Improvements for feet and legs using new recording procedures

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Abstract

Claw disorders can be diagnosed at the time of claw trimming. Modern technology makes it possible to record electronic data during claw trimming in the stable. Using this technology, it is possible to simultaneously link the diagnoses with previous recordings of basic cow data like registration number, date of birth, pedigree and milk yield data and then integrate the new data. The main programme is running on a server PC. Here all the basic data of an animal and/or of a farm are filed. Under “clients“ the farms are listed with their addresses. From here the latest and “new” basic data of the cows can be ordered from the host of the central milk recording data server via the Internet. Data needed in the stable is subsequently transferred onto the pocket PC. On farm, the pocket PC is used to collect the diagnoses (Figure 1). The program is asking you which cow (by number) one would like to have on the screen. After putting in if the animal is clean and lame or not, you choose the leg you want. The diagnoses are put in and after that the localisation has to be added. If there is no other leg with any diagnose, you go back to the screen which is asking you for the number of the next “candidate”. All recordings were done by the last author of this paper as outlined by Pijl (2004).

Figure 1: Taking records at trimming using a pocket PC

The project is ongoing. At present (as of March, 2007) a total of 49,875 records (observations) in 136 Holstein herds from 16,681 cows have been collected over a period of six years. The resulting data comprised 17 categories of pathological findings, herd environment information, milk yields, pedigree information, and fertility records. The incidence rates of the eight main pathological findings are summarized in Table 1.

Table 1: Incidence rates per disorder/disease in three subsets of the data for the eight most frequent diseases
(Multiple diseases per observation possible)

Name of disease	All Observations %	All cows with a first examination done by R. Pijl %	First trimming in 1st lactation %
Laminitis	31.29	33.49	33.63
Dermatitis Digitalis	19.49	21.91	26.37
Dermatitis Interdigitalis	11.89	11.87	9.38
White line disease	13.78	14.38	13.85
Sole ulcer	6.63	5.50	4.73
Rotation	13.66	16.47	20.73
Interdigital growth (Tylom)	8.44	4.41	3.88
Thick hock	3.26	2.97	3.02
No. of observations	49,875	16,681	10,444

As can be seen from Table 1, the incidence of diseases of the bovine claw is high. More than 60 % of all records had at least one positive (diseased) observation. This finding underlines the need for increasing all efforts to improve the situation, be it through improved claw trimming, better environmental conditions or by genetic selection.

In contrast to other large field studies that dealt with single observations per cow only (e.g. König et al., 2005; van der Waaij et al., 2005, Sogstad et al., 2005; Sogstad et al., 2007) our database has the distinct advantage that different types of studies and analyses are possible. This pertains to analyses of housing systems when modelling systems across herds, genetic models including a herd effect, and especially to univariate and multivariate models with or without taking repeated records into account.

Some of the results from the own ongoing project (Swalve et al., 2005; Pijl and Swalve, 2006; Swalve and Pijl, 2007) are:

- Disorders and diseases are affected differently by the housing system. Concluding, there is no unique system which leads to decreases of incidence rates for all diseases. An example also is grazing. For laminitis, it is advantageous to allow cows a few hours of grazing per day while day-and-night systems or keeping cows indoors at all times is increasing the incidence of laminitis.
- Different claw diseases occur at different times throughout parity number and stage of lactation within parity. As an example, laminitis is more frequent in older cows whereas dermatitis digitalis is less frequent in higher parities.
- Heritability estimates from threshold models are in the range of 5 to 12 % for most diseases. Since incidence rates for the 6 to 8 most frequent diseases are high, applying linear models yield results which are very similar to those from threshold models. The magnitude of the heritability estimates is in line with findings from the literature (e.g. König

et al., 2005; van der Waaij et al., 2005). Thus being in the intermediate to low range, the heritabilities demonstrate that genetic selection will is feasible.

- Analysing the relationship between the incidence of a claw disease or disorder and milk yield is a complex task and can be done in a variety of ways. A clearly negative (antagonistic) phenotypic relationship exists when adding the corresponding test day milk yield into the model. However, when modelled as a second trait (e.g. milk yield in the entire first lactation), milk yield genetically is almost unrelated to the incidence.
- Claw disorders affect fertility parameters less than anticipated. The number of inseminations per pregnancy is almost unaffected while the number of days open is decreased by claw diseases.

Model calculations (König and Swalve, 2006) have shown that genetic improvement to lower incidence rates of claw diseases is only worthwhile when it is based on field recording systems for the diseases. Such recording systems may not be possible to be implemented across all herds. Rather, contract herds used to test young bulls should be subject to such recording systems.

Literature

S. König, A. R. Sharifi, H. Wentrot, D. Landmann, M. Eise, and H. Simianer (2005): Genetic parameters of claw and foot disorders estimated with logistic models. J. Dairy Sci. 88: 3316-3325.

S. König and H.H. Swalve (2006) Modellkalkulationen zu züchterischen Möglichkeiten auf Klauengesundheit beim Milchrind. Zkde 78(5): 345-356

R. Pijl (2004): Electronic data recording during claw trimming. In: 13th Int. Symp. and 5th Conf. on lameness in ruminants, Maribor, Slovenija, Proc., 14-15

R. Pijl and H.H. Swalve (2006): An analysis of claw disorders diagnosed at claw trimming. Proc. 6th Conf. Lameness in Ruminants, Colonia, Uruguay, Nov 8 – 11. Page 34-36.

Å.M. Sogstad, T. Fjeldaas and O. Østerås (2005): Lameness and claw lesions of the Norwegian Red Dairy Cattle housed in free stalls in relation to environment, parity and stage of lactation. Acta vet. scand. 46: 203-217.

Å.M. Sogstad, O. Østerås, T. Fjeldaas, and A. O. Refsdal (2007): Bovine claw and limb disorders at claw trimming related to milk yield. J. Dairy Sci. 90: 749–759.

H.H. Swalve, R. Pijl , M. Bethge , F. Rosner and M. Wensch-Dorendorf (2005): Analysis of genetic and environmental effects on claw disorders diagnosed at hoof trimming. Proc. 56th EAAP meeting, Uppsala, Sweden, Abstr. No. 263.

H.H. Swalve and R. Pijl (2007): Claw disorders diagnosed at hoof trimming – a potential aid in analyses of fertility problems in dairy herds. Abstract No. 96, 40th Ann. Conf. Physiol. Path. Reproduction, Berlin, 22 to 23 February. In: Reproduction in Domestic Animals 42 (Suppl. 1): 31.

E. H. van der Waaij, M. Holzhauer, E. Ellen, C. Kamphuis, and G. de Jong (2005): Genetic Parameters for claw disorders in Dutch dairy cattle and correlations with conformation traits. J. Dairy Sci. 88: 3672-3678.

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