

## LOOKING AHEAD WITH A LOOK BEHIND

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### Summary

The current economic situation dictates that dairy producers use all available tools and resources to maximize efficiency. Yearly milk yield is the most reliable predictor of profitability. Because the genetic base dictates each cow's potential for converting feed into milk, using 80<sup>+</sup> percentile proved sires is strongly recommended along with a 100% commitment to artificial insemination of cows and heifers. Current technology allows dairy producers to make significant gains in resolving poor reproductive performance.

A user friendly recordkeeping system to routinely measure individual cows' productivity along with overall herd performance is essential for maximizing return on capital investment.

### Introduction

Lessons learned in the '80's will continue to apply to the dairy business in the '90's. Yearly milk production per cow seems to have the greatest impact on the probability for profit or loss. During the decade of the 1980's, production increased 23%. This was fortunate because milk price varied little, while other costs increased as much as 32%. Table 1 compares Kansas Dairy Herd Improvement (DHI) data for the years 1992 and 1982.

The increased productivity is a real testimony to the ability of Kansas dairy producers to implement research findings into management practices that make the

dairy cow more efficient. Some of the factors involved during the 1980's include:

1. New National Research Council (NRC) nutrient requirements.
2. Higher energy and protein dense rations.
3. Improved accuracy and acceptance of sire summaries.
4. Use of prostaglandins (PGF) and gonadotropin releasing hormone (GnRH) to improve reproductive performance.
5. Enhanced recordkeeping systems, particularly those adapted for on-farm computers such as the electronic barn sheet (EBS).
6. Somatic cell count (SCC) as a monitor of udder health, milk quality, and milk loss, which serves as a basis for premium payments.

Milk production is under genetic control, but heritability estimates are around 25% ( $h^2 \cong .25$ ) - the lowest of any of the economic traits in farm animals. Great biological variation exists, as seen in Table 2, which groups Kansas Holstein herds by yearly milk per cow.

As much or more variation exists among cows within a herd, which necessitates a production testing program to evaluate cows for production traits (milk, % fat, % protein) as well as somatic cells (SCC).

Because feed costs reflect 45-55 % of the cost of producing milk, the key to profit is income-over-feed cost and factors that affect it, such as yearly milk and ration costs. Feed costs for maintenance are

mostly constant when comparing cows of similar body size and are not dependent upon yearly milk. Consequently, as noted in Table 2, as yearly milk increases 70% from the low to high groups, income-over-feed cost increases 114%, significantly improving the chance for profit.

A negative genetic correlation exists between production and reproduction. However, yearly milk per cow has little effect on calving interval (Table 2) and other measures of reproduction. Apparently, managers of higher producing herds “overmanage” the negative effect.

Do genetics limit production? Yes! The genetic effect is easily seen when comparing daily or lactation milk yields between beef and dairy cows after many generations of selection. However, within a breed or within a herd, the genetic effects are subtle and difficult to assess, because environmental factors and chance account for 75% of the variation among cows’ yearly milk production. Genetic progress is limited because involuntary culling (mastitis, reproduction, injury, death) is greater than voluntary disposal for inferior milk production. By necessity, all herds keep cows below the genetic base to satisfy milk volume and heifer replacements. Genetic gain can be maximized only by selecting the top echelon of proved bulls to breed both cows and heifers.

Figure 1 presents USDA data that show changes in milk production using 1960 as the base and estimates genetic change over time. It was not until the late 1960’s that reliable estimates of sires’

breeding worth became available to effectively rank bulls. More recently (1980’s), the animal model has further refined the reliability and accuracy of ranking bulls for production traits.

Table 3 presents insight on the genetic effect on yearly milk per cow. Although little difference occurs in the average breeding value of the proved sires (MFP\$) among the various groups, the percentage of cows sired by proved bulls is startling! The same situation holds for the percent of cows identified by sire. If the nonproved sires in Table 3 were assumed to have breeding values of zero (MFP\$ = 0), the genetic difference between the low and high herds would be MPF\$ = 86 or about 700 lb milk.

As shown in Table 4, the value of using AI proved bulls strongly recommends the commitment to a total AI program, if profit is the primary motive for milking cows.

Competing in the 90’s will be more enjoyable and profitable if:

1. Commitment to AI (cows + heifers) is total.
2. PGF and GnRH are a part of reproduction management.
3. Least cost ration formulation is based upon forage analyses.
4. Herd SCC permits premium payments.
5. Herd health program minimizes medical problems.
6. Recordkeeping system readily allows economic analyses of various management areas.

**Table 1. Comparative DHIA Data for 1992 and 1982 with Percent Change**

Item	1982	1992	± Change
Milk/cow	13,939 lb	18,116 lb	+30%
Price/cwt	\$12.91	\$12.43	-4 %
Feed Cost	\$747	\$988	+32%
Feed cost/cwt	\$5.36	\$5.44	+1%
Income/feed cost	\$1,053	\$1,263	+20%
Cows/herd	69	74	+7%

**Table 2. Kansas DHI Holstein Herds Grouped by Yearly Milk Per Cow and the Effect on Income, Reproduction, and Summit Milk Yield (SMY), 1992**

Yearly milk (lb)	Summit milk yield* (lb)	Income/feed cost (\$)	Calving interval (days)
12,451	55	707	404
15,153	64	979	412
17,102	70	1,129	404
19,066	76	1,304	405
21,265	83	1,516	403

\*Summit Milk Yield (SMY) estimates daily peak yield. Calculated by averaging the two highest test day milk weights of the first three months after calving.

**Table 3. Genetic Merit of Sires of Producing Cows in Kansas Holstein Herds Grouped by Yearly Milk Per Cow, 1992**

Yearly milk (lb)	% Cows ID by sire (%)	cows w/ proved sires (%)	Proved sires' avg MPF\$ (\$)
12,451	<b>38</b>	23	104
15,153	<b>60</b>	46	104
17,102	65	54	118
19,066	84	78	128
21,265	84	82	134

**Table 4. Average Breeding Value (MFP\$) for All U.S. Bulls Summarized in July, 1993**

Breeds	Active AI (MFP\$)	1st Time AI (MFP\$)	Non-AI (1st) (MFP\$)
Ayrshire	+ 104	+70	+34
Brown Swiss	+ 144	+ 107	+37
Guernsey	+ 143	+ 124	+73
Holstein	+225	+181	+91
Jersey	+ 193	+141	+87

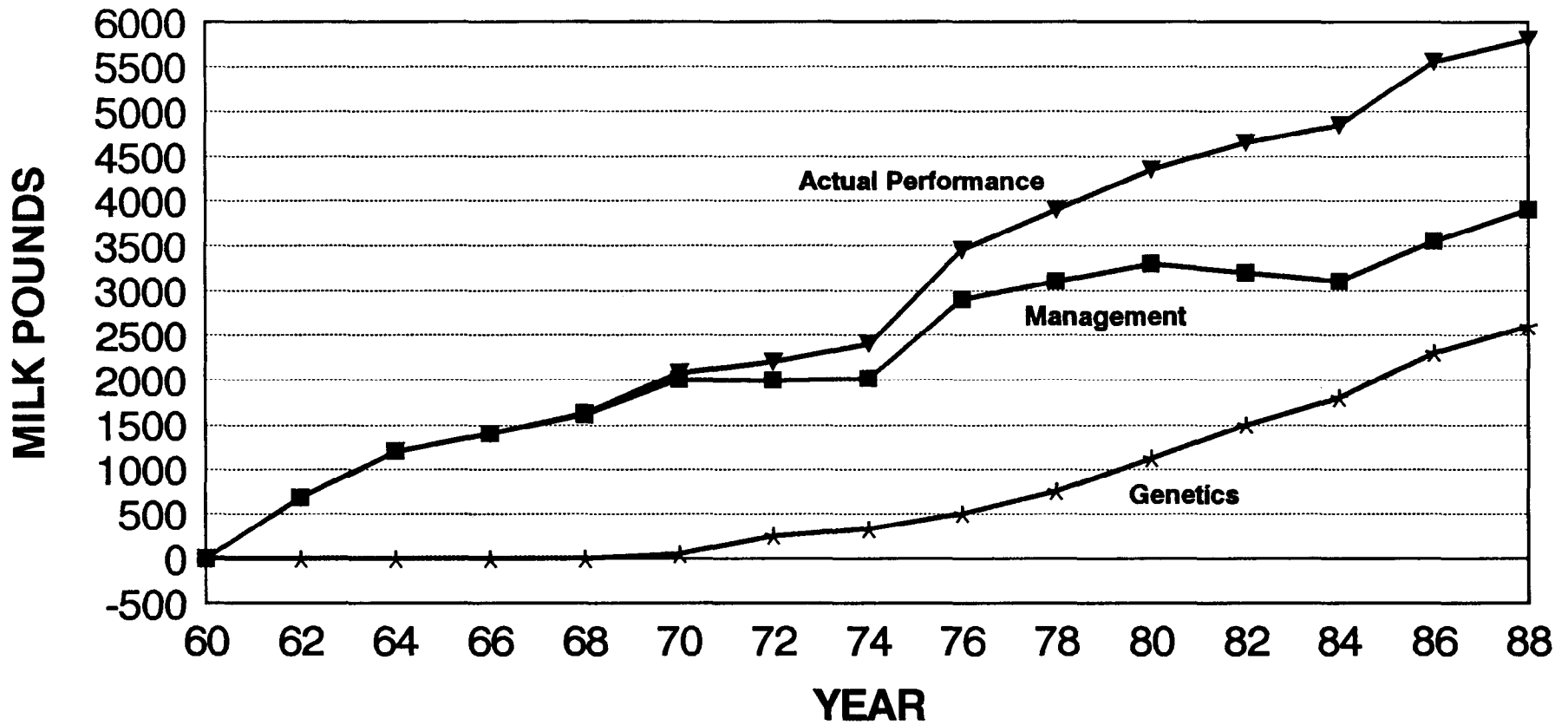


Figure 1. Changes in Milk Production and Effects of Management and Genetics (Modified Data, AIPL, USDA)