EBV CHANGES DUE TO DIFFERENT AGE ADJUSTMENT FACTORS IN THE ITALIAN FRIESIAN

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SUMMARY
Mature equivalent productions are often used as input for breeding values estimation. Adjustment factors can affect genetic trend, thus efforts should be put in order to verify projected production. Adjustment factors used in different countries refer to various ages. EBV changes with adjustment factors projecting lactations to primiparous vs. adjustment factors projecting production to pluriparous were compared. No evident difference was found both in genetic trend and in ranking of sire and cows by changing reference age except for some re-ranking for top 10,000 cows. Effect on genetic trend and EBV variability was found when base parameters of heterogeneity of herd variance were different.
Keywords: Genetic evaluation, dairy cattle, age adjustment, herd variance

INTRODUCTION

Age and month of calving are two factors having great effect on milk production. To compare cows of different ages, mature equivalent productions (ME) are usually computed. ME are used as an input for genetic evaluation procedure and, by farmers, as a tool to make decisions on cows. Bonaiti et al. (1993) stated that genetic trend is sensitive to mature equivalent adjustment factors. Comparisons between additive and multiplicative adjustment factors were carried out by Chauhan (1988) who did not found differences of additive vs. multiplicative factors and by Khan and Shook (1996) who suggested that multiplicative factors tend to inflate estimated genetic trend. Also indication are given to estimate ME periodically in order to avoid bias in projecting lactation, because change in population structure and farming environment (Keown and Everett 1984).

In routine genetic evaluation, productions are usually extended to ME with multiplicative factors, thus affecting both mean and variance. Also heterogeneity of herd variance adjustment is considered in genetic evaluation procedures of various country.

ME adjustment factors adopted in different countries often do not refer to the same age: in Italy multiplicative factors are adopted (Bagnato et al. 1994) and production are projected to 84 month of age.

Aim of this study is evaluate effect on estimate breeding values (EBV) if equivalent production are calculated to 27 months of age vs. 84 months of age, and to verify the effect of heterogeneity of herd variance adjustment on EBVs estimated from production regressed to different ages.

MATERIALS AND METHODS

Official genetic evaluation of March 1997 of the Italian Friesian was used as comparison: productions are projected to ME at 84 month of age calving in January. Same data set, consisting of more than 8,250,000 record of more that 3,000,000 cows was used to calculate primiparous equivalent production (PE) for milk kg, fat kg and protein kg. Coefficient to project lactations to PE were derived from those calculated by Bagnato et al. (1994) choosing as reference age 27 months at first calving, and January as month of calving.

Data set containing lactation projected to PE was used as input for two different genetic evaluation: a first one (PE1) using as base parameters for phenotypic adjustment of heterogeneity of herd variance same values of the routine breeding value estimation (1,200, 43, 38 for milk kg, fat kg and protein kg respectively), while in the second evaluation the values were estimated on PE production and set to 1,000 for milk kg, 37 for fat kg and 31 for protein kg (PE2). Model used was the same described in Canavesi et al. (1994). Fixed factor included was herd-year-season-parity, while random factors were additive genetic effect, permanent environmental effect and the residual error.

To compare changes in EBV all AI bulls, cow population, and the top ranking 10,000 cows were considered. Trend of EBVs were compared, Pearson and Spearman correlations were calculated for EBV estimated with the official genetic evaluation (OFF) and with PE1 and PE2, and top 10,000 cows in OFF, PE1, and PE2 were compared.

RESULTS AND DISCUSSION

In Figure 1 is shown the estimated genetic trend for milk kg using the three data set considered (PE1, PE2, OFF) for AI bulls.

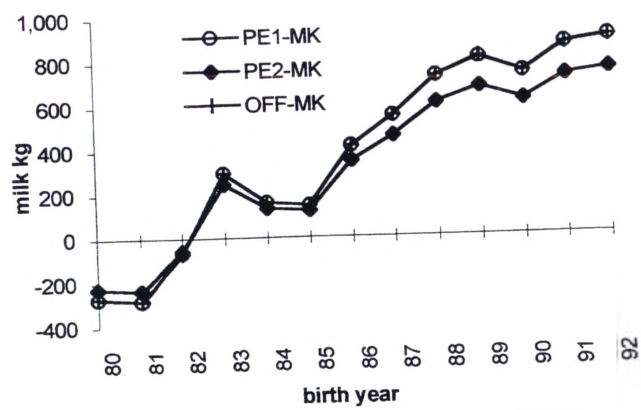

Figure 1. Trend of EBVs for active AI bulls for milk production for the three data set considered (PE1, PE2, OFF).

There is no difference in observed genetic trend when different age adjustment factors are used but same adjustment for heterogeneity of herd variance is performed (PE1-MK vs. OFF-

MK). Average genetic values of younger bulls calculated with PE2 is 20% lower then those calculated with PE1 or OFF reflecting reduction used in herd variance adjustment. EBVs for fat kg and protein kg showed same trend observed for milk kg. These results confirm that parameters used in herd variance adjustment play a determinant role in scaling EBVs. In Table 1 are shown descriptive statistics for EBVs estimated with the three data set (OFF, PE1, PE2). EBVs relative to PE2 have lower means and smaller variability respect to OFF and PE1. Pearson and Sperman correlations between EBVs of same traits but different data set (OFF-PE1 and OFF-PE2) are all greater than .99. This indicate that although variability of indexes is affected by a different adjustment for herd variance, ranking is not.

Table 1. Means, standard deviations, minimum and maximum for EBVs for official evaluation (OFF), data set PE1 and data set PE2.

	Mean	Std. Dev.	Minimum	Maximum
OFF MK	280.6	787.8	-2343	1964
FK	9.69	27.6	-79	76
PK	10.06	25.9	-67	67
F%	-.0127	.170	-.51	.8
P%	.0175	.091	-.3	.31
PE1 MK	280.4	787.8	-2339	1943
FK	9.80	27.6	-79	76
PK	10.02	25.9	-66	68
F%	-.0118	.170	-.50	.8
P%	.0171	.091	-.3	.3
PE2 MK	233.8	656.5	-1950	1619
FK	8.2	23.1	-66	64
PK	8.18	21.11	-54	55
F%	-.012	.14	-.42	.66
P%	.013	.074	-.25	.25

Sire with difference in EBVs larger then 2 standard deviation than average difference between PE1 and OFF and PE2 and OFF, were analyzed singularly: change in their EBV was due to variation of group of contemporaries of their daughters, because slight different sampling due to routine editing.

In figure 2 is shown estimated genetic trend of all cows of the population for milk kg. EBVs trend for PE1 overlaps the one for OFF while that for PE2 is lower.

It can be view that average genetic EBV for cows follow same trend of EBV trend of bulls: PE2 is 20% less than PE1 and OFF. Pearson and Sperman correlations between EBVs of same traits but different data set (OFF-PE1 and OFF-PE2) show also for females values grater than .99, except for Pearson correlation for fat and protein %. Correlations between EBVs calculated sampling top 10,000 cows for OFF are also greater then .99 except for protein kg (.98).

Analysis on top 10,000 cows of OFF data set was carried in order to identify cow not ranking in top 10,000 when PE1 or PE2 data set were considered. Less then 1% of the cows were not ranking in the top 10,000 for PE1 and PE2 when milk kg is used as comparison criteria but more than 1.7% and 4.3% for PE1 and PE2 respectively when fat kg is considered and 1.9% and 2.7% for PE1 and PE2 respectively for protein kg. Re-ranking was probably limited to cows close to border line ranking cows, given large values for correlations for same traits in different pair of data set.

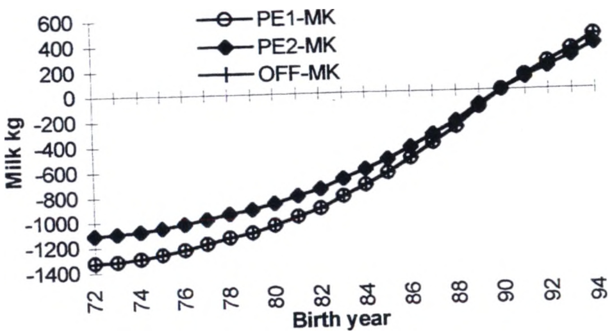

Figure 2. Trend of EBVs of cows for milk production for thet three data set (PE1, PE2, OFF).

CONCLUSION

Projecting lactations to 27 months of age versus 84 months of age did not affected significantly the ranking of active AI bulls or cows. Trend and variability of EBVs are affected proportionally by parameters used in heterogeneity of herd variance adjustment.

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