# Investigations on dairy welfare and performance on German organic farms

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## Abstract

An investigation was carried out on 74 organic dairy farms in Germany. Results were an average milk production of 5.960 kg, 223.000 somatic cell counts (SCC), 387 days calving interval, 23.5 % culling rate, 46 Euro annual veterinary costs per cow. Farmers were asked for disease incidences. Cows were scored for injuries and body condition. The results were combined with possible influencing factors (herd size, breed, region, farming association, housing system, housing factors, amounts of concentrates). The most frequent health problems were udder, fertility, and claw disorders. These subjective estimations of disease incidences by the farmers could be validated with herd recording data (SCC, calving interval, culling reasons). Overall rate of injuries was low. Body condition scoring revealed only few problems. Holstein-Friesians showed the highest milk production, but also more health problems and a higher culling rate. The straw yard systems seem to have advantages with regard to lameness, fertility, and injuries, but a higher risk for mastitis.

## Introduction/Problem

Animal health and welfare are of growing importance in organic dairy production (e.g. Hörning 1998, Lund & Algers 2003, Nicholas *et al.* 2004, Vaarst *et al.* 2004). Winckler *et al.* (2003) proposed different indicators to be used for on-farm welfare assessments in cattle.

No information about the current state of dairy health and welfare on organic farms in Germany is available. Some data were collected ten years ago (Krutzinna *et al.* 1996). The aim of the project was therefore to provide up-to-date information.

## Methodology

Information was collected during farm visits to 74 dairy farms in 2002/03. Farms were selected from a sample of 780 organic cattle farms that responded to a questionnaire. Selection criteria for farm visits were a representative distribution (according to the number of organic farms in the federal states), a minimum herd size of 10 cows, and participation in milk recording. The sample was then taken randomly from the farms that fulfilled these criteria.

Performance data were taken from the milk recording schemes of the last completed year (milk yield, somatic cell counts/geometric means, age of cows, culling reasons). Information about disease incidences, amounts of concentrates, veterinary costs and udder hygiene measures were based on interviews of the farmers because no veterinary health recording system exists in Germany. Disease incidence was classed as never, seldom, regular, or frequent.

645 dairy cows were scored for injuries. Size and severity of injuries were scored at different body parts according to a scheme developed by Wechsler *et al.* (1996). Injuries were recorded with three scores for type of changes (hairless patches, scabs, wounds), size of changes (< 2 cm, < 5 cm, > 5 cm), or swellings (slight, medium, severe) in different body areas (fetlock, carpal and hock joints, shoulder-blade, neck, dewlap, coxal and ischial tuberosity). Body condition was scored with a ten-point scale at eight body regions (583 cows).

Data were evaluated statistically with the SPSS package 12.0. Herd averages were used instead of individual cow results. Spearman rank correlations or Mann-Whitney-test were used for the non-

normally distributed data. A GLM (Generalized Linear Model) procedure was used for multivariate analyses. The GLM allows for calculate metric and discrete variables at the same time. Whenever appropriate, breed (Holstein-Friesian, Simmental, Brown Swiss, rare breed), housing system (stanchion barn or loose housing), and organic association (Bioland, Demeter, Naturland, others) were included as fixed factors, and number of cows, milk yield, and amount of concentrates as covariates.

## Results and brief discussion

Table 1 gives an overview of the recorded animal-related parameters and selected key features of the farms (possible influences on animal parameters). In the following, first univariate and then multivariate analyses will be discussed.

Table 1: Animal-related parameters and selected key features (possible influences) of farms investigated

| | | | **Animal-related parameters** | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Selected key features** | **Farms** (n) | **Cows** (n) | **Concen-trates** (100 kg/year) | **Milk yield** (kg) | **Somatic cell count** (1.000) | **Calving interval** (days) | **Age of cows** (years) | **Culling rates** (%) | **Veterinary costs** (€) |
| **All farms** | **74** | **52.0** | **9.5** | **5957** | **223** | **387** | **6.0** | **23.5** | **45.8** |
| 1 – 29 cows | 21 | 21.1a | 7.2 a | 5482a | 198 a | 391 | 6.3 a | 23.8ab | 50.3 |
| 30 – 59 cows | 37 | 44.3b | 9.4 b | 6035b | 233 b | 386 | 6.0 ab | 21.8a | 42.1 |
| ≥ 60 cows | 15 | 110.3c | 12.5 c | 6398b | 231 b | 385 | 5.8 b | 27.0b | 48.0 |
| Bioland | 49 | 48.6 | 9.9 a | 6052a | 227 | 390 | 6.0 a | 24.4 a | 48.7 a |
| Demeter | 14 | 45.0 | 7.1 b | 5232b | 205 | 384 | 6.4 b | 21.2 b | 24.3 b |
| North/ West | 20 | 50.1 | 10.2 | 6355a | 243 | 396 a | 5.7 a | 28.6 a | 52.4 |
| East | 5 | 141.8 | 13.2 | 6454 | 233 | 386 | 5.9 | 27.8 | 29.0 |
| South | 49 | 43.6 | 8.8 | 5743b | 214 | 384 b | 6.1 b | 21.1 b | 45.1 |
| Holstein-Friesian | 20 | 78.1a | 11.9 a | 6818a | 220 | 396 a | 6.0 a | 29.1 a | 42.7 |
| Simmental | 16 | 43.0b | 9.1 b | 5753b | 198 | 378 b | 5.5 b | 20.3 b | 29.0 |
| Brown Swiss | 14 | 46.2b | 6.2 c | 5668b | 224 | 389 c | 6.3 a | 23.5 b | 43.9 |
| Stanchion barn | 15 | 29.7a | 7.1 a | 5415a | 221 | 392 | 6.3 | 22.3 | 43.1 |
| Loose housing | 59 | 57.6b | 10.1 b | 6094b | 223 | 386 | 6.0 | 23.8 | 46.6 |

Different letters indicate significant differences within that part of the column ($p < 0.05$).

Means of milk yield were 5.957 kg (s.d. 1.135). Milk yield increased with increasing herd size and increasing amount of concentrates. Milk yield was higher in loose housing than in stanchion barns. Milk yield was higher in the northwest than in the southern part of Germany. Holstein-Friesian cows had a higher performance than Brown Swiss or Simmental cows. Farms belonging to the Bioland association had a higher milk yield than Demeter farms. Mean somatic cell counts amounted to 222.797 (s.d. 90.101). Smaller farms had a lower somatic cell count. No other influences were found. The average calving interval was 387.2 days (s.d. 23.0). Calving interval was longer in the northwest than in the southern part of Germany. Holstein-Friesian cows had a longer interval than Brown Swiss or Simmental cows. Cows were on average 6.0 years old (s.d. 1.0). Cows were older in smaller farms, in Demeter farms and in southern Germany. 23.5 % of the herd was culled per year (s.d. 8.93). Holstein-Friesian cows, bigger herds and farms in the Northwest showed higher culling rates. Veterinary costs amounted on average to 45.80 Euro per cow per year (s.d. 28.2). Demeter farms had lower veterinary costs.

Multivariate analyses with the GLM procedure revealed herd size and concentrates amount as significant influences on milk production (coefficient of determination $r^2 = 0.504$); breed had no influence. Veterinary costs were influenced by herd size and milk production level ($r^2 = 0.736$), but not by breed or region. No significant influences on somatic cell counts, calving interval, culling rates or

age of cows could be found. Therefore, other influences seem to be effective, e.g. preventive hygiene measures for SCC.

Disease incidences mentioned as regular or frequent were 44.6% for udder health problems, 31.1 % for fertility, and 36.4 % for claw health problems. Fertility and claw problems were stated less often for Simmental (18.8 and 25.0 % respectively). Udder health problems were stated more often by farmers with loose housing systems (47.5 %), but fertility problems more often in stanchion barns (40.0 %).

Veterinary costs increased with increasing number of health problems given by the farmer (mastitis, infertility, claw disorders). Surprisingly, udder health problems and somatic cell counts were higher in farms that reported the use of more udder hygiene measures (e.g. cleaning towels, teat disinfection, frequency of servicing the milking equipment). One explanation could be that farmers do not take such meausures until health problems occur.

Somatic cell counts increased with increasing frequency of udder health problems, and calving interval increased with increasing fertility problems (Table 2). With increasing frequencies of udder health, fertility, or claw health problems, the culling percentages for the respective health problems also increased. These results could be interpreted as a validation of farmers' subjective estimations by objective herd record data.

Table 2: Objective herd record data in relation to subjective disease estimations by farmers

| | **Herd record data:** | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Somatic cell counts** (1000) | | **Calving interval** (days) | | **Culling reasons** (% of the respective reason of all culling reasons) | | |
| **Disease incidence:** | **Udder diseases** | **Infertility** | **Udder diseases** | **Infertility** | **Udder diseases** | **Infertility** | **Claw health** |
| Never | 211 | 254 | 376 | 372 | 16.0 | 16.2 | 0 |
| Seldom | 217 | 218 | 385 | 388 | 11.6 | 16.4 | 8.0 |
| Regularly | 216 | 194 | 390 | 387 | 24.8 | 30.0 | 17.3 |
| Frequently | 259 | 216 | 408 | 398 | 40.4 | 34.8 | 14.0 |

The main culling reasons were udder health and infertility (Table 3). Holstein-Friesians had the highest percentage of mastitis as culling reason. Mastitis was also more frequent in straw yard systems than in cubicle houses or stanchion barns. However, infertility and claw health were mentioned less often for this housing system.

83.5 % of cows investigated showed skin alterations. Each cow had on average of 0.8 alterations. However, skin alterations were mostly moderate (more than 90 % hairless patches). The main body parts affected were hock and tarsal joints (146 and 131 cows). Injuries were found less often in straw yards than in stanchion barns or cubicle houses. Within both latter systems, an increase was found with decreasing amount of straw. Busato *et al.* (2000) found most injuries at hock joints in 152 Swiss organic dairy farms (mostly stanchion barns).

As in the study of Trachsel *et al.* (2000) on 152 Swiss organic farms, extreme values in body condition scoring were seldom found. However, BCS score was higher when dry cows were kept together with lactating cows. BCS scores were lowest in Holstein-Friesians.

Krutzinna *et al.* (1996) visited 268 organic dairy farms in West Germany (1993 – 1995). They found a milk yield of 4.953 kg, an average amount of concentrates of 580 kg per cow per year, somatic cell counts of 271.000, a calving interval of 385 days, and veterinary costs of 36.3 Euro. The lower cell counts in the present study could be a consequence of more restrictive legislation (max. of 400.000 cells allowed since 1998). Furthermore, Krutzinna *et al.* (1996) recorded fewer loose housing systems in their study (better hygienic conditions in the milking parlour).

Milk yield of all cows under milk control in Germany (3.6 million) in 2002 was 7.231 kg, SCC 191.000, calving interval 398 days, age of cows 4.8 years and culling rates 37.6 % (ADR 2003). It is questionable if the higher SCC counts found in this study compared with the literature values are

caused by the organic farming method because Deneke and Fehlings (2001), for example, found in 203 Bavarian organic farms that recommendations for preventive udder health measures often were not followed.

Table 3: Culling reasons in relation to breed or housing system

| **Culling reasons** | **All farms** | **Breed** | | | **Housing system** | | |
|---|---|---|---|---|---|---|---|
| | | **Holstein-Friesian** | **Simmental** | **Brown Swiss** | **Cubicles** | **Straw yards** | **Stanchion barn** |
| Breeding reasons | **1.5** | 0.6 | 0 | 6.3 | 1.8 | 0.8 | 1.1 |
| Age | **10.9** | 6.8 | 10.3 | 14.7 | 9.8 | 5.4 | 18.8 |
| Low performance | **15.2** | 11.0 | 18.2 | 21.3 | 17.5 | 15.1 | 5.8 |
| Infertility | **21.9** | 20.9 | 16.1 | 24.1 | 25.6 | 9.3 | 24.2 |
| Other diseases | **2.7** | 3.4 | 1.4 | 0.3 | 1.7 | 8.3 | 0 |
| Udder diseases | **21.2** | 31.8 | 10.3 | 10.4 | 16.9 | 38.5 | 17.8 |
| Milkability | **4.5** | 5.0 | 7.7 | 1.8 | 3.3 | 8.8 | 4.5 |
| Claw health | **10.6** | 13.3 | 11.4 | 8.7 | 11.6 | 4.5 | 13.5 |
| Others | **11.8** | 7.1 | 24.3 | 13.5 | 12.2 | 9.3 | 14.0 |

## Conclusions

Milk yield has increased in organic farms as in conventional farms during the last ten years in Germany. This could be explained by falling milk prices for organic milk. Veterinary costs increased with increasing milk production. Compared with data from the literature for all cows in Germany, organic cows investigated in this study had clearly lower milk production. They seem to have more mastitis, indicated by higher SCC, but fewer fertility problems and a longer life span. The latter parameters could be related to the lower milk production. Higher mastitis incidence seems not to be caused by organic farming per se but by management practices. Therefore, training and education measures seem useful to reduce health problems in organic farms.

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