SIRE EFFECTS ON LONGEVITY DEPENDING ON POTS [(*)] IN HOLSTEIN POPULATION IN JAPAN

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** Proportion of cows with a type score in a herd*

Objectives

The objectives of this study are to estimate sire effects on functional longevity in several subsets with different POTS [(*)] in Holstein population in Japan and to compare the sire effects among these subsets.

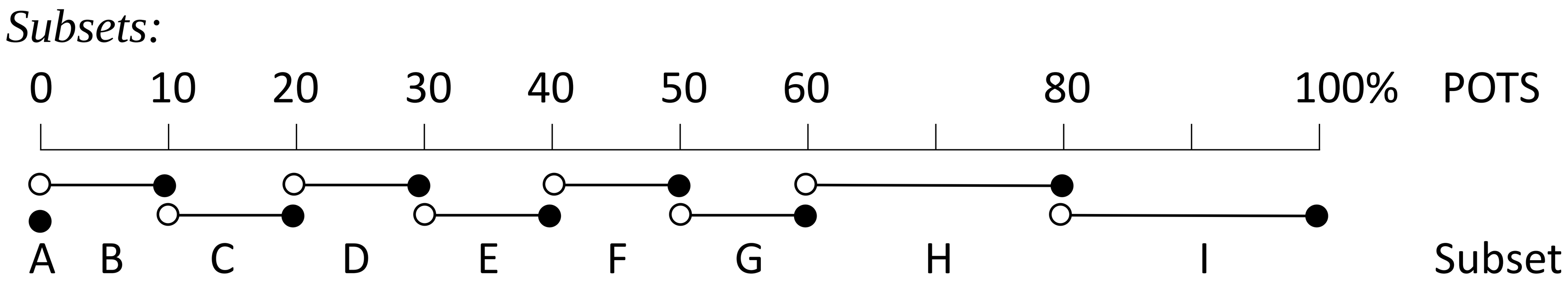
Introduction

Many studies have reported parameter estimates of longevity of Holstein cows in several countries. Few reports examined the dependence of sire effect on the longevity on POTS.

Materials and Methods

Data: 1,176,931 cow records from the Hokkaido Dairy Milk Recording and Testing Association.
Period of analysis: 1991 ~ 2007.
Censoring: if alive on December 31, 2007.
Longevity measure: number of days from first calving to culling or censoring date

Subsets:



Edits: herd with at least 30 animals, sire with at least 20 daughters.
Software: "Survival Kit Version 5.0".
Model:

$$h(t) = h_{0,n}(\tau) \exp [HY_i(t') + Y_j(t') + MILK_k(t'') + SIZE_l(t') + FM_m + TS_n + SIRE_o]$$

where:
h(t): hazard function of the cow, t days after her first calving,
$h_{0,n}(\tau)$: Weibull baseline for the n^{th} subclass of parity by stage of lactation. τ denotes the number of days between the most recent calving and current time t,
$SIRE_o$: time independent random effect of the o^{th} sire of cow, assumed to be independently distributed and following a normal distribution.

Table 1. Details for classes of effects included in the model [1].

$HY_i(t')$, $Y_j(t')$:	Calendar year 1991, 1992, 1993, ... , 2007
$MILK_k(t'')$:	Milk yield class 1: ≤ μ - 1.5 SD, 2: μ -1.5 SD to μ - 0.5 SD, 3: μ - 0.5 SD to μ + 0.5 SD, 4: μ + 0.5 SD to < + 1.5 SD, 5: ≥ μ + 1.5 SD
$SIZE_l(t')$:	Code 1: Variation in herd size between two consecutive years < - 15%, 2: - 15 % to - 5 %, 3: - 5 % to + 5 %, 4: + 5 % to + 15 %, 5: ≥ + 15 % <
$FM_m(t'')$:	Code 1: Age at first calving ≤ 21 months, 2: 22 months, 3: 23 months, · · · · · 22: 41 months
TS_n :	Code 1: presence of type score, 2: absence of type score

[1]**t'** = calendar time: **t''** = time since the most recent calving.

Results

Sire variances varied from 0.017 (subset B) to 0.0431 (subset I). The highest (0.1342) and the lowest (0.0288) heritabilities were estimated in subsets I and A, respectively.

Figure 1 shows regression coefficients and rank correlation coefficients of sire effects estimated in different subsets. Regression coefficients were generally low when difference in POTS between two subsets was large. Rank correlations were not in close relationship with difference of POTSs between subsets.

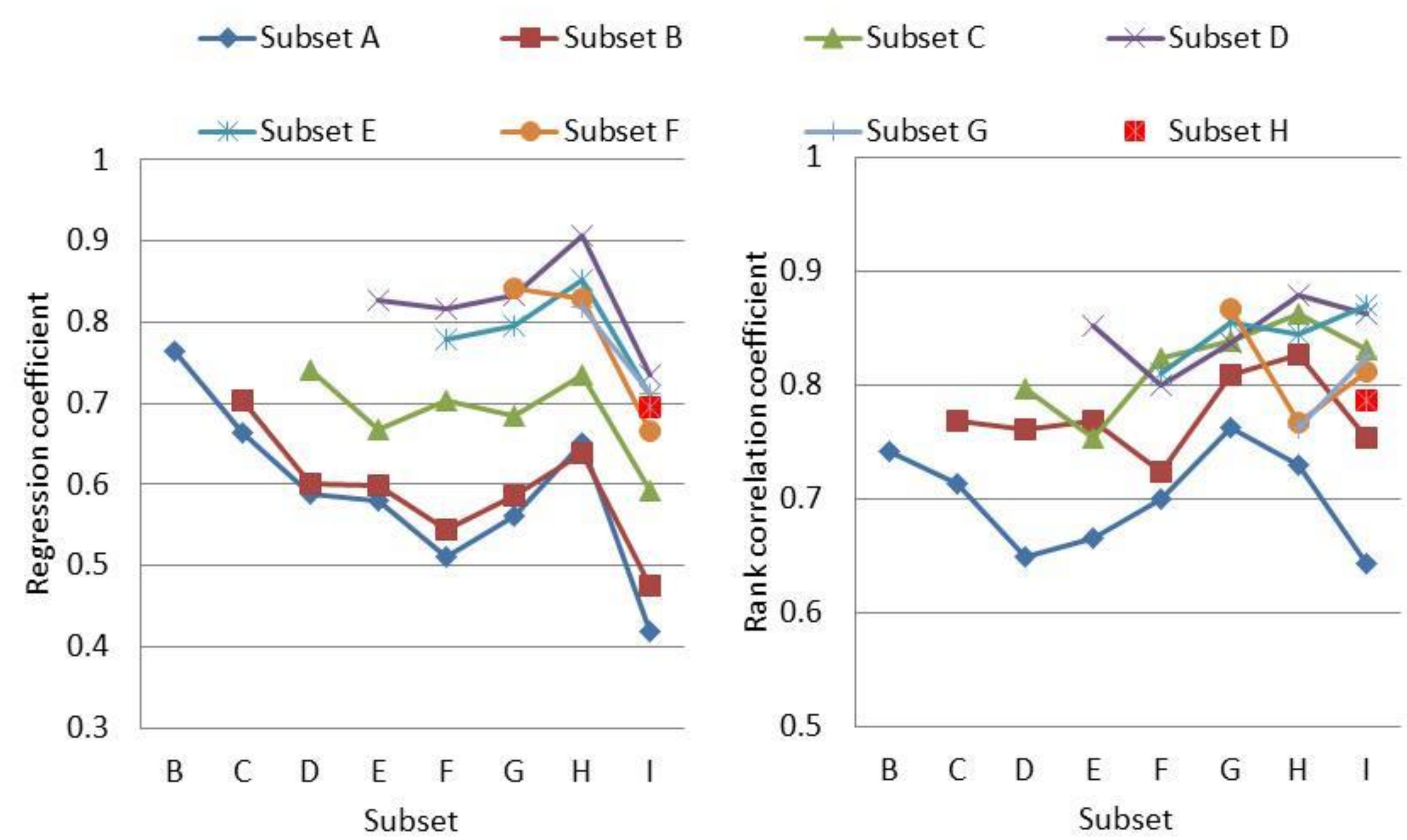


Figure 1: regression coefficients and rank correlations of sire effects estimated in two subsets (No. uncensored record => 100)

Figure 2 is a scatter plot of sire effects in subsets B and I showing closer relationship between sire effects estimated in different subsets when sires had 100 or more uncensored daughter records. Rank correlation coefficient and regression coefficient are much smaller than 1.

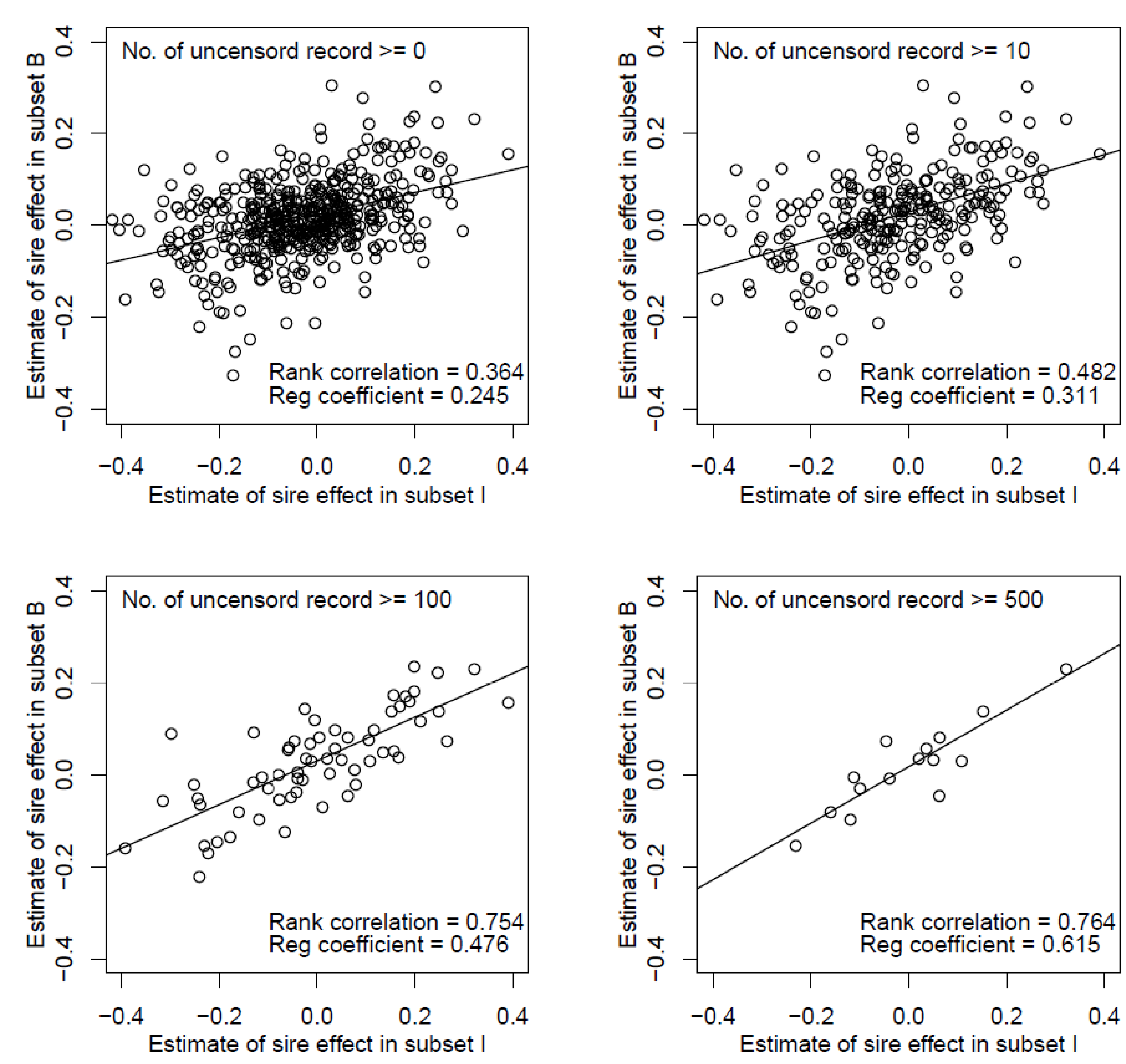


Figure 2: scatter plot of estimates of sire effect in subset B and I.

Discussion

Small regression coefficients show a large scale effect across subsets. Given the rank correlations estimated in this study, a strong re-ranking of EBV evaluation exist between subsets

Conclusion

LPL (and the corresponding EBV) strongly differ between herds with low or high proportion of cows with a type score in Japan.