Genetic analysis of calf and heifer diseases in Danish Holstein

Birgit Fuerst-Waltl[1] and Morten Kargo Sørensen[2,3]
[1]University of Natural Resources and Applied Life Sciences (BOKU) Vienna, Austria
[2]Faculty of Agricultural Sciences, Department of Genetics and Biotechnology, Tjele, Denmark
[3]Danish Agricultural Advisory Service, Aarhus, Denmark

University of Natural Resources and Applied Life Sciences Vienna

Danish Agricultural Advisory Service National Centre

Danish Health Registration

- Routine registration in cattle since 1990
- Used for management and breeding
- For genetic evaluation diseases of calves and heifers not considered so far!

Health traits in calves and heifers

- Economical and welfare aspects
- Only limited number of publications, especially with regard to genetic effects
- Possible future selection criterion?

Data

- Female **Danish Holstein calves and heifers** born 1998 - 2007 (N = 816 493)
- Age: 1d to first calving (maximum 1200d)

Traits analysed

At least one treatment (binary data structure) of the following diseases:

- **Udder diseases (UDD)**
- **Reproductive diseases (REP)**
- **Feet and leg diseases (FL)**
- **Digestive diseases (DIG)**
- **Other infectious diseases (INF)**
- **Total (TOT):** either of the above

Restrictions

- Minimum age reached: 30d (DIG, FL, INF, TOT)
- Minimum age reached: 365d (REP, UDD)

Summary

- **Frequencies of different disease groups between 1.52% and 3.89%**
- **9.99% of calves and heifers were at least treated once up to first calving**
- **Heritabilities (linear) <= 0.01; heritabilities (threshold) <0.01 – 0.026**
- **Monitoring and research towards including traits in breeding programs recommended**

Genetic analysis

- **Generalized linear mixed models**
- **Univariate linear/threshold sire model** (DMU)
- **Effects**: Herd*Year*Season and sire (random); Year*Season, calving ease, calf size and no of dam's parity (fixed)

Heritabilities

Trait	N	Freq (%)	h^2 lin	h^2 thr
DIG	816 493	1.52	<0.001	<0.001
INF	816 493	2.59	0.003	0.026
FL	816 493	1.88	0.001	<0.001
REP	699 228	3.89	0.003	0.014
UDD	699 228	1.95	0.010	-[1]
TOT	816 493	9.99	0.004	0.010

[1]did not converge: values between 0.053 and 0.067


Photos: Poul Bech Sørensen, VikingGenetics