STØTTET AF
Mælkeafgiftsfonden

Inbreeding in A-matrix and including inbreeding depression in the model

Trine Andersen & Jørn Pedersen, February 2022

Based on November 2021 data for Jersey
/usr/home/nav/denmark/navjop/AMcalving/Snell/JEReval_inbr_depr
/usr/home/nav/denmark/navjop/AMcalving/Snell/JEReval_inbreeding

Inbreeding in A-matrix
The inbrfile jerinbreed.dat is included in the clm file

Inbreeding in A-matrix and inbreeding depression in the model
The inbrfile jerinbreed.dat is included in the clm file
Calfinbr and cowinbr er inincluded is fixed effects in the model

Results
The regression coefficients for calfinbr and cowinbr are shown in the table1. Overall, the effect of inbreeding is negative as expected, despite for cowinbr for CS2. The effect of 100% inbreeding in index units are high, but this is also not the current image of the inbreeding level of animals, which is shown in table2.

	Solutions from model		100% inbreeding in index units		1% inbreeding in index units	
trait	calfinbr	cowinbr	calfinbr	cowinbr	calfinbr	cowinbr
SB1	-0.316	-0.039	-134	-16	-1.34	-0.16
CE1	-0.084	-0.115	-25	-33	-0.25	-0.33
CS1	-0.727	-0.235	-37	-29	-0.37	-0.29
SB2	-0.186	0.001	-192	1	-1.92	0.01
CE2	-0.045	-0.075	-22	-52	-0.22	-0.52
CS2	-0.686	0.063	-36	8	-0.36	0.08

Table 1: inbreeding effect

% Indbr level	Number of calves	% calves	Number of cows	% cows
0-4	1704352	69.6%	1936793	79.0%
5-9	697315	28.5%	480325	19.6%
10-14	36708	1.5%	24988	1.0%
15-19	7895	0.3%	5436	0.2%
20-24	165	0.0%	119	0.0%
25-29	3539	0.1%	2360	0.1%
30-34	112	0.005%	63	0.003%
35-39	8	0.0003%	10	0.0004%
Sum	2450094	100.0%	2450094	100.0%

Table 2: distribution of inbreeding levels for calves and cows

Below is shown the GEBV correlations for Nordic JER AI bulls with more than 100 offspring and 50 daughters with offspring for SB and CE. There are 310 bulls behind the correlations.

- nnn is snell score evaluation without including inbreeding
- nia is snell score evaluation with inbreeding in A-matrix
- nii is snell score evaluation with inbreeding in A-matrix and inbreeding depression in the model

The correlation between nnn and nia is above 0.999 for all traits both direct and maternal. Therefor it has no effect on the ranking of GEBV for Nordic AI bulls when inbreeding is included in the A-matrix.
The correlations between nnn and nii are in the range 0.992 – 0.999 for different traits. The correlations are higher for maternal than for direct. Overall, this means that there is no reranking of Nordic AI bulls if inbreeding is included in the A-matrix and inbreeding depression is included in the model.
This is in line with earlier results for HOL.

	direct			**maternal**		
	nnn-nia	nnn-nii	nia-nii	nnn-nia	nnn-nii	nia-nii
SB1	>0.999	0.995	0.995	>0.999	0.999	0.999
CE1	>0.999	0.999	0.999	>0.999	0.999	0.999
CS1	>0.999	0.998	0.998	>0.999	0.998	0.998
SB2	>0.999	0.992	0.992	>0.999	0.998	0.998
CE2	>0.999	0.999	>0.999	>0.999	0.999	0.999
CS2	>0.999	0.999	0.999	>0.999	0.999	0.999

Table 3: GEBV correlations for Nordic AI bulls