized on-farm management systems are essential for collecting health data on a national basis. Use your system consistently; establish a routine for entering events and updating records. Record incidents of disease using standardized codes. Information stored in your system using farm-specific codes may not be usable for genetic evaluation due to limitations of automated data processing.

Figure 3. Trend in Holstein genetic merit for daughter pregnancy rate



Culling Codes. Culling codes are already included on lactation records in the national dairy database. Records of culling already contribute to evaluations for productive life. Research has shown that the specific culling codes for mastitis and reproduction may be valuable as indirect indicators for genetic evaluation of these traits. This is not possible when the reason for culling is not specified. To improve the usability of these codes a code for laminitis and room to report a secondary reason for culling are being considered.

Calving Ease. Calving ease evaluations are available for Brown Swiss and Holstein bulls, and heifers should always be bred to bulls with good PTA (Predicted Transmitting Ability) for calving ease. Cows whose lactation began with a difficult calving have higher risks of developing metabolic diseases (ketosis, displaced abomasa, etc.) and failing to breed back than cows that began their lactation with an easy calving.

Net Merit. Select bulls based on their PTA for Net Merit Dollars (NM$), which is a measure of expected lifetime profit. The current formula for Net Merit accounts for the influence of health traits including productive life, SCS, udder type, daughter pregnancy rate, and calving ease. Healthier cows generate more profit over their lifetimes, making NM$ useful as an indirect indicator of health.

Patience. The health traits that have been studied have low heritabilities compared with the familiar production traits like milk and protein. For example, daughter pregnancy rate has a heritability of 4% (meaning, 4% of the variation in daughter pregnancy rate is due to genetics), while the heritability of milk or protein is 30%. This means that it may take many generations to make substantial genetic changes in the population and bulls need more daughters to receive high-reliability proofs for traits with lower heritability. Also, it takes time to develop accurate evaluation tools; even if AIPL started receiving data tomorrow, it would probably be a couple of years before a new trait evaluation could be provided to the industry.

It will take an industry-wide effort and lots of patience to genetically improve dairy cattle health. The payoff will come when you are milking healthier, longer-lived, more profitable cows.