

Genetic Evaluation of Dairy Cattle in Korea

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Abstract

A total of 543,700 dairy cattle, Holstein Friesian, were raised by 13,348 herds as of December, 2000 in Korea. The dairy population size has been stable for last few years. Of all, about 110,000 cows (about 35% of a total of 312,000 milking cows) were participated in DHI program. In 2000, annual 305 days milk, fat and protein production per cow were 8,086 kg, 298 kg and 254 kg, respectively. Under DHI program, all dairy farm records, such as individual milk production, fat and protein components, nutrition level, somatic cell count and reproduction data, etc were collected and analyzed to provide useful information to all members monthly in cooperation with member-coops of National Agricultural Cooperatives Federation (NACF) through nationwide network system. The first national genetic evaluation for 7 lactation yields and 16 type traits was run using a single trait-animal model with repeated lactation records in 1995. From 1999, the model was changed to a single trait animal model with only first lactation records to avoid possible problems such as preferential treatments and limitation of data sources. Currently, national evaluation is run 4 times a year, then the results of March and September are officially published for sire and elite cow selection.

Keywords: DHI; Genetic evaluation; Animal model

Dairy population in Korea

As of December 2000, 543,700 dairy cattle of Friesian Holstein were raised by 13,348 herds in Korea. The trend of the dairy population size has been relatively stable for last few years. However, since 1985 the total number of herds has steadily decreased from 45,000 to 13,348 as of year 2000. Thus, the average herd size has continued increasing up to 41. Among total dairy cattle in Korea, about 110,000 cows (about 35% of total milking cows) were registered in DHI program.

Milk recording program

For more than 20 years, the milk recording scheme has been run under the strict DHI rules stipulated by Government. All DHI supervisors investigate daily and cumulative milk yield records of every individual cows once a month. The supervisor visits each farm to gather data for milk productions and their components within $\pm$ 35 days. Then, all the records are processed by the Central Data Processing system.

Table 1. Comparison of milk products by year and by head between tested and non-tested populations in Korean Dairy industry

Year	All herds			Tested herds			
	305daysMilk yield(kg)	Herds	No. of cows	305daysM ilk(kg)	305days fat%	Herds	No. of cows
1980	4,494	22,122	206,851	4,957	3.70	241	3,780
1981	4,562	18,229	194,205	5,340	3.60	299	4,564
1982	4,662	22,536	228,248	5,418	3.60	309	5,294
1983	4,745	29,537	274,783	5,398	3.60	304	5,460
1984	4,765	37,646	334,352	5,355	3.60	297	5,505
1985	4,681	43,760	390,135	5,412	3.60	358	6,388
1986	4,724	42,728	437,333	5,438	3.60	324	5,355
1987	4,818	38,131	463,330	6,215	3.57	307	5,613
1988	5,126	35,713	480,239	6,069	3.41	572	7,775
1989	5,315	34,038	494,524	6,421	3.72	794	11,238
1990	5,363	33,277	503,947	6,176	3.64	768	11,385
1991	5,533	30,150	495,772	6,327	3.62	834	13,018
1992	5,639	27,965	508,241	6,676	3.64	840	13,569
1993	5,665	28,219	553,343	6,790	3.63	870	15,411
1994	5,729	25,667	552,139	6,763	3.58	968	19,208
1995	5,836	23,159	553,467	6,868	3.58	995	22,269
1996	5,959	21,129	551,493	7,038	3.61	1,017	23,716
1997	5,882	17,419	544,417	7,171	3.61	2,163	53,450
1998	5,972	15,671	538,913	7,252	3.57	2,419	62,496
1999	6,135	14,392	534,506	7,629	3.51	3,029	84,897
2000	6,350	13,348	543,708	8,086	3.69	3,441	107,712

Genetic evaluation

The main goal of national genetic evaluation is the selection of sires and elite cows for the genetic improvement of dairy cattle in Korea. The progeny test for sire selection began in 1987 in Korea. The first national genetic evaluation of dairy cattle was run in 1995. Until 1995, the whole quantity of semen consumed in Korea was imported from abroad. However, at present, a sizable quantity of semen produced at Korea by large covered the semen market in Korea.

The yield and type data used for evaluation were collected from Dairy Cattle Improvement Center (DCIC), the central Dairy Herd Improvement (DHI) with 27 regional affiliates, and Korea Animal Improvement Association (KAIA), breed association, respectively. Also, pedigree information for evaluation was offered from KAIA. The yield data were adjusted for 305 ME and checked for the feasibility of validity prior to analysis. The adjustment factors were renewed in 1999.

Genetic evaluation has been undertaken at National Livestock Research Institute (NLRI) since 1995. Up to now some evaluation models based on animal model have been modified for accurate genetic evaluation. The main reason of changes of model was due to limited source of data available for the analysis.

The first implemented animal model, which was applied from 1995 to 1998, was single trait animal model with repeated lactation records adjusted for mature equivalent (Model 1). The cumulated milk recording data has been shown that some problems existed to adopt repeatability model for evaluation because many of cows have not had lactation records more than 1 record. And also, almost 50% of cows were first tested after 2nd parity.

Since 1999, single trait animal model with only first lactation records adjusted 305 day (Model 2) has been adopted to avoid a possible problem with selection bias and shortage of cumulated records of cow. The statistical model used to date was described as: $y = hys + a + e$; where, hys is

fixed effect of herd-calving year-calving season, a is random effect of additive genetic effect, e is random residual effect. Regardless of some advantage for former model, this model doesn't reflect the characteristics of repeat production of dairy cattle.

Recently, the feasibility for multiple trait model with each parity treated as a separated trait (Model 3) is now under study. The results showed that this model could improve the defects of former 2 models. However, it seemed that this model also

had problems, especially small contemporary group size of each correlated parity. In future, with more data accumulated this model could be a more reasonable model for genetic evaluation in Korea.

Currently, the evaluation was run 4 times a year and then, the results of March and September were presented to the national dairy cattle breeding committee for sire and elite cow selection. The results of evaluation and supplement information (status of inbreeding) were distributed nationwide through the report book and the internet.

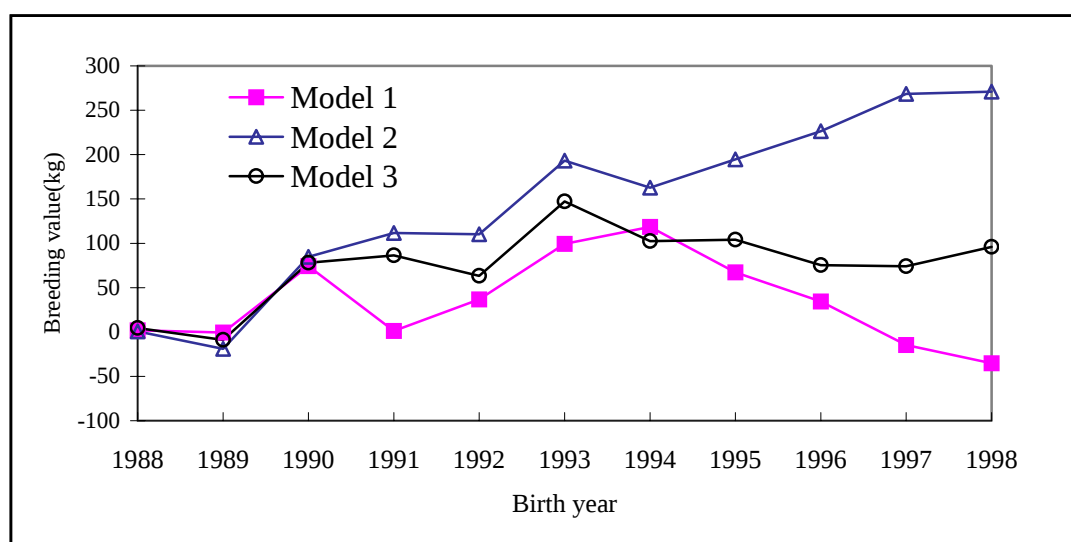


Figure 1. Comparison of trend in breeding values for milk yield among models.

Future projects

DHI services of Korea were granted for the qualification of a full membership of the International Committee for Animal Recording (ICAR) and INTERBULL in 1999. The DHI system is going to adapt the unique identification code for national-level animal recording and breeding schemes as well as farm management and animal health control following an ICAR recommendation.

Work is proceeding on adding health and management traits such as SCS and milking speed.

And milk, fat, protein and SNF evaluations are currently calculated.

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