Effect of Imported Daughters on the Genetic Evaluation of Holsteins in the United Kingdom

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Introduction

The publication of the official Holstein Friesian evaluations in the United Kingdom (UK) in January 1995 generated concern over the relative ranking of certain bulls previously tested in other countries. In particular the very high ranking of To-Mar Blackstar and other semen import bulls compared with their converted foreign evaluations emphasised the problem. In order to understand why this was happening all aspects of the UK genetic evaluation system were investigated including age month adjustment factors and heterogeneity of variance. The only factor which significantly affected the ranking of bulls was the exclusion of records from imported daughters (about 16000 lactations) from the evaluation. An imported daughter was defined as a cow with a dam of foreign origin. While the exclusion of such a large number of records will normally create changes, it clearly indicated the need to examine more closely the effects of imported daughters on genetic evaluations. The problems of preferential treatment and the bias it causes have generally been ignored in evaluation systems. This is potentially a greater problem in the UK in view of the wide spread importation of foreign genetics. This paper presents a simple method used to account for preferential treatment in imported daughters and its effects on genetic evaluations.

Materials and Method

In the UK genetic evaluation, animals are assigned to management groups on the basis of herd, year, two month calving season and lactation (first or later). If there are insufficient animals the two month season is expanded. This procedure was modified such that imported daughters within a herd were assigned to a separate management group from daughters of UK bred animals. This was based on the assumption that imported animals are more likely to be treated differently to home bred animals. To avoid a large loss of animals, imported animals which could not be assigned to their own management group due to lack of contemporaries were re-grouped with home bred daughters. The minimum size of group initially accepted was 2.

In addition the preliminary investigations highlighted a problem of lack of pedigree information for non-registered imported animals. These records were identified and pedigree obtained from various countries.

The genetic evaluation was then carried out as usual using the same data as for January 1995 (95:1). The results from this test run (95:1*) were compared with those from 95:1 to determine the effect of the new management grouping structure.

The effects of the grouping strategy were further re-examined after the official July 1995 (95:2) run by comparing these results with those of 95:1 which had the old grouping method. Moreover, the July 1995 run was repeated using the old management grouping (95:2*) and results compared with the official run (95:2).

Results and Discussion

Bulls. Comparison of Official evaluation (95:1) and Test evaluation (95:1*).

A comparison of all bulls evaluated showed that the differences between evaluations in

example, the standard deviation for milk was 83 in comparison to 17, indicating greater changes within this group than are normally found. The standard deviations of the differences for fat and protein yield were 3 and 2.5 respectively which compares with 0.9 and 0.6 normally found in a routine run.

The distribution of differences indicated that for PTA milk, 4,216 cows increased their PTAs with 4,451 showing a decrease. A total of 402 cows were identified as having a significant change based on reliability and size of the change. Of these 236 cows changed ± 200-300 kg milk.

*Comparison of Bull Rankings from July 95:2 and 95:2**

A comparison of 95:2 (official) with 95:2* (test) confirmed the limited change introduced by the new grouping procedure. For the first 60 bulls ranked on UK profit index, only four differed by greater than 40 kg milk and 2 kg of fat and protein. The four in question were LEADMAN (118 kg milk), MICHAEL (97 kg milk), AEROSTAR (46 kg milk) and BLACKSTAR (92 kg milk), all bulls with significant numbers of imported daughters. In the next 360 bulls there were a further ten bulls, with a change greater than 40 kg milk, the largest differences being WATERGATE ROUGE RED (114) and MARSHFIELD ELEVATION TONY (118). At least four of the five are from the USA, with one being from Canada.

If no revised management grouping structure had been included the PTAs of BLACKSTAR and MICHAEL would all have decreased due to the dilution effect of the addition of UK daughters but would still have been significantly above their converted evaluations.

Conclusion

In conclusion, the introduction of the revised herd management grouping structure for 'imported' animals has, in practice, had a small but important effect. In the test runs the larger changes were mainly found in bulls from the USA which is not unexpected since the majority of imports have come from that country. The results showed that extreme evaluations for sires, such as BLACKSTAR and MICHAEL, have been brought closer to expectation, as defined by their converted foreign evaluaton.

When the July evaluation was carried out with the original management grouping procedure the initial high PTAs decreased as the influence of the imported daughters was diluted by UK bred daughters. However, the initial rankings of bulls in the UK are extremely important. It is not acceptable to wait in the hope that the situation will correct itself.

The largest changes for cows were found in 236 animals with foreign dams. These tended to be cows at the top of the rankings. Within the large number of cows evaluated, this number is small but they were, in the main, from high profile herds.

The size of imported animal contemporary group is important. In the light of experience a minimum of 5 may be more appropriate to ensure a reasonable level of accuracy. The new management grouping procedure remains in the evaluation model.

General Reference

Wiggans, G. R., Misztal, I. and Van Vleck, L. D. 1988. Implementation of an Animal Model for Genetic Evaluation of Dairy Cattle in the United States. Proceedings of the Animal Model Workshop, J. Dairy Sci. vol 71 Suppl. 2, 54-69.

Table 1. Differences between Official (95:1) and Test (95:1*) Evaluation

	% Imported Daughters	Milk kg	Fat kg	Protein kg
BLACKSTAR	77	-137	-3	-4
MICHAEL	42	-118	-4	-4
AEROSTAR	36	- 49	-2	-2
GAMBLER	95	60	2	1
SUNNY BOY	46	42	1	1

Table 2. Differences in Management and Yield Deviations between 95:1* (test) and 95:1 (official)

	DTRS			TRAITS	MDEV			YDEV		
	All	H	I		All	H	I	All	H	I
AEROSTAR	204	131	73	Milk	-51	20	-175	-33	7	-95
				Protein	-2.1	0.6	-6.9	-1.3	0.2	-3.9
BLACKSTAR	290	68	222	Milk	-168	-55	-203	139	-59	-164
				Protein	-6.2	-1.8	-7.5	-4.9	-1.8	-5.8
MICHAEL	135	78	57	Milk	-124	-31	-245	-110	-34	-202
				Protein	-4.8	-1.2	-9.7	-4.0	-1.2	-7.7
SEXATION AMOS	1122	765	327	Milk	5	20	-30	14	21	2
				Protein	-0.3	0.5	2.4	0	0.5	-1.0
SUNNY BOY	1321	711	610	Milk	-5	13	-26	17	19	14
				Protein	-0.8	-0.2	-2.1	0	0.4	-0.5

H = home bred, I = imported, MDEV = Management deviation, YDEV = Yield deviation.

Table 3. Difference Between 95:2 Official Run and 95:1 Official Run by Country of Origin

	Number of Bulls	Milk kg	Fat kg	Protein kg
UK1	4,683	-2 (15)	-0.4 (0.8)	-0.3 (0.5)
UK2	343	1 (33)	0 (1.4)	-0.1 (1.0)
GER	14	-3 (50)	0.4 (1.7)	-0.01 (1.6)
DEN	21	0 (19)	0.5 (0.7)	0.2 (0.6)
NZ	46	-11 (43)	0.2 (2.0)	-0.2 (1.3)
NLD	27	-11 (66)	-0.2 (2.3)	-0.2 (1.9)
CAN	736	-2 (32)	-0.2 (1.3)	-0.1 (0.9)
USA	147	-11 (65)	-0.2 (2.7)	-0.1 (1.8)
FRA	17	-15 (43)	-0.9 (2.1)	-0.5 (1.4)

Figures show average difference with standard deviation in brackets.
UK1 = UK registered Holstein Friesians, UK2 = UK registered Holsteins.