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CHANGES IN THE ITALIAN FRIESIAN EVALUATION

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Summary.

Accuracy of breeding values and their stability over time is important for the industry to maximize genetic progress and to maintain breeders' confidence in selection programs.
In order to improve proof stability over time, new Mature Equivalent (ME) multiplicative factors, including a parity by age effect, were estimated for the Italian Holstein breed. Also management groups, previously including all parities and of variable length (2to10 months), were divided by parity (first versus later) and were fixed in length (3 months). Proof stability over time was tested by running the genetic evaluation with these changes on the data sets used for four subsequent evaluations (January and July 1992, January and July 1993). Comparisons between the proofs from the new model and the official proofs showed an increased stability of estimated breeding values over time.
The new model, officially implemented for the genetic evaluation starting from January 1994, reduced bull proof standard deviation by 17% and cows genetic trend from 150 to 120 kg milk/year. As a result, conversion factors with Italy were also affected.

Introduction.
In the field of international evaluation much attention has been recently payed to correct estimation of genetic trend, since biases in genetic trend may seriously affect international ranking of sires. If breeding values are unbiased, we expect that they will not change by using more lactations of the same daughters or by adding new daughters born in different years. Bonaiti (1993) has shown that in an animal model using all lactations, genetic trend may be seriously affected by comparisons between different parity cows if age adjustment factors are biased. Including an age by parity effect in the model would greatly reduce the bias in genetic trend.
Since July 1989, a single trait repeatability animal model has been used in Italy to estimate EBV for the Holstein breed (Jansen, 1989). Several improvements (e.g. adjustment for heterogeneous variance) have been implemented since, in order to improve proof accuracy. In spite of that, proofs of domestic bulls seemed to change with time, decreasing from the first to the fifth evaluation and then gradually going back again to their initial values. Also bull breeding values showed a rate of genetic progress different from their pedigree indexes. The objective of the study was to increase proof stability over time for the Italian Holstein breed.

1. New Mature Equivalent Factors.
New Mature Equivalent (ME) factors were estimated on lactations recorded between 1988 and 1992 using an animal model (Bagnato et al., 1994). Since cows of the same age but different parities have different productions, the model included a parity by age, beside the animal genetic and permanent environment effect, herd year, days open and a zone by month interaction effect. If parity was not accounted for, ME factors would underestimate production for first parity cows calving after 32 months. The largest difference (more than 5%) in the ME factors estimated with and without parity effect was found between first and second lactation. New days open factors were also estimated by the same model.

2.New Herd-Year-Season Grouping Strategy.
In the Italian genetic evaluation flexible management groups, inclusive of all parities, have been used since 1989, with the aim of minimizing record losses (Jansen, 1989). All lactations used in the genetic evaluations are closed, except for first lactation records. However, the timing of the data flow may cause unbalanced comparisons when contemporary groups include projected first lactations together with short closed later lactations. In this situation sires of first calvers would be overestimated, while sires of second and later parities, with short lactations, would be penalized.

In order to correct for this problem, four 3-month seasons were defined and split into two parity groups: first versus later (Canavesi et al, 1994). This was equivalent to introducing a parity effect in the model. Subclasses with one observation only were discarded and about 4% of cows previously indexed were lost, because they did not have contemporaries.

Four test evaluations were run with new management groups, days open and ME factors on the same data sets used for four official evaluations (January and July 1992, and January and July 1993). Average proofs of sires by date of first proofs from the four test evaluations were compared to the official proofs and showed a better stability over time (Tables 1 and 2).

In the official evaluations the rate of genetic progress based on pedigree indexes differed from the genetic progress estimated on bulls breeding values (Figure 1). In the test evaluations the rate of genetic progress estimated on bull proofs was consistent with the rate based on their pedigree indexes (Figure 2).

The increase of breeding value stability over time was mostly due to the new grouping strategy, while new ME and DO factors alone caused virtually no changes in bulls breeding values.

The changes in the genetic evaluation reduced overall bull proofs standard deviation by 17% and decreased cows' genetic trend from 150 to 120 kg milk/year compared to July 1993 official evaluation.

Changes in bull proof standard deviations and genetic trend also affected conversions to and from Italy with reduction of 'b' from 15 to 30%, depending on whether the method used to estimate 'b'accounted for genetic trend. In Table 3 old and new conversion factors are given.

Conclusions.
Timing of data flow caused unbalanced comparisons between first and later parities, thus over-evaluating young sires. As a consequence, genetic trend was overestimated. A new grouping strategy, dividing first from later parities was the main factor correcting the problem.

Based on the results of several test runs aimed at checking proof stability over time, it was decided to use the new grouping strategy, ME and DO factors from the January 1994 run. Due to the reduction in genetic trend, also conversion factors to and from Italy were affected by the changes.

Starting from January 1995 the genetic base for the Italian Holstein breed will be updated and will be the average breeding value of cows born in 1990.

References.
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Table 1 - Average milk yield proofs by date of first proof: new proofs with HYS by parity.

Date of first proof	N. bulls	92/01	92/07	93/01	93/07
87/01	24	0	-6	-4	-8
87/07	23	180	189	192	206
88/01	48	35	31	37	37
88/07	21	343	274	450	406
89/01	36	482	497	501	510
89/07	45	526	516	533	541
90/01	55	349	432	415	413
90/07	56	421	427	449	452
91/01	69	500	503	510	530
91/07	81	610	597	578	617
92/01	112	688	708	688	726
92/07	128	-	833	804	789
93/01	102	-	-	867	863
93/07	145	-	-	-	949

Table 2- Average proofs by date of first proof: official proofs with no HYS by parity.

Date of first proof	N. bulls	92/01	92/07	93/01	93/07
87/01	24	0	-13	-39	-153
87/07	23	184	208	184	98
88/01	48	6	54	57	-70
88/07	21	274	326	397	370
89/01	36	406	423	465	481
89/07	45	532	513	508	505
90/01	55	352	364	375	330
90/07	56	517	470	445	370
91/01	69	694	585	533	467
91/07	81	910	846	713	605
92/01	112	904	1047	920	751
92/07	128	-	1083	1098	928
93/01	103	-	-	1075	1100
93/07	147	-	-	-	1134

Table 3. Conversion factors for milk from Canada, the Netherlands and USA to Italy.

Country	Conversions Jan 1993		Conversions Jan 1994	
	a	b	a	b
USA	572	0.820	1043	0.558
CAN	570	97.3	986	67.0
NLD	116	1.160	517	0.996

Figure 1. Official EBV and PI
by bulls first evaluation date

MILK kg

Legend: — EBV, ⋯ IP

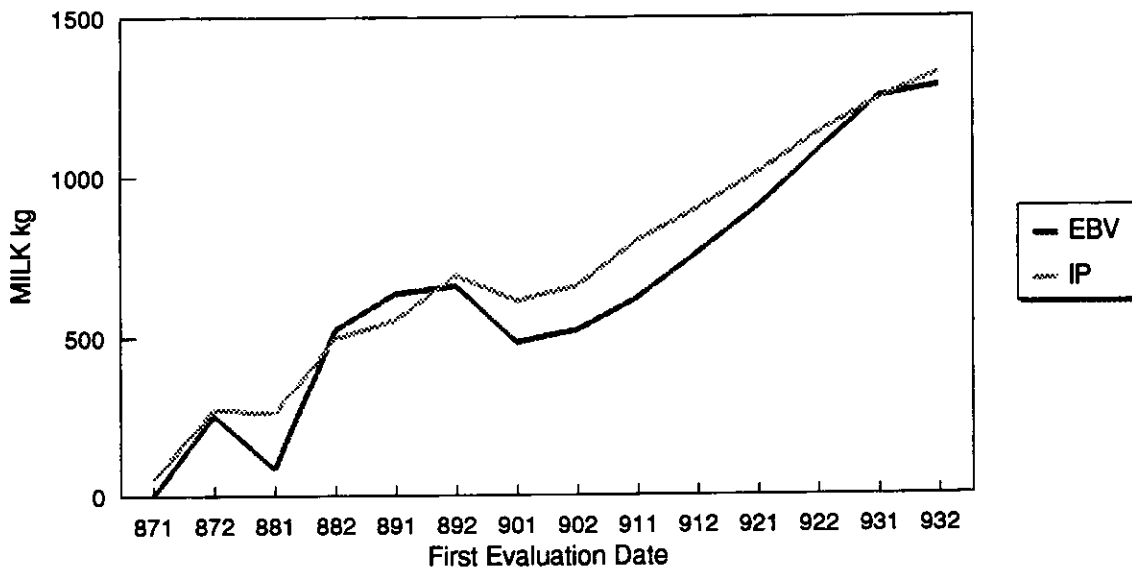First Evaluation Date: 871 872 881 882 891 892 901 902 911 912 921 922 931 932

Figure 2. Test EBV and PI
by bulls first evaluation date

MILK kg

Legend: — EBV Ttest, ⋯ IP test

First Evaluation Date: 871 872 881 882 891 892 901 902 911 912 921 922 931 932