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# Genetic selection and breeding practices of Kansas Holstein herds in relation to yearly level of production

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### Abstract

An analysis of 41,426 cows in 635 Kansas Holstein herds indicated that considerable improvement can be made in genetic gain by more stringent sire selection and greater use of proved bulls. The generation interval in dairy cattle is about 5 yr so a dairy producer has only a limited number of decisions by which to make genetic improvement. Maximum genetic gain is possible by breeding 80 percent of the herd to bulls in the 80+ percentile. The remainder of the herd should be bred to several young sires in a progeny test program to aid in selecting the meritorious sires of the next generation. All heifers should be bred to superior bulls using calving ease as an additional selection criterion.; Dairy Day, 1985, Kansas State University, Manhattan, KS, 1985;



### Keywords

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# GENETIC SELECTION AND BREEDING PRACTICES OF KANSAS HOLSTEIN HERDS IN RELATION TO YEARLY LEVEL OF PRODUCTION

E. P. Call


## Summary

An analysis of 41,426 cows in 635 Kansas Holstein herds indicated that considerable improvement can be made in genetic gain by more stringent sire selection and greater use of proved bulls. The generation interval in dairy cattle is about 5 yr so a dairy producer has only a limited number of decisions by which to make genetic improvement. Maximum genetic gain is possible by breeding 80 percent of the herd to bulls in the 80+ percentile. The remainder of the herd should be bred to several young sires in a progeny test program to aid in selecting the meritorious sires of the next generation. All heifers should be bred to superior bulls using calving ease as an additional selection criterion.


## Introduction

Great variation exists in the inherent ability of dairy cows to produce milk. Of this variation, about 25% is genetic and 75% is due to other factors, such as feeding, management, environment, and chance. Since the heritability of milk production is relatively low ($h^2$ = .25), great emphasis must be placed on systems that will determine the estimated transmitting ability of dams and sires of the next generation. Evaluating dams becomes more difficult since cows have a few records and daughters upon which to make estimates. Most of the genetic progress must come from the sire's side since he is more prolific, and the sire proving system through progeny test programs can be very accurate in ranking a bull's transmitting ability. Such a system for proving bulls has been available industry-wide for the last 15 yr. The degree of acceptance of this system is the reason for the analysis in this paper.

## Procedures

The data for this analysis was obtained from the Dairy Herd Improvement (DHIA) records of 635 Kansas Holstein herds with 41,426 cows that completed a testing year in December, 1984. These herds provide breeding information as an adjunct to the regular testing procedures. The herds were grouped by level of rolling herd average (RHA) to assess possible differences in attitudes toward sire selection. Criteria used to evaluate selection practices were the average Predicted Difference for dollars (PD82$) of cows in the herd and the same evaluation for service sires used to breed these cows. Service sires were ranked according to the percentile ranking system where the top 1% of the PD$ bulls would be in the 99 percentile and the poorest bulls at 0 percentile. Any genetic evaluation program must be based upon accurate identification of sires and dams. These values also were analyzed according to RHA groups.

## Results and Discussion

The data are summarized in Table 1. There was a positive linear relationship in all of the categories analyzed. Higher producing herds not only have more complete identification, but they have used a higher percentage of proved bulls of greater genetic merit in the milking herd. Because genetic progress is an on-going process, the PD$ value of sires of the current herd is expected to be less than that of the generation of bulls being used now as service sires. However, the $43 dollar difference between the low group and the high group of herds (RHA) represents a significant amount of yearly milk production. The same disparity is seen in the quality of service sires being used. The percent of proved bulls ranges from 50% in the low group to 75% in the high group and a difference of $37 is noted in PD$. In July, 1985, the average AI Holstein bull had a PD$ = +82, whereas all non-AI proved bulls had PD$ = -51, or a difference of $133. On the average, Holstein dairy producers in Kansas are not taking full advantage of the genetic potential that is available through the AI industry. When all service sires are considered, non-proven bulls are assumed to be zero (Based upon the summary of all non-AI proven bulls in Kansas in 1985, only 16% were greater than zero). Under the category of All Bulls, the percentile ranking varied from 13 to 55 as RHA increased.

## Recommendations

1. Kansas Holstein dairy producers need to place more emphasis upon sire selection.

2. Breed 80 percent of the herd to bulls in the upper 20% or bulls with 80+ percentile (PD$ > 115).

3. Select several young bulls to service the remaining 20 percent of the herd to help the AI industry prove the superior bulls of the next generation.

4. Use a herd mating service as an aid in selecting conformation or type traits that are of economic importance.

5. Breed all heifers to bulls in the upper 20% (80+ percentile) with final selection based upon ease of calving rank.

Table 1. Average genetic characteristics of 635 Kansas Holstein herds with 41,426 cows grouped by level of rolling herd average (RHA).

| Rolling Herd Avg Milk (lb) | Identification | | Cows Sired by P.D. Bulls | | Service Sires | | | All Bulls | |
|---|---|---|---|---|---|---|---|---|---|
| | Sire ($) | Dam (%) | (%) | (PD$) | With PD ($) | PD$ | Rank (%tile) | PD$ | Rank (%tile) |
| 10,699 | 49 | 74 | 33.3 | -26 | 50.0 | +75 | 45 | +39 | 13 |
| 12,565 | 56 | 78 | 40.3 | -16 | 53.7 | +76 | 46 | +41 | 14 |
| 13,569 | 57 | 83 | 42.3 | 0 | 64.7 | +89 | 62 | +57 | 24 |
| 14,510 | 72 | 88 | 58.1 | -2 | 67.3 | +89 | 62 | +59 | 26 |
| 15,504 | 74 | 91 | 67.1 | -4 | 65.4 | +90 | 63 | +60 | 27 |
| 16,514 | 81 | 93 | 75.0 | +2 | 69.0 | +99 | 72 | +69 | 37 |
| 17,414 | 79 | 94 | 76.7 | +18 | 71.9 | +100 | 72 | +71 | 39 |
| 19,152 | 86 | 94 | 79.4 | +17 | 75.0 | +112 | 84 | +84 | 55 |