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Welfare of Dairy Cows in Danish Summer Grazing Herds

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Summary

Structural changes in the prime sector have led to increasing dairy herd sizes followed by a decrease of grazing use in Denmark. Citizens in Europe and the US rate natural life and outdoor/pasture access high in terms of animal welfare whereas managing cows without pasture access finds hardly an agreement in the public opinion. However, sufficient knowledge on a distinct welfare benefit of grazing for the cows under Danish farm management condition was yet lacking. The aim of this PhD study was to investigate the effect of summer grazing on the welfare of dairy cows in Danish herds. The focus was on large herds. The hypotheses of the PhD thesis were i) cow mortality is lower in grazing than zero-grazing herds and specific grazing management factors have an impact on the mortality (**mortality study, paper I**); ii) an increased number of grazing hours decreases the probability of integument alterations at hock joint in dairy cows (**integument study, paper II**); iii) cow welfare as multi-dimensional state in dairy herds is better during summer grazing than during full-time winter housing. Furthermore, improved welfare with an increase in daily summer grazing hours is expected (**multi-dimensional welfare summer-winter, paper III**).

The mortality rate in the year 2008 has been evaluated in 131 summer grazing and 260 zero-grazing herds (all housing at least 100 cows) based on information from the national cattle data base and survey information on grazing management. The mortality was affected by an interaction of grazing and milking system. The risk of a cow dying was reduced to 46% in a grazing compared to a zero-grazing herd having automatic milking system. In traditional milking system, mortality was reduced to 75% in grazing compared to zero-grazing herds. Within the grazing herds, the risk of mortality decreased with increasing number of hours on pasture during the season. Free access between barn and pasture was associated with increased cow mortality (odds 1.42 times).

For the integument and multi-dimensional welfare study, 41 grazing and 20 zero-grazing Danish dairy herds have been recruited for on-farm welfare assessments. Inclusion criteria for all herds were a herd size of minimum 100 cows and housing cubicle loose housing system. The grazing herds were visited twice, once in winter and once in summer and the zero-grazing herds once in the year 2010. Welfare of sample cows was assessed within each herd using a welfare assessment protocol which was orientated in the Welfare Quality® assessment scheme.

In the integument study, 36 grazing and 20 zero-grazing herds were included. The probability for the hock integument alterations hair loss, lesions or swellings was found to decrease with increasing amount of grazing hours (odds of 3-9 hours 2.2 times, odds of >9-21 hours 4.8 times lower than of zero-grazing). Probability for only lesions or swellings decreased with >9-21 grazing hours (odds 2.1 times) but not with 3-9 hours

(odds 1.0 times) compared to zero-grazing. Lameness, hard cubicle surface and Danish Holstein breed increased the probability of integument alterations. Increase in days in milk increased the probability of lesions and swellings. It was concluded that the more daily grazing hours the more beneficial for the hock integument of Danish cubicle-loose housed dairy cows.

In the multi-dimensional welfare study, a range of 17 animal welfare measures assessed in the 41 grazing herds were evaluated. A panel of 20 experts on cattle welfare and husbandry evaluated the relative weight of the 17 welfare measures. Based on the weights and the herd prevalence of each measure, a welfare index (WI) was calculated for each herd and visit (the higher the index the poorer the animal welfare).

The mean WI in summer was significantly lower than in winter (mean 2,926 vs. 3,330; paired t-Test $p=0.0001$). The difference was based on primarily better integument, claw conformation and better access to water and food in summer vs. winter. Body condition and faeces consistence were worse during summer. The positive effect of grazing was found most pronounced for herds with high winter WIs and highest number of daily grazing hours during summer. There was a high variance of WI among herds. In conclusion, this multi-dimensional study showed a positive within-herd effect of summer grazing on dairy cow welfare where many daily grazing hours were more beneficial than few daily grazing hours.

This PhD study reported a beneficial effect from grazing on the single welfare indicators mortality and integument for grazing vs. zero-grazing dairy herds and beneficial withinherd effect of summer grazing on a multi-dimensional welfare index. High variation of welfare indices among herds in summer and winter indicated that summer grazing has the potential but does not guarantee better animal welfare than winter barn-housing systems.

Further research on even more comprehensive cow welfare assessment is necessary with stronger inclusion of behaviour aspects and with regard to further factors of grazing management. Such a 'global' assessment may detect if grazing is elementary for 'good' welfare of dairy cows.