

Welfare in Danish Dairy Herds 2. Housing Systems and Grazing Procedures in 1983 and 1994

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Alban, L. and J. F. Agger. Welfare in Danish dairy herds 2. Housing systems and grazing procedures in 1983 and 1994. Acta vet. scand. 1996, 37, 65-77. This paper presents the second part of a questionnaire survey carried out in 2148 Danish dairy herds during 1994, as well as results from a similar survey carried out in 1983. The welfare status and trends during the 11 year period are discussed with respect to cattle housing systems and grazing procedures. Generally speaking, the results show that Danish dairy farmers in 1994 followed the common recommendations, i.e. 1) there are partitions between stalls in almost all tie stall houses, 2) feeding cubicles are seldomly seen in cubicle houses, 3) bedding is provided for most cows, 4) saw dust as bedding for cows is not commonly used, and 5) the majority of cows and heifers are pastured during summer. However, adjustments in the following areas would be appropriate: 1) tie systems which restrict the cow's natural rising and lying should be phased out, and 2) loose housed heifers in boxes should have access to a bedded resting area.

cattle; animal welfare; behaviour; health; questionnaires; surveys; descriptive epidemiology.

Introduction

The economic and competitive developments characterizing intensive dairy industry inevitably have an impact on production, housing, and management. Examples thereof in Denmark are increased labour costs, increased milk production per cow, and increased herd size for herds remaining in business. And also due to milk quotas introduced in 1984, the number of dairy cows have declined. The current discussion in Denmark focuses on the possible impact of this development on cow welfare (*Anon.* 1988a, *Tinggaard* 1994). Studies by *Agger* (1981, 1983) and *Agger & Willeberg* (1991) indicate, under Danish conditions, relationships between current developments in housing, management, and productivity, and increased mortality in dairy cows from 1960 to 1991.

Simonsen (1993) defined welfare to be the sum of positive and negative experiences that an animal has. As examples of substantial negative experiences *Simonsen* (1993) stated pain, fear, and frustration, and as substantial positive experiences joy, play, and satisfied expectations. Under climatic conditions like the Danish, dairy cattle are housed generally 6 months a year. Therefore, the housing system and grazing procedures inevitably have a great impact on the experiences of the cows.

The aim of the present paper is to discuss the welfare status in Danish dairy herds with respect to housing systems and grazing procedures. Information about housing systems, grazing procedures, and management routines in Danish dairy herds was last gathered in 1983 from 156 dairy herds and in large scale in 1988

from 12,096 dairy herds (Anon. 1988b). Results from a 1994 survey carried out in 2148 Danish dairy herds selected in Ringkøbing County, Funen County, and around the city of Brørup, as well as results of the 1983 survey are presented. Disease management routines and welfare are dealt with in another paper (Alban & Agger 1996), and health management and general procedures are dealt with in a third paper (Agger & Alban 1996).

The questionnaire survey was carried out as a part of the research project "Welfare in dairy cows" funded by the Danish Ministry of Agriculture.

Materials and methods

This publication and the publications by Alban & Agger (1996) and Agger & Alban (1996) are based on 2 data sets collected in 1983 and in 1994. The results from the 1983-study in 152 tie stall herds will be given in the text and from the 1994-study of 2148 dairy herds primarily in tables. The materials and methods for both surveys are described in detail in Alban & Agger (1996). The results of the 1994 survey will be compared to the 1983 survey and a large survey carried out in 1988 (Anon. 1988b), and trends during the 11 year period will be discussed. Furthermore, the results of the 1994 survey will be compared to the general recommendations for cattle keeping. In case there was a significant association between a variable and type of housing, this is stated. The statistical evaluation was done by use of Chi-square test and Pearson standardized residual analysis (Christensen 1990).

Results

The 1983 study

A sample of 156 farms in East Denmark showed that 152 had tie stall houses (97.4%), only 3 herds (1.9%) had cubicle houses, and 1

had deep bed house (0.6%). In the tie stall herds the 3 most commonly used tie systems were ash wood / double chain tie (22.5%), vertical chain tie with tight neck tie (23.0%) and vertical chain tie with loose neck tie (21.7%). 9.2% had yoke tie, 9.2% used neckbar tie, and 14.4% used other ties. Cow trainers were present in almost all herds (79.9%). Half of the farmers (56.1%) turned the power on the cow trainers more than 21 days per month, and the other half (43.9%) less than 21 days per month. On a daily basis 31.5% turned it on for less than 9 h, 22.1% turned it on for 9-16 h, and 46.4% during more than 17 h. In the majority (53.0%) of the herds, partitions were only present between every 2 cows, between all cows in 33.4% of the herds, in 5.3% less frequent, and in the rest (8.3%) of the herds there were no partitions at all. The majority (87.3%) of the tie stall houses had a traditional open dung channel, while the rest (12.7%) either had the dung channel covered with gratings or slats. Almost all (96.0%) farmers had the cows on concrete floor, and only 4.0% on bricks in very old stalls. Concrete floor with long straw bedding was commonly used (80.8%), and 7.6% used long straw upon rubber mats. Only 2.7% used chopped straw on concrete, and 2.5% on rubber mats. Only 1.2% used saw dust on concrete, 3.8% used rubber mats without bedding, and 1.4% did not use any bedding material at all. A total of 13.9% of all the herds used rubber mats for a few or all cows, and a total of 5.3% of the farmers used chopped straw. The average stall age was 13.7 years (sd = 9.6, range 1-63 years). There was an almost significant ($p = .09$) negative correlation ($r = -0.2$) between age of stall and the general condition of the stall, evaluated on a scale with grade 0 = very bad condition, and grade 9 = very good condition with respect to holes and sharp edges. Summer grazing was practiced in the majority of the herds (81.8%), and among these 43.3% pastured the cows every day and

night. The rest (18.2%) practiced zero-grazing. The average pasture time was 5 months (sd = 1, range 2-7).

The 1994 study

Only a few herds (15) had mixed types of cattle houses. These herds were excluded from all other tables than Table 1. The neckbar tie was the most commonly used type of tie (Table 2). The majority of the tie stall herds used the cow trainer (89.1%) and had partitions between all cows (70.4%) (Table 2). An open dung channel was the most common type of dung system in the tie stall herds (60.2%) (Table 2). The majority of the cubicle house herds had resting cubicles (94.3%) and slatted floor (89.1%) (Table 3). Significantly more cubicle house herds had the cows on concrete without bedding ($p = 0.002$) or with saw dust ($p < 0.001$) than tie stall herds (Table 4). The average floor age in the tie stall houses was 20 years (sd = 12, range 0-99), and in the cubicle house herds 15 years (sd = 7, range 0-93). There was a significant association between increasing floor age and the farmers' smaller score of being satisfied with the floor ($r = -0.23$, $p < 0.001$). Heifers were defined as animals between 12 and 24 months of age. Significantly more herds with cubicle houses for the cows had the heifers in boxes ($p < 0.001$) and less in tie stall houses ($p < 0.001$) (Table 5). Among the herds with deep bed houses, significantly more had the heifers in deep bed houses ($p < 0.001$) and fewer in tie stall houses ($p = 0.01$). The majority of the tethered heifers were kept on concrete with straw or saw dust (84.2%), and the majority of box housed heifers were kept on slatted floor without bedding (96.7%) (Table 6). Cow trainers were only used among heifers in very few herds (14.6%) (Table 7). Among the herds with cubicle houses, significantly less summer grazed their cows ($p = 0.008$) and more zero-grazed their cows ($p < 0.001$) compared to the other housing

Table 1. Types of cow housing systems among 2148 Danish dairy herds, which participated in a questionnaire survey regarding housing system, management, and welfare. The survey was carried out from February to September 1994

Type of housing	No herds	%
Tie stall house	1875	87.3
Cubicle house	193	9.0
Deep bed house	65	3.0
Combinations	15	0.7
Total	2148	100

Table 2. Type of tie system, use of cow trainer, presence of stall partitions, and type of dung channel among 1875 tie stall herds

Stall factor	No herds	%
<i>Type of tie</i>		
Neckbar tie	1091	58.2
Chain tie	250	13.3
Yoke tie	165	8.8
Other combination	369	19.8
Total	1875	100
<i>Use of cow trainer</i>		
Constant use (more than 10 h a day)	871	46.5
Periodic use	799	42.6
Not in use at all	203	10.8
Did not answer	2	0.1
Total	1875	100
<i>Presence of stall partitions</i>		
Partions between all cows	1320	70.4
Partions between every 2 cows	427	22.8
No partions between cows	36	1.9
Other or combinations	91	4.9
Did not answer	1	0.1
Total	1875	100
<i>Type of dung channel</i>		
Traditional open dung channel	1128	60.2
Dung channel covered with gratings	638	34.0
Dung channel with slats on top	80	4.3
Combination of types	28	1.5
Did not answer	1	0.1
Total	1875	100

Table 3. Types of cubicles and floors among 193 herds with cubicle houses.

Cubicle house factor	No herds	%
<i>Type of cubicle</i>		
Resting cubicle	182	94.3
Feeding cubicle	11	5.7
Total	193	100
<i>Type of floor</i>		
Slatted floors	172	89.1
Concrete floors	19	9.8
Both slatted floors and concrete floors	2	1.0
Total	193	100

systems (Table 8). More herds with deep bed houses had their cows outside during winter, either on pasture ($p < 0.001$) or in an exercise area ($p < 0.001$) than herds from the other housing systems, where almost no cows were outside during winter (Table 8). More farmers with box housed heifers ($p < 0.001$) and fewer farmers with tethered heifers ($p < 0.001$) practiced zero-grazing than farmers with deep bed houses (Table 9). More herds with deep bed houses had the heifers outside during winter, either on pasture ($p < 0.001$) or in an exercise area ($p < 0.001$) compared to herds with the other housing

Table 4. Types of lying area for cows in 1875 tie stall herds and 193 cubicle house herds

Type of lying area	Tie stall house		Cubicle house	
	No herds	%	No herds	%
Concrete with straw	1570	83.7	139	72.0
Rubber mats without bedding	88	4.7	12	6.2
Concrete without bedding	73	3.9	17*	8.8
Rubber mats with straw	57	3.0	4	2.1
Concrete with saw dust	47	2.5	18*	9.3
Rubber mats with saw dust or other bedding	6	0.3	2	1.0
Did not answer	34	1.8	1	0.5
Total	1875	100	193	100

* $p \leq 0.002$

Table 5. Housing system for the heifers by the type of housing for the cows. Heifers were defined as animals between 12-24 months of age

Type of heifer house	Type of cow house							
	Tie stall house		Cubicle house		Deep bed house		Total	
	No herds	%	No herds	%	No herds	%	No herds	%
Boxes with slatts	781	41.7	132*	68.4	25	38.5	938	44.0
Tie stall house	750	40.0	30*	15.5	13*	20.0	793	37.2
Deep bed house	139	7.4	12	6.2	22*	33.8	173	8.1
Combinations	192	10.2	19	9.8	5	7.7	216	10.1
No answer or did not have heifers indoor	13	0.7	0	0.0	0	0.0	13	0.6
Total	1875	100	193	100	65	100	2133	100

*: $p \leq 0.01$

systems, where almost no heifers were outside during winter (Table 9). On the farms where the cows were pastured during summer, the average pasture time was 5.8 months (sd = 1.0, range 1-12). Stone bruises occurred seldom, and there was no difference between the housing systems (Table 10). The average walking distance for a cow on pasture was 119 m (sd = 173, range 1-1500 m).

Discussion

Housing systems for the cows

Cattle houses. In the 1988 survey (Anon. 1988b), 92% of the herds had tie stall houses. Cubicle houses accounted for 6.4%, deep bed houses for 1.4%, and the remaining (0.2%) had mixed types of housing. The difference between the 3 surveys indicates a slight change from tie stall houses to the larger loose houses (Table 1). This is in agreement with the fact that the average herd size is increasing (Anon. 1994a). And loose housed herds are usually larger than tied herds. Finally, deep bed houses were twice as common in 1994 as in 1988, while there were only 1 deep bed house among the 156 farms in the 1983 survey.

There are both advantages and disadvantages associated with each type of cattle houses. Broom (1992) mentioned that the good housing system gives the cow control over its environment, is predictable and diverse. This is to some extent favoured in the loose house. The loose house also allows social contact with other cows and the possibility of exploring the environment. A disadvantage for the loose house is a high degree of fecal contamination which may be associated with an increase in the incidences of claw disorders (Baggott & Russell 1981, Peterse, 1992). And there may be a high level of social tension compared to grazing (Miller & Wood-Gush 1991), especially if there is a high stocking density (Wierenga 1983).

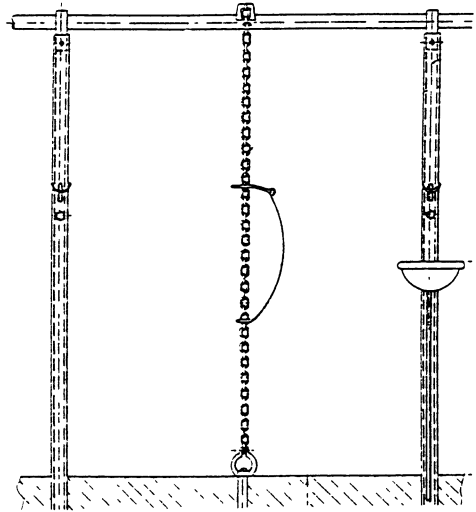


Figure 1. Chain tie (Mortensen 1971, with permission)

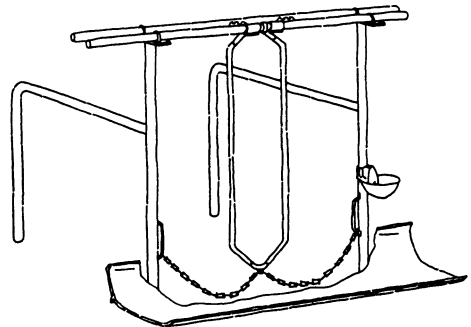


Figure 2 Yoke tie (Rom 1995, with permission)

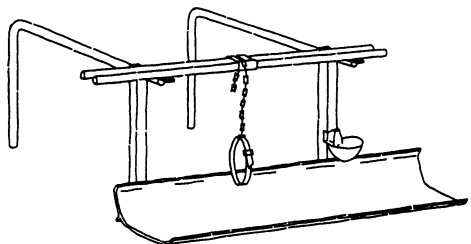


Figure 3. Neckbar tie (Rom 1995, with permission)

Table 6. Type of lying area for the heifers among 793 dairy herds with tethered heifers and 938 herds with box housed heifers.

Type of lying area	Tied heifers		Box housed heifers	
	No herds	%	No herds	%
Concrete with straw or sawdust	668	84.2	14	1.5
Concrete without bedding	83	10.5	8	0.9
Slatted floors without bedding	29	3.7	907	96.7
Rubber mats with or without bedding	9	1.1	1	0.1
Slatted floors with bedding	3	0.4	5	0.5
Did not answer	1	0.1	3	0.3
Total	793	100	938	100

Table 7. Use of cow trainer among tethered heifers in 793 dairy herds.

Use of cow trainer for the heifers	No herds	%
Not in use at all	677	85.4
Constant use (more than 10h a day)	57	7.2
Periodic use	59	7.4
Total	793	100

The farmer and his cows are generally in closer contact in the tie stall house. This provides a better opportunity to observe disease. But the tie stall house is a restrictive environment compared to the loose house. Krohn & Munksgaard (1993) found that lying down took significant longer time for tethered cows than for loose housed cows. And tethered cows may have re-

Table 8. Grazing procedures for the cows during summer and winter by the type of housing system for the cows.

Grazing procedures for the cows	Tie stall house		Cubicle house		Deep bed house		Total	
	No herds	%	No. herds	%	No herds	%	No herds	%
<i>Summer</i>								
Grazing	1440	76.8	117*	60.6	57	87.7	1614	75.7
Zero-grazing	343	18.3	60*	31.1	6	9.2	409	19.2
Only dry cows	77	4.1	7	3.6	0	0.0	84	3.9
Exercise area	8	0.4	8	4.1	2	3.1	18	0.8
Other	7	0.4	1	0.5	0	0.0	8	0.4
Total	1875	100	193	100	65	100	2133	100
<i>Winter</i>								
Zero-grazing	1850	98.7	190	98.4	54	83.1	2094	98.2
Grazing	11	0.6	0	0.0	8*	12.3	19	0.9
Exercise area	9	0.5	3	1.6	3*	4.6	15	0.7
Other	5	0.3	0	0.0	0	0.0	5	0.2
Total	1875	100	193	100	65	100	2133	100

*: $p \leq 0.008$.

Table 9. Grazing procedures for the heifers during summer and winter by the type of housing system for the heifers

Grazing procedures for the heifers	Tie stall house		Cubicle house		Deep bed house		Total	
	No herds	%	No herds	%	No herds	%	No herds	%
<i>Summer</i>								
Grazing	761	96.0	805	85.8	160	92.5	1726	90.6
Zero-grazing	30*	3.8	121*	12.9	10	5.8	161	8.5
Exercise area or other	2	0.3	12	1.3	3	1.7	17	0.9
Total	793	100	938	100	173	100	1904	100
<i>Winter</i>								
Zero-grazing	780	98.4	927	98.8	154	89.0	1861	97.7
Grazing	8	1.0	5	0.5	12*	6.9	25	1.3
Exercise area or other	4	0.5	1	0.1	7*	4.0	12	0.6
Did not answer	1	0.1	5	0.5	0	0.0	6	0.3
Total	793	100	938	100	173	100	1904	100

* $p < 0.001$.

duced possibility of grooming their back part – depending on the tie system (*Munksgaard & Krohn 1990*). Hock lesions are also common in inadequately designed tie stalls (*Thyssen 1987, Krohn & Munksgaard 1993, Alban et al. 1995*). Regarding construction of new cattle houses, The National Committee on Danish Cattle Husbandry recommends loose houses for large herds, because they comply better with the cows' need for social behaviour and freedom of movement than the tie stall houses (*Thøgersen 1995*).

Tie systems in the tie stall house. In the 1988 survey, 43% of the herds had neckbar tie, while 14% had chain tie, and 12% yoke tie. The difference between the 3 surveys indicates that many farmers install neckbar ties when they change tie system (Table 2). From a welfare point of view, this is a positive trend, since the other ties are considered to be less suitable. E.g. *Mortensen (1971)* found that the chain tie and the yoke tie restricted the cow's natural rising and lying. *Blom (1981)* found that the yoke

Table 10 Occurrence of stone bruising of the claws based on the farmers' memory Only herds which practiced summer grazing were included

Occurrence	No herds	%
Never happened	589	36.5
Seldom	972	60.2
Frequent	50	3.1
Did not answer	3	0.1
Total	1614	100

tie was associated with lameness. And *Munksgaard & Krohn (1990)* found that the yoke tie restricted the cow's movement, hindered the cow in rising and lying, and reduced the possibility of grooming.

Cow trainer. In the 1988 survey, 29% of the herds used the cow trainer constantly, 48% in periods, and 23% did not use it. The results of the 3 surveys may indicate that more farmers use the cow trainer today compared to 1983 and 1988 (Table 2). The function of the cow trainer is to force the cow back when it defecates, and,

hence, improve the cleanliness of the stall and the claw health (Bergsten & Pettersson 1992). Some authors found that the cow trainer had a negative impact on the cows behaviour (Lefcourt *et al.* 1986, Kohli 1987), while others found no effect (Metzner & Groth 1992, Simensen & Bøe 1988). Regarding health, diverging results exists as well. Some authors found improved health (Bergsten & Petterson 1992, Matzke *et al.* 1992), while others found no or even a negative effect on the health (Bakken 1982, Alban *et al.* 1995). Since 1988 in Sweden, it has been prohibited to install or use a cow trainer in new tie stalls, and the use of cow trainers in already existing tie stalls was phased out by the end of 1993 (Anon. 1994b). If a farmer wants to use the cow trainer, the Danish recommendations should be followed to minimize the possible negative impact of the cow trainer: correctly placed (≥ 5 cm above the cow's back), daily checked, switched off in longer periods, and not used for ill animals, cows in heat, cows in late pregnancy, or steers in boxes (Anon. 1991).

Stall partitions in the tie stall houses. Unfortunately, no information was available on this subject in the 1988 survey. A comparison of results from the 1994 and the 1983 survey indicates that many more herds have partitions between all cows in 1994 (Table 2). From a welfare point of view this is a positive trend, since the partitions may reduce the incidence of teat injuries (Näsi & Saloniemi 1981, Bakken 1982, Matzke *et al.* 1992).

Type of dung channel system in the tie stall houses. Since 1983 it has become more common to have gratings over the dung channel. It was observed that the open dung channel system may provide less draught and urine splash in the stall than the other types with gratings or slats over the dung channel. Therefore,

the open dung channel may provide a better environment for the cow. But further work is needed on this subject.

The cubicle and the floor type in the walking area in the cubicle house. There was no information on these subjects in the 1983 or the 1988 surveys. Therefore, no inference can be made about a trend in the development. Regarding type of cubicle, the only conclusion which can be drawn is, that only a few herds had feeding cubicles in 1994 (Table 3). From a welfare point of view this is positive, since the feeding cubicle is known for poor hygiene (Rådum *et al.* 1982). Regarding floor type, slatted floor was by far the most common kind of floor in 1994 (Table 3). The welfare impact of the different kinds of floor types is difficult to judge, since detailed information is needed on e.g. the maintenance level of the floor, and for slatted floor, the width of the slats and the opening between the slats. But as a general judgment, Blom (1982), Buchwald *et al.* (1982) and Thyssen (1987) found that a solid concrete floor may lead to more incidences of lameness compared to slatted floor. Hence, it is positive that there were only few cubicle houses with solid floor in 1994.

Type of lying area. In the 1988 survey, 84% of the farmers used straw as bedding, 6% used saw dust, while 10% did not give bedding at all. It appears that the proportion of farmers giving bedding to the cows was unchanged in 1994 (Table 4) compared to 1988, but it was less than in 1983. Saw dust was almost not in use in 1983, in 1988 it was more common, and in 1994 it was less common again (Table 4). From a welfare point of view, the low use of saw dust is positive, since use of saw dust is supposed to have a negative impact on the udder health (Schmidt *et al.* 1985). A well-bedded resting area provides the best opportunities to

maintain a good health (Schmidt *et al.* 1985, Ekesbo 1966), and as an example, Krohn & Munksgaard (1993) found that tramped teats may be a result of too little or no bedding. Furthermore, Singh *et al.* (1993) found, that cows lay down for longer periods in deep bed houses compared to cubicle houses probably because they preferred the comfortable lying surface. The use of chopped straw was much more common in 1994 compared to 1983. Chopped straw is used by some farmers because it is able to pass through the openings between grates or slates. Schmidt *et al.* (1985) found that chopped straw had the same absorption capacity as not-chopped straw, and therefore, there should be no welfare implications for the use of chopped straw.

In both the 1983 study and the 1994 study there was a negative correlation between floor age and the general condition of the floor. The low correlation ($r^2 \approx 0.05$) indicates that quality and maintenance are more important than the age of the floor.

Housing system for the heifers

Housing and type of lying area. In the 1988 survey, loose houses – including deep bed houses – accounted for half of the herds, while the tie stall houses were used in the other half of the herds. It is not possible to make a closer comparison between the surveys, since the results of the 1988 survey were not presented in detail, and no information on this subject was available from the 1983 survey. Regarding type of lying area for heifers, the 1983 survey did not cover this subject. In the 1988 survey, the percentage of farmers which used bedding for the loose housed heifers was not mentioned, while it was stated that 86% of the herds with tethered heifers used bedding. Hence, no change has probably taken place among the tie stall farmers (Table 6). Among the loose housed heifers, the majority were kept in boxes on slatted floors

without bedding. Boxes provide young cattle with an opportunity for social contact with other animals of the same species – which they have a strong need for (Broom 1982). But a high stocking density should be avoided, since it is associated with high risk of tramped tails which may need amputation (Madsen *et al.* 1987). Both from a welfare point of view and to improve production, boxes with a bedded resting area and a not-bedded walking area are recommended for heifers. (Anon. 1991, Thøgersen 1995).

Cow trainer for heifers. No information on this subject was available in the 1983 survey. In the 1988 survey, 11% of the herds used the cow trainer for the heifers. Compared to the 1988 survey, there may have been a slight increase in the use of cow trainers for heifers (Table 7). It is our belief, that the cow trainer is less suitable for the heifers than for the cows, because young animals in general are more nervous than older ones.

Grazing

Cows on pasture – during summer. In the 1988 survey, 72% used summer grazing, 23% zero-grazing, 3% exercise area, and the rest (2%) used other procedures. Hence, from 1988 to 1994, there has been a trend towards increased use of summer grazing (Table 8). But compared to 1983, fewer herds practiced summer grazing in 1994. From a welfare point of view, the increased tendency to let the cows graze is positive, since grazing, generally speaking, is associated with better health and reproduction (Ekesbo 1966, Kristensen *et al.* 1986, Krohn 1986, Krohn & Rasmussen 1992, Gustafson 1993). The positive effect is probably due to both grazing, sunshine, and fresh air. Freedom of movement is important too, since it allows the animals to perform a wide range of species-specific behaviours. Furthermore, the negative effects of a less suitable

housing system are minimized by daily exercise. It should be mentioned, that summer grazing is compulsory in organic Danish cattle keeping (Anon. 1994c). As well, The National Committee on Danish Cattle Husbandry recommends that tie stall cows should have the possibility for exercise either by use of summer grazing or in an exercise area (Thøgersen 1995).

Cows on pasture – during winter. No information on this subject was available in the 1988 survey. In the 1983 survey the cows were pastured for a maximum of 7 months. This indicates that winter grazing was not in use at all in 1983. In 1994, winter grazing was almost only used in deep bed herds (Table 8). The Danish Veterinary Health Board has, in the light of the Danish law for protection of animals, specified that animals which are kept outside during winter should have access to shelter, a dry bedded lying area, and be provided with supplemental food and fresh water (Nielsen, personal comm. 1994). The deep bed houses are often constructed in such a way that the cows may walk in and out freely. In this way, the Health Board's recommendations can be followed easily. This may explain why it was almost only the deep bed farms which practiced winter grazing. It can be expected that, in particular the tied cows, may benefit from exercise during winter, and this can be provided by use of an exercise area. It should be mentioned that in the organic Danish cattle farming, all animals should have the possibility for regular exercise during winter (Anon. 1994c).

Heifers on pasture – during summer. There was no information on this subject in the 1983 survey. In 1988, 91% of the farmers had the heifers on pasture and 6% practiced zero-grazing during summer. This is almost the same as the 1994 survey (Table 9). Under the assumption that grazing has the same effect on heifers as on cows, the common use of summer

grazing is positive, and the relative high use of zero-grazing among box housed heifers is unfortunate. Foldager *et al.* (1993) found that summer grazing had a positive impact on the development of the heifers' motorical system, the ease of handling, and later on the ease of milking. Furthermore, the National Committee on Danish Cattle Husbandry states that heifers should be grazed at least one season during the rearing period (Thøgersen 1995).

Heifers on pasture – during winter. Winter grazing was not mentioned either in the 1983 survey or in the 1988 survey. Among the 1994 herds, winter grazing of heifers was almost only seen in deep bed herds (Table 9). Again, this may be related to the ease at practice grazing in deep bed houses. The recommendation for cows on pasture during winter is also valid for the heifers.

Walking distance and problems with stone bruising of the claws. No information was available on these subjects in the surveys from 1983 og 1988. Danish dairy cows do not have to walk very far to reach the field, compared to how long they walk on the field, and only a few herds had frequent problems with stone bruising (Table 10). Cows walk longer on the field, e.g. Krohn *et al.* (1992) found that cows with free access to grazing areas would walk 2.0-3.4 km per day during summer time. Furthermore, Gustafson (1993) concluded that "exercise for 0.5-3 km per day had a significantly positive effect on the health of the cows around calving". Chesterton *et al.* (1989) found that the track maintenance level was associated with lameness in dairy cows. Therefore, the conclusion may be, that exercise has a positive effect on the cows' health and reproduction – given the path is maintained. If it is difficult to maintain the path, an exercise area, e.g. made of concrete, may be an alternative way of providing exercise for the cows.

General points with questionnaire data. The possibility of bias in a questionnaire survey is discussed in an adjacent paper (*Alban & Agger* 1996).

Conclusion

It is the farmer who is in daily contact with the cows – not the veterinary practitioner or the agricultural advisor. Hence, to improve welfare, means should be taken to inform farmers about welfare aspects of housing systems and grazing procedures. The results show that generally speaking the Danish dairy farmers in 1994 follow the common recommendations: 1) there are partitions between stalls in almost all tie stall houses, 2) feeding cubicles are seldomly seen in cubicle houses, 3) bedding is provided for most cows, 4) saw dust as bedding for cows is not commonly used, and 5) the majority of cows and heifers are pastured during summer. However, adjustments in the following areas would be appropriate: 1) tie systems which restrict the cow's rising and lying should be phased out, and 2) bedding should be provided for the loose housed heifers in boxes.

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Sammendrag

Velfærd i danske malkekvægbesætninger 2 Staldsystemer og græsningsrutiner i 1983 og 1994

Denne artikel præsenterer anden del af et rundspørge udført i 2148 danske malkekvægbesætninger i 1994 samt resultater af en lignende undersøgelse fra 1983. Staldsystemet og græsningsrutinens betydning for velfærden diskuteres, ligesom status og udvikling gennem de 11 år kommenteres. Resultaterne viser, at generelt set følger danske mælkeproducenter anno 1994 de gældende anbefalinger: 1) Der er bås adskillelse mellem hver bås i næsten samtlige bindestalde, 2) fodersengebåse er ikke særligt udbredte, 3) de fleste køer har strøet leje, 4) savsmuld som strøelse bruges kun af få, og 5) de fleste mælkeproducenter har både køer og kvier på græs om sommeren. Ændringer på følgende områder vil dog være hensigtsmæssige: 1) Bindsler, som hindrer koen i at rejse og lægge sig naturligt, bør udfases, og 2) boksopstaldede kvier bør have adgang til strøet leje

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