Phantom Groups and Equivalence Between Daughter Yield Deviations and Deregressed Proofs as Critical Elements in MACE International Evaluation

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Introduction

De-regressed proofs (DRPF) are the preferred dependent variable to be used in international sire evaluation procedures as Multiple Across Country Evaluation (MACE). DRPF are currently used for International genetic evaluation of dairy bulls for production and type traits.

A decreasing trend in DRPF variability over time was observed in Italian bull proofs data since 1980 (Cassandro et al., 1996). This trend had a clear impact on estimated sire variances (Cassandro et al., 1997).

A series of check was run on Italian genetic evaluation to verify if any of the applied procedures was causing the trend. None of the changes analysed did influence the pattern in de-regressed proofs variability.

DRPF are assumed to be equivalent to daughter yield deviations (DYD) (Sigurdsson et al., 1995). At the international level, the DYDs are impossible to be estimated without lactation records. If DYDs do not account for all information on ascendants, DRPF do not account completely for the effect of mates , and in case of repeated records, do not account for permanent environmental effects.

The objective of the present study was to test the international de-regression procedure to verify: 1) the effect of genetic group structure and 2) to compare DYD and DRPF standard deviations trend over time.

Material and Methods

Official files from Italian genetic evaluation were used to test different settings of phantom groups and assessed their effect on DRPF trend both on Italian and foreign (imported semen) bulls.

Using February 1999 Italian official data, different group structures were tested for Italian bulls (progeny tested) and foreign bulls (imported semen) and compared to the structure officially used in Interbull evaluations.

The comparison of DYD and DRP trends was performed using the results from several test run on Italian data of September 1997 with:

1) data unadjusted for heterogeneity of variance
2) data adjusted for heterogenity of variances.

Results and Discussion

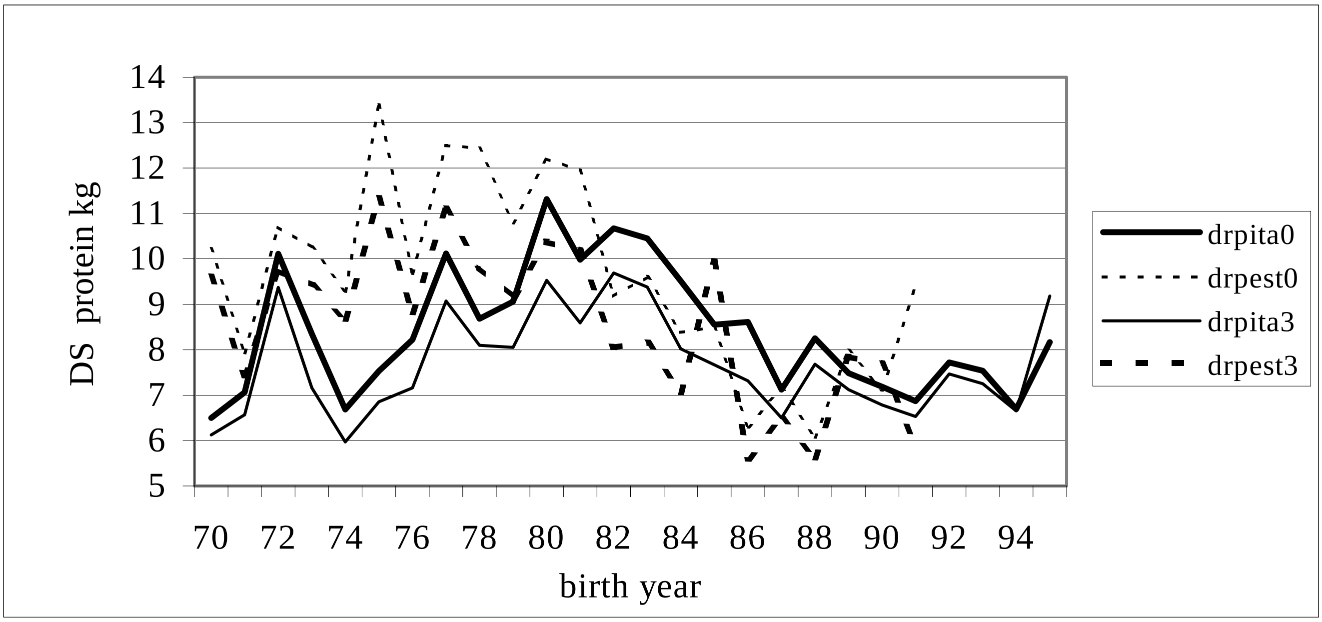
1. Effect of phantom groups definition on DRPF

The effect of different structures of genetic groups on DRPF was tested over time.

Results for protein yield are shown in Figure 1. Base (0) is the structure of phantom groups defined by Interbull and (3) are the results obtained using a structure separated for Italian and foreign bulls. DRPF standard deviation trend and sire variances estimation were different for the two situations.

Moving from Interbull phantom group definition to a different setting of groups, sire variances changed from 7.82 to 7.92 for Italian bulls and from 8.69 to 8.03 for foreign bulls.

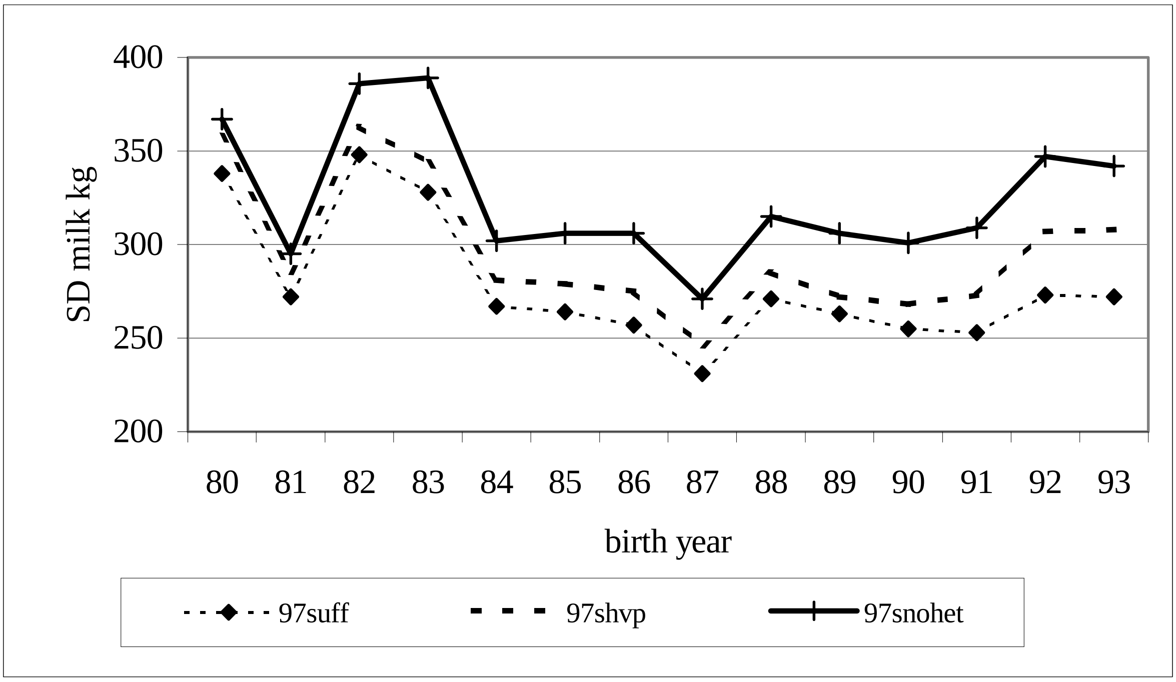
Figure 1. De-regressed proofs standard deviation trend for Italian (ita) and foreign (est) bulls with different phantom group structures: Interbull definition (0) and separated into Italian and foreign phantoms (3).



2. Reason for the decreasing trend in DRPF SD

In order to test if the decreasing trend in DRPF was caused by one of the steps of the current genetic evaluation the editing normal steps and different methods were checked. In detail methods to adjust for heterogeneity of variance and random genetic groups were considered one by one and did not show any effect on DRPF standard deviation trend but a clear decreasing trend over time (Figure 2). Using data unadjusted for heterogeneity of variance was the only one showing a different trend.

Figure 2. DRPF standard deviation trend with different types of evaluations: official (uff), correction for heterogeneity of variance across herds within parity (shvp) and with no adjustment for phenotypic heterogeneity of variance across herds (nohet).

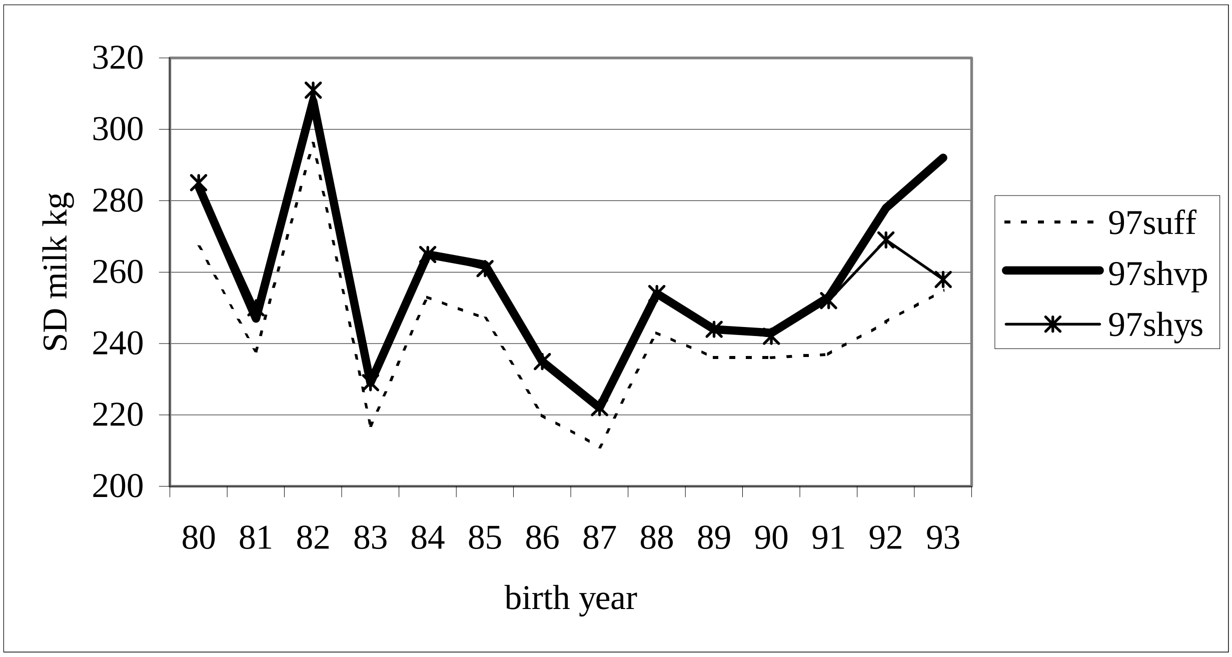


3. DYD standard deviation trends

Since DRPF are supposed to be equivalent to DYD, results from all test were also compared in terms of DYD standard deviation trend. DYD are routinely computed for genetic evaluation distribution purposes following Van Raden (Van Raden et al., 1991). Also for DYD there is, with the exception of data unadjusted for heterogeneity of variance, a slight decreasing trend over time.

With no adjustment for heterogeneity of variance across herds applied, DYD variability tend to increase over time. This is in agreement with the increase in phenotypic variance and was also expected in deregressed proofs, although it was not detected.

Figure 3. DYD standard deviation over time with different types of evaluations: official data (uff), data corrected for heterogeneity of variance across herds within parity (shvp) and with no adjustment phenotypic heterogeneity of variance across herds (nohet).



4. Comparison between DRPF and DYD

The comparison of DYD with DRPF within the same run of genetic evaluation, in official proofs of September 1997, is shown in Figure 4. Moving from DYD to DRPF the slope of the trend becomes more negative.

If we observe the results of the comparison in the case of data unadjusted for heterogeneity (Figure 5) DYDs have an increasing trend over time and DRPF do decrease.

Figure 4. DYD compared to DRPF in official evaluation results (September 1997).

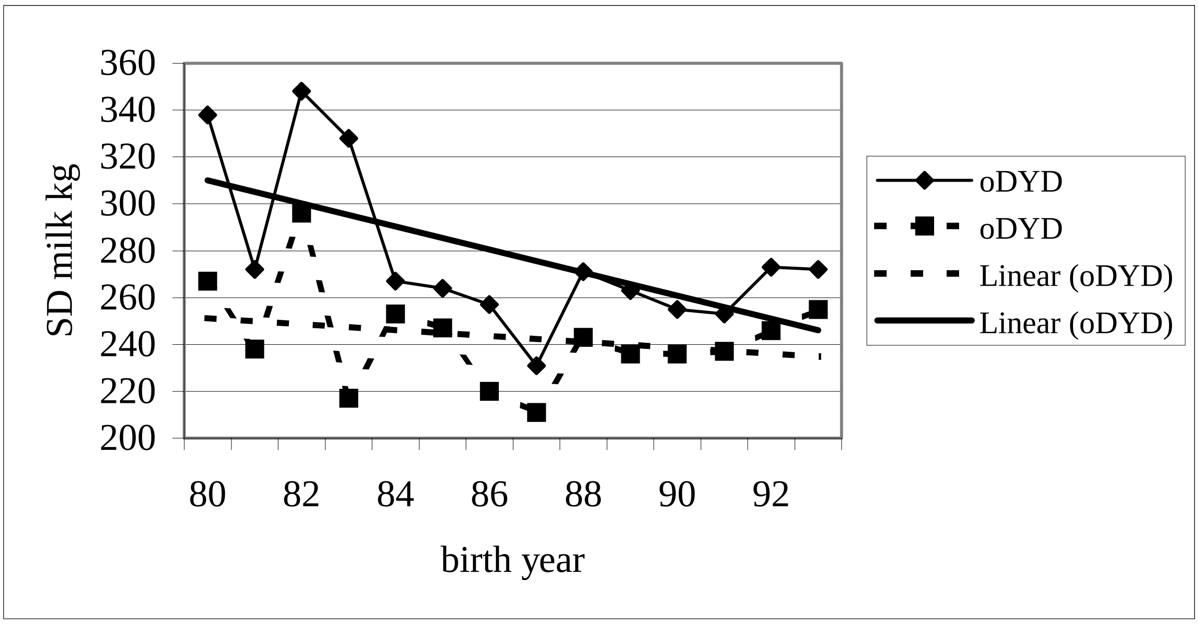
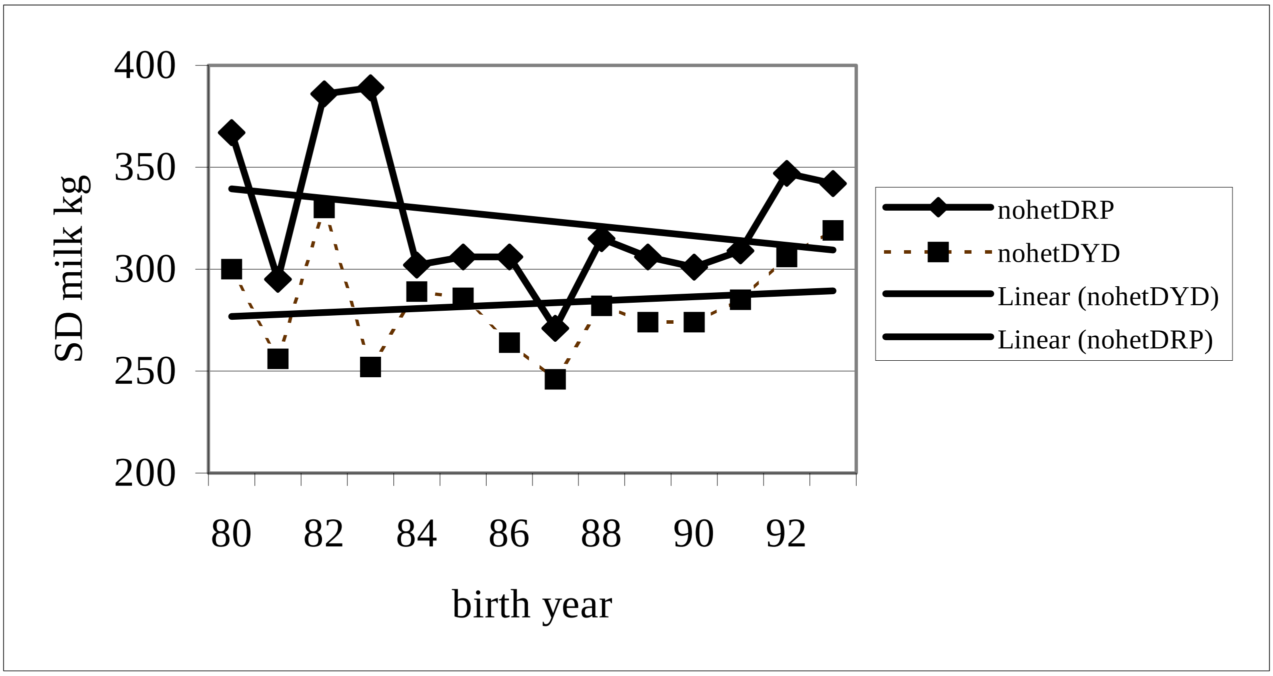
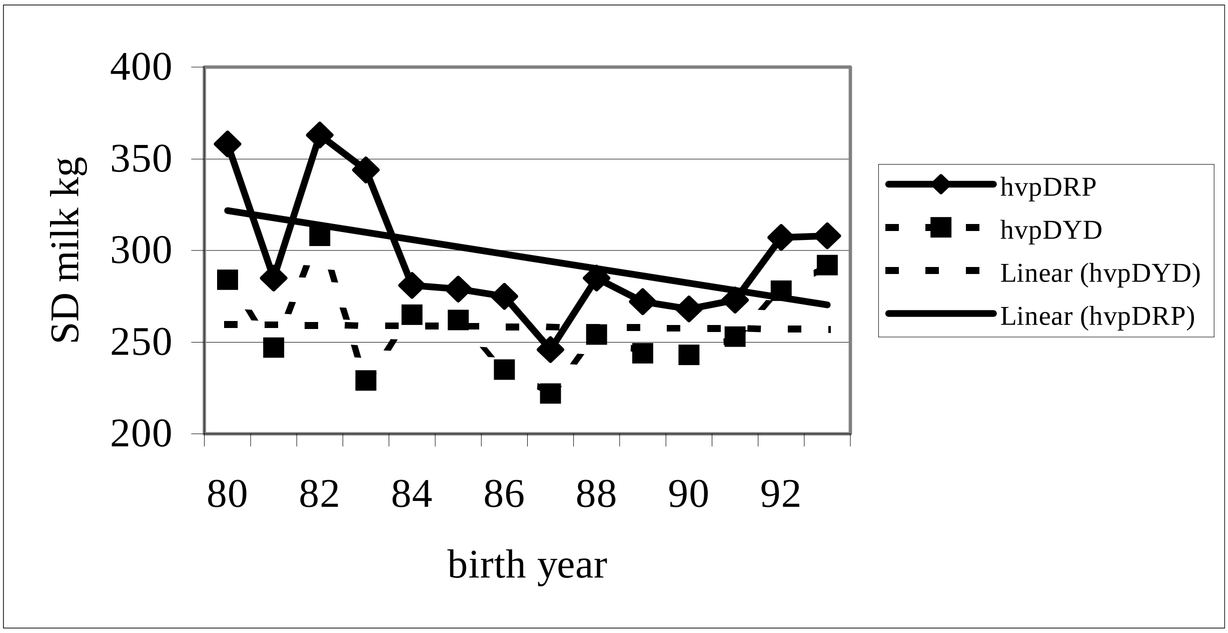


Figure 5. DYD compared to DRPF when data are not adjusted for heterogeneity of variance (September 1997).



When the pre-adjustment for heterogeneity is different on first and later parities (the approach previously used in Canada) DYD do not show any trend but DRPF standard deviations do decrease over time (Figure 6).

Figure 6. DYD compared to DRPF with adjustment for heterogeneity different for first and later parities (September 1997).



Conclusions

Different phantom groups structures did influence trend of DRPF standard deviation over time and the resulting sire variances estimates. Therefore the structure should be carefully defined to account properly for selection in each country and perhaps different groups should be used for national (progeny tested) and foreign bulls.

Changes in the official evaluation routine did not influence DRPF trend over time.

The comparison between DYD and DRPF behavior over time raise some question about the correctness of the equivalence between DYD and DRPF, at least within the Italian data structure and seem to suggest that DYD are more able to correct for changes in selection than DRPF.

Literature

1. Cassandro, M., Canavesi, F., Brandts, A., Carnier, P., Gallo, L., Bittante, G. & Bagnato, A. 1996. Trend of within country sire variance and potential impact on international evaluations for production traits. *Proc. Interbull Meeting, Veldhoven, The Netherlands, June 23-24, 1996.*

2. Cassandro, M., Miglior, F., Carnier, P., Bittante, G., Canavesi, F., Santus, E. & Banos, G. 1997. Effect of standardization of within country-year sire variance of de-regressed proofs on international evaluations. *Proc. Interbull Meeting, Vienna, Austria, August 28-29, 1997.*

3. Sigurdsson, A. & Banos, G. 1995. Dependent variables in International sire evaluations. *Acta Agric. Scand. 4,* 209-217.

4. Van Raden, P.M. & Wiggans, G.R. 1991. Derivation, calculation and use of national animal model information. *J. Dairy Sci. 74,* 2737-2746.