

A survey on Inbreeding Coefficients of Iranian Holstein Dairy Cows in Isfahan Province

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Abstract— This study was aimed to estimate inbreeding coefficients of Holstein cows in Isfahan province of Iran. Pedigree information of 27375 cows born from 1984 to 2006 in Isfahan province of Iran was extracted from the total pedigree file of Iranian dairy cows. Inbreeding coefficients were estimated using ASREML software. Average inbreeding coefficient varied from 0.25% (1996 yr) to 0.44% (2006 yr) with 0.019 % average annual increase. Distribution of inbreeding coefficients showed that estimated inbreeding for 71% of cows were equal to zero. However, 10% of total cows in the pedigree file did have the inbreeding coefficient of 5 to 26 percent. Having these cows/sires with high inbreeding coefficients indicated that sire selection in some of dairy herds was not considered as a serious management concerns that might be due to inappropriate recording system.

Keywords: *Inbreeding, Dairy, Holstein, Isfahan, Iran.*

I. INTRODUCTION

Dairy cows have been subjected to highly intensely selection for milk yield and its content in the most of developed developing and countries. Worldwide trade of semen from limited numbers of prominent bulls brought almost similar circumstances across the world with considering a lag between exporting and importing countries. In our country, dairy producers and AI technicians do believe that use of semen from external bulls will lead to significant achievement in production traits related to internal bulls. Our previous work also confirmed that daughter's estimated breeding values (EBVs) of sires from Iranian sources was minimum related to those originated from Canada, USA and New Zealand bulls (Eghbalsaied et al., 2009). Global use of these AI sires and their offspring in successive generations has led to increase in average inbreeding coefficient in almost all dairy breeds, such as Holstein, Jersey and Ayrshire (Sewalem et al., 2006). Inbreeding depression in vast variety of traits like production, fertility and adaptability traits is the main disadvantage of inbreeding (Freyer et al., 2005). Inbreeding depression and heterozygosity are closely connected to mating systems occurring as a result either from inbreeding or crossbreeding. The main objective of this study was to estimate inbreeding coefficient of dairy cows in Isfahan province and survey its trend in time.

II. MATERIALS AND METHODS

The total pedigree file of Iranian registered dairy cows was provided by Animal breeding centre of Iran (ABCI). Pedigree information of 27375 cows born from 1984 to 2006 was extracted from the total pedigree file. Inbreeding coefficients were estimated using ASREML software.

III. RESULTS

Data was provided by Animal Breeding Centre of Iran (ABCI) from 1984 to 2006 for 51 herds in Isfahan district. Recording system was firstly applied in Iranian Holstein dairy cows since 1985. However, clarifying the advantages of having data file for dairy producers was cumbersome job and had a little progress till 1995. Since then with improvements in semen world wide trade the trend has been promising so far and almost all of modern dairy cows are aware of the importance of pedigree and data file for all production, reproduction and type traits.

As depicted in figure 1, average inbreeding coefficient varied from 0.25% at 1996 to 0.44% at 2006 with 0.019 % annual average increase. It fluctuated in each two years with similar upward and downward, except for the last three years. Even though, the average inbreeding in Iranian dairy cows related to other countries was quite low, the trend of increase, exclusively in last 3 yrs, was very sharp with more than 0.1% in two successive years. Average and minimum-maximum of estimated inbreeding coefficient were 3.6, 0-35.78 in Jersey; 3.99, 0-45.41 in Ayrshire and 3.2, 0-44.71, respectively. Moreover, the trend from 1998 (0.03) to 2004 (up to 0.06) were positive for all three breeds (Sewalem et al. 2006). Dam inbreeding in Holstein and jersey dairy cattle in Germany were estimated 3.68 and 4.62, respectively (Freyer et al., 2005).

Distribution of inbreeding coefficients in table 1 clearly showed that estimated inbreeding for 71% of cows were equal to zero. This is most likely due to the lack of pedigree information for great proportion of dairy cows followed by underestimation of their inbreeding coefficients. Surprisingly, 10% of total cows in the pedigree file did have the inbreeding coefficient of 5 to 26 percent. Having these cows/sires with high inbreeding coefficients indicated that sire selection in some of dairy herds was not considered as a serious management concerns that could be due to inappropriate recording system.

IV. CONCLUSION

Average inbreeding coefficients in Iranian dairy cows (0.6 %) were much lower than those reported in other countries. However, there was a positive (unfavorable) trend in inbreeding with the time passing. Vast majority of sires and dams did have an inbreeding equal to zero that could be due to having lots of animals with unknown sire or dam. Since, obtaining the short and long term breeding goals are closely related to data availability, it is recommended that ABCI devices appropriate plans in order to highlight dairy recording system.

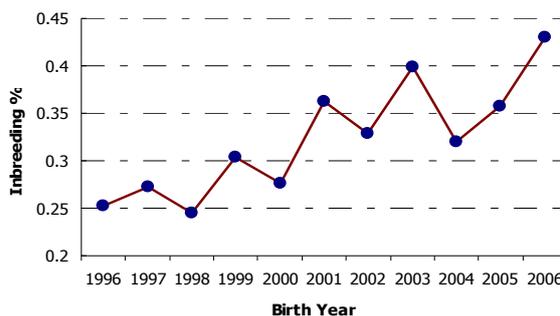


FIG. 1. Trend of average inbreeding coefficients of Holstein cows calved from 1996 to 2006.

TABLE I. DISTRIBUTION OF INBREEDING COEFFICIENTS (F) OF HOLSTEIN DAIRY COWS IN IRAN.

%F	0	0-1	1-2	2-4	4-8	8-12	12-24	24-26
cows	19612	5351	1520	615	227	4	27	19
(%)	71.6	19.5	5.6	2.2	0.8	0.0	0.1	0.1

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