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IMPROVING WELFARE ON 25 HOLSTEIN-FRIESIAN FARMS IN HUNGARY

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Abstract

Welfare of 11 422 dairy cows, 2153 dry cows, 5175 heifers, 4934 calves >70 days, and 2170 calves <70 days was evaluated on 25 Hungarian Holstein-Friesian farms in 2010 and 2011. Advices were given to farmers regarding the weakest areas on the farms regarding welfare measures and welfare in 2010 and were checked again in 2011. The Shapiro-Wilk test was used to check the normality of animal welfare measures. Multiple factor analysis of variance (for normally distributed data) and Mann-Whitney test (for not normally distributed data) was performed to observe differences in animal welfare measures between 2010 and 2011. A Spearman Rank Correlation test was run to find correlations between animal welfare measures and environmental factors. A Chi-square test for relatedness or independence was used to evaluate the differences in animal welfare distributions on farms between 2010 and 2011. Advices given to farmers significantly affected improvement in cleanliness of all groups of cattle and improvement of body conditions of thin younger calves, fat heifers and fat milking cows. There were less obviously ill heifers reported and less neck rail injuries among heifers, dry and milking cows. Decrease in welfare was observed in older calves with dirtier hindlimbs, higher number of thin heifers and milking cows. Higher number of older calves with diarrhoea and more dry and milking cows being obviously ill were estimated. After the advice, more lameness and not normal behaviours were found in milking cows. There was also higher number of hock injuries discovered among older calves, heifers, dry and milking cows. Finally, more neck rail injuries among older calves with more non-hock injuries in heifers and dry cows were observed. Totally, 18 improved and 14 worst measures were discovered after providing farmers with dairy welfare solutions. Results found in the study confirm that farmers choose between improved cleanliness with better body conditions and more ill cattle with injuries. It can be explain either because those aims were the easiest to achieve or this is how welfare is perceived by farmers.
Key words: dairy cattle, welfare, assessment, monitoring, herd health

Introduction

The main idea followed by animal welfare experts and legislation authorities in Europe is to maintain higher-than-only-minimum standards for farm animals (*EFSA*, 2009). So far there are no specific rules established at the European Union level about the welfare of dairy cows. Several Member States also have national legislation for dairy cows (Germany, Sweden, United Kingdom and Denmark). There is no specific legislation in Hungary related to the welfare of dairy cows except European Union Council Directive 98/58/EC and its equivalent in Hungarian legislation (Act on the protection and humane treatment of animals 32/1999. (III. 31.) about keeping animals for farming purposes and their minimal requirements about well-being).

When investments are considered, the impact on animal welfare should be monitored and changes should promote improvement in the animal's welfare. It is important that any changes in dairy production consider animal welfare. Furthermore the facilities with stockmanship are adequately staffed for the total number of animals in the herd and for everyday activities. Stockmanship is considered as the most important factor anticipating and alleviating many potential welfare problems. The best welfare-friendly husbandry systems may fail if proper management practice and sound stockmanship are not provided (*FAWC*, 1993). There were EU animal welfare and innovation programmes run on Hungarian dairy farms in 2009-2011. The changes included new milking parlours and swapping straw yards to cubicle husbandry systems. Those activities are giving opportunities to check how the new keeping systems are influencing the welfare of dairy cows.

Literature is missing in studies covering farm assurance schemes and their positive roles in improving animal welfare. The only available review of the farm welfare programme so far was done by *Main et al*. (2003). The study compared various indicators of welfare on farms following and not following the RSPCA UK Freedom Food scheme. What is interesting, farms had better results for mastitis, non-hock injuries, cow cleanliness and body condition, and poorer welfare indicators for eight of the measures, including hock and knee injuries, lameness and restrictions in rising behaviour. Results of other commercial dairy farm assurance schemes are not available because retailers do not want to provide this information, even for scientific purposes (*Main* – personal communication).

In conclusion, the welfare of dairy cattle has not been previously examined in Hungary to any great extent. The need for creating such a review is especially pertinent in the light of the increasing intensification of dairy farming, legislation's obligations, increasing retailers' and consumers' demands. Such a background can be useful to provide anyone of interest (academia, authorities or commercial companies) with transparent and reliable information. There is no available information about dairy welfare standards in Hungary, except for particular production and health issues. The majority of livestock farms in developed countries are raised according to the requirements of a farm assurance scheme. These types of programmes will likely play an increasingly important role in the dairy industry. If Hungarian farmers are considering running dairy business successfully, it is very likely that they also will have to cope with animal welfare standards expected by consumers and retailers. The aim of this study was to measure welfare of dairy cattle in Hungary and to share the conclusions with the farmers. Hypothesis 1 stated: 'Hungarian Holstein-Friesian cattle have an acceptable standard of welfare.' Another aim was to estimate how cattle welfare can change after voluntarily given advice about improving animal welfare. Hypothesis 2 claimed: 'Advice voluntarily given about animal welfare will significantly

improve specific, measurable, attainable, relevant and time-limited welfare measures of Hungarian Holstein-Friesian herds.'

Material and methods

Data collection

The project presumed dairy farm monitoring in Hungary. The farms were visited twice; the first time from May to December 2010 and the second time from May to December 2011. To make the project successful, there were 27 farms recruited for this study. After one year, two farms were excluded from the study because of lack of interest in further cooperation. There were, on average, 457 heads of lactating cows in the herds producing on average 9047.80 kg (min. 7390 kg and max. 10860 kg) in 2010 and 8984.36 kg (min. 7624 kg and max. 10621 kg) in 2011.

Farm visits were established for creating an animal welfare report summarising conditions on Hungarian dairy farms. Data collection was created according to already-existing assessment of *Whay et al.* (2003). The use of some measures from already-existing protocol was driven by the fact that they were selected through a process of consultations with experts. Measures should be important to the welfare of animals and could be measured in a consistent way. The project, however, needed the protocol to be established again, for in Hungarian conditions some of the points of the protocols would simply not work (for example – access to the pasture). A new welfare quality tool was created including all needed measures that could be important to the welfare of animals and could be comparatively simple, meaningful, time-efficient and usable on a farm. These aims were reached by avoiding a usage of complicated devices and gadgets, so the research (measure) could be repeated easily by another person, for example farm manager.

The following items were used during every visit: Psion Workabout MX hand-held computer, laminate pages with lameness and body condition score. There was also a tape measure for checking the barn and milking parlour dimensions and thermometer for checking the silage and extra notebook in use. Additionally, the protocol was created to have a minimal-as-possible impact on cows, so the daily routine was not disrupted and farmers could work normally. Following these priorities there was need for a test which the results could be meaningfully interpreted. In case of a discussion with the farmer, there was need for confident explanations, numbers and examples that results (good or bad welfare) actually mean something. Preparation for visiting farms included training with a professional dairy cow selection assessor judging cows for selection purposes. Training was run in parallel with the work of the expert. Oral judgement of the body condition and lameness scores was performed and any hesitations were discussed.

Data handling

Data from the completed welfare assessments was gathered into Microsoft Excel 2007 and then transformed for use in SPSS 13.0 statistical package. Various statistical methods were used in the study (*Table 1*).

Results

Measures for all groups of cattle

Water is a basic need which has to be offered to the animals and its availability and quality are extremely important for animal health and productivity (*Table 2*). No widespread specific production problems have been reported to be caused by consumption of low quality water. Poor water quality might cause reduced production or non-specific diseases and should be investigated when there are herd health and production problems.

***Table 1*. Statistical methods used in the study assessing welfare of dairy cattle**

Statistical method	Observation measured
Shapiro-Wilk test	Checking normality of animal welfare measures
Multiple factor analysis of variance (Univariate)	Differences in animal welfare measures between 2010 and 2011 (for normally distributed data).
Spearman Rank Correlation test	Correlations between animal welfare measures and environmental factors to determine strength of that relationship.
Chi-square test for relatedness or independence	Differences in animal welfare distributions on farms between 2010 and 2011. Comparison of categorical data for one or more variables.
Mann-Whitney test	Differences in animal welfare measures between 2010 and 2011 (for not normally distributed data). Analysis of significant differences between independent variables on dependent measures.

There were on average 13-15 younger calves, 56-58 older calves, 52-56 heifers, 34-36 dry cows and 42-44 lactating cows sharing 1m of available water trough (*Tables 3-7*). Any evidence of a dull demeanour or signs of sickness should alert the farm manager to take action. There are many factors that influence sickness of dairy cattle, but one of the most important is identifying the sick cattle and starting treatment early. Among young calves, older calves and heifers not more than 4% were found obviously ill. However, a 0.51% significant drop in average percentage of cattle with dull demeanour or signs of sickness was observed only in heifers with χ^2 (1, N = 10350) = 3.380 and $p < 0.05$. In the dry and lactating cows group the percentage of obviously sick animals was slightly higher reaching 4-5%. A similar result was observed by *Whay et al.* (2003) who reported on average 3.4% of obviously ill lactating cows.

Cleanliness has been used in the dairy industry as a possible indicator of cow welfare and in studies of the influence of housing conditions on the incidence of mastitis (*Ward et al*., 2002), the effects of tail docking, sub-clinical intra-mammary infection rates and the risk of bacterial contamination of milk (*Sanaa et al*., 1993). A high standard of cow cleanliness indicates limited exposure to environmental mastitis pathogens and is elementary to food safety, hygiene and quality assurance schemes.

Cubicles are a key component of dairy free-stall housing and must allow enough room for the rest to freely enter the stall, lie down, rest comfortably and easily get up. If cows find rising or finding a position in the cubicle not comfortable they will be probably avoiding lying in the

boxes spending more time standing (*Graves et al*., 2009). In the study, rising, if all animal groups, was acceptable with younger calves, older calves and dry cows having, on average, rather unrestricted rising. Heifers and lactating cows had slightly mild restricted opportunities for raising their bodies. This can be explained by the fact that heifers and lactating cows were, on some farms, housed in cubicles which were not of the proper size for the animal.

***Table 2*. Water and bedding quality for all age groups in 2010 and 2011**

Group of cattle	Measure	Category	Percentage of farms		Difference
			2010	2011	
Young calves (<70days)	Water quality	1 – Clean	88	96	+8
		2 – Partly dirty	8	4	-4
		3 – Dirty	4	4	0
	Bedding	1 – Deep, clean and dry	80	72	-8
		2 – Uneven, soiled but dry	12	20	+8
		3 – Poor, soiled and wet	8	8	0
Older calves (>70days)	Water quality	1 – Clean	68	68	0
		2 – Partly dirty	12	8	-4
		3 – Dirty	20	24	+4
	Bedding	1 – Deep, clean and dry	48	56	+8
		2 – Uneven, soiled but dry	28	16	-12
		3 – Poor, soiled and wet	24	28	+4
Heifers	Water quality	1 – Clean	48	56	+8
		2 – Partly dirty	28	24	-4
		3 – Dirty	24	20	-4
	Bedding	1 – Deep, clean and dry	16	24	+8
		2 – Uneven, soiled but dry	28	28	0
		3 – Poor, soiled and wet	56	48	+8
Dry cows	Water quality	1 – Clean	32	36	+8
		2 – Partly dirty	32	32	0
		3 – Dirty	36	32	-4
	Bedding	1 – Deep, clean and dry	40	48	+8
		2 – Uneven, soiled but dry	36	32	-4
		3 – Poor, soiled and wet	28	20	-8
Lactating cows	Water quality	1 – Clean	24	32	+8
		2 – Partly dirty	32	36	+4
		3 – Dirty	44	32	-12
	Bedding	1 – Deep, clean and dry	28	20	+2
		2 – Uneven, soiled but dry	48	68	+7
		3 – Poor, soiled and wet	24	16	+5

Wall et al. (2007) concluded that body condition affects health and fertility. A cow with the ability for high milk production produces more milk partly because she is better predisposed for losing body condition to maintain milk production. High-yielding cows with negative energy balance in early lactation have weaker immune resistance and are more susceptible to some diseases. Those cows need careful management to provide good nutrition, to avoid extremes of body tissue loss and to be fertile.

Lameness is caused by a combination of poor management and a failure to select breeding stock with good feet and legs. On average, in both years 2.8% of young calves, from 5.48% to 6.74% older calves and from 7.46% to 7.65% heifers had impaired locomotion but there were no differences between the years. An increase in poor locomotion was observed among dry cows (6.4%) and lactating cows (7.98%) with χ^2 (1, N = 4306) = 26.652, $p < 0.001$ and with χ^2 (1, N = 22844) = 154.492 and $p < 0.001$. *Grandin* (2011) in the 'Outline of cow welfare critical control points for dairies' asserted that less than 5% of lame cows represents an excellent level. Over 10%, should be not acceptable. There were on average 27.31% in 2010 and 35.29% of lame cows observed during the farm visits. That level of occurrence was found to be similar to *Haskell et al*. (2006), *Huxley et al*. (2004) and *Rutherford et al*. (2009) with 19.3%, 24%, and 39% of cows found to be clinically lame, respectively.

Calves

Individual calving, in comparison to group calving pens, with or without sick cows has an advantage in cases of fewer respiratory problems, lower diarrhoea cases and a lower risk of *Salmonella* infections (*Svensson et al*., 2003). Only on three farms among 25 (12%) calving occurred in group calving pens with contact with sick animals; it also takes place in Canada (52.8% of farms) and in the USA (32.4% of farms) (*Vasseur et al*., 2010). Group calving pens were present on sixteen farms (64%) which is between (57%) Canada and (70%) the USA (*Vasseur et al*., 2010).

Mortality of calves is an important cause of economic losses on dairy farms (*Wathes et al*., 2008). The most important diseases in calves are diarrhoea and respiratory infections with enteritis and pneumonia being the major causes of death. Mortality reported in the USA in 1999 was 11% at an average age of eight weeks. In most cases it was due to enteritic and respiratory infections. *Svensson et al*. (2006) estimated in Sweden an average mortality of 5% which on average occurred before 60 days of age and most of deaths were caused by gastrointestinal disorders. In a study from France 3.1% of the animals died before 80 days of age (*Fourichon et al*., 1997) and in a Danish study 9% of calves died before 90 days of age (*Torseina et al*., 2011). In the present study the mortality rate was 10.49% in 2010 and 11.18% in 2011. Most of the cases were related to diarrhoea and respiratory infections.

Heifers

Heifers are expected to grow, milk and bred successfully. The performance and ability of heifers to be conceived are highly affected by adjusting to new herd mates. Heifers fed separately and observed by *Brickell et al*. (2008) produced more milk and were culled less often than heifers fed with older cows. The issue is perceived as stressful for young animals, especially in modern farming with large herd sizes and a high ratio of animals per one stockman. In the present study, heifers were given an adaptation period before entering the milking herd on six of the 25 farms in both years.

Lactating Cows

The average somatic cell count on farms in the study was 423 000 cells/ml (min. 150 000 and max. 620 000) in 2010 and 429 000 cells/ml (min. 220 000 and max. 658 000) in 2011. In comparison the mean SCC in the United States evaluated by *Norman et al*. (2000) was 307 100 cells/ml in 1996 and 313 500 cells/ml in 1997. *Sewalem et al*. (2006) measured the overall

average SCC for lactating Holstein cows in Canada at 167 000 cells/ml. *The Dairy Site* (2009) reports that in the last fourteen years, SCCs have risen by 30% in the UK.

Infertility is a main reason for culling dairy cows which is not, in itself, a welfare problem but might indirectly indicate poor welfare. In the research the conception rate was 35.08% in 2010 and 34.36% in 2011 (i.e., approximately three services per conception) which is similar to *Beam et al.* (1998) who reported that conception rates to the first service are decreasing around 0.5% per year in the USA. In the UK the conception rates to the first service decreased in fourteen years (between 1982 and 1996) by 15% (*Royal et al.*, 2002).

On average 22-23% cows of all milking cows were slaughtered on 25 farms. In the current study in 2010 and in 2011 cows were culled due to digestion disorders (20.83%), lameness (19.74%), reproductive disorders (17.23%), mastitis (17.23%), poor milk production (16.23%) and other outbreaks (8.61%) (data not shown). In the USA 25.9% of cows were slaughtered in 2009 (*USDA*, 2012) and the main reasons for that were: reproductive disorders (28%), mastitis and udder problems (23%), lameness or injuries (19%), poor milk production (16 %) and other reasons (14%). In comparison, according to *FAWC* (2010), around 4.7% of British cows were culled because of lameness and 9% because of mastitis. *Whitaker et al.* (2000) emphasised that a relatively low number of cows are slaughtered in the UK because of lameness even though the annual incidence is over 25%.

Dairy cow mortality indicates suboptimal herd health and welfare, causes financial loss and is increasing over time (*Raboisson et al.*, 2011). The farm manager's husbandry methods highly influence mortality and various reasons are behind the percentages of lameness, respiratory disease, sick cows treated with antibiotics, feeding a total mixed ration, culling fewer cows in early lactation, longer calving interval (*Thomsen et al.*, 2004). In the present study deaths were reported at 4.86% in 2010 and 4.80% in 2011. Those results are comparable with mortalities in other countries. In Denmark the mortality risk has increased from approximately 3.5% in 1999 to approximately 4.2% in 2008. In the USA the National Animal Health Monitoring System (NAHMS) evaluated increase in mortality from 3.8% in 1996, 4.8% in 2002 and 5.7% in 2007 (*USDA*, 2012).

Stereotypic behaviours are seen when idling, like pushing the bars with the nose, grasping the bars with their mouths, moving the head from the left to the right or transferring weight from one leg to another. When the cow lies backward in the cubicle she is contaminating the bedding. Another negative behaviour is the dog-sitting position which might give an indication that the rail neck is wrongly positioned or there is not enough lounge space in front of the stall (*Overton et al.*, 2002). There was a highly significant increase in the number of lactating cows not engaged in any activities and expressing idling behaviours from 11.34% in 2010 to 13.72% in 2011 with χ^2 (1, N = 22844) = 37.777 and $p < 0.001$.

Table 3. **Welfare measures taken for young calves (<70days) in 2010 and 2011 and the difference between the observations in the two years**

Measure	2010		2011		Differ.	Sig.
	Mean or % of farms	Std. dev.	Mean or % of farms	Std. dev.		
Water – No./1m of trough	15.32	13.07	13.78	12.46	-1.54	NS
Obviously ill (%)	3.50	2.86	3.20	3.22	-0.30	NS
Dirty flanks (%)	10.86	11.95	9.30	8.71	-1.56	P<0.001
Dirty hindlimbs (%)	7.41	14.80	5.76	8.32	-1.65	P<0.001
Dirty belly (%)	6.93	19.11	4.44	6.08	-2.49	P<0.001
Hair loss (%)	2.65	2.67	2.51	2.17	-0.14	NS
Non-hock injuries (%)	1.94	1.86	1.97	2.84	+0.03	NS
Hock and knee lesions (%)	2.46	2.51	2.09	1.95	-0.37	NS
Neck rail injuries (%)	9.40	9.97	10.43	13.21	+1.03	NS
Flight distance (cm)	71.68	20.29	71.88	20.30	+0.20	NS
Thin (BCS 1+2) (%)	12.23	9.60	10.59	8.10	-1.64	P<0.001
Lameness (%)	2.81	3.87	2.85	2.97	+0.04	NS
Unlimited water (% farms)	72	-	80	-	+8	NS
Diarrhoea (%)	4.50	4.62	4.21	3.83	-0.29	NS
Reared together (% farms)	20	-	16	-	-4	NS
Mortality (%)	10.49	13.86	11.18	11.26	+0.28	NS

Table 4. **Welfare measures taken for older calves (>70days) in 2010 and 2011 and the difference between the observations in the two years**

Measure	2010		2011		Differ.	Sig.
	Mean or % of farms	Std. dev.	Mean or % of farms	Std. dev.		
Water – No./1m of trough	56.23	35.76	58.89	29.87	+2.66	NS
Obviously ill (%)	2.54	2.34	3.02	2.99	+0.48	NS
Dirty flanks (%)	22.48	29.04	21.94	26.61	-0.54	NS
Dirty hindlimbs (%)	35.70	37.45	36.03	35.23	+0.33	P<0.001
Dirty belly (%)	27.24	32.23	25.77	30.91	-1.46	P<0.001
Hair loss (%)	2.59	3.84	3.02	3.79	+0.43	NS
Non-hock injuries (%)	2.87	2.45	2.86	2.23	-0.01	NS
Hock and knee lesions (%)	7.06	13.94	8.19	14.78	+1.13	P<0.001
Neck rail injuries (%)	34.45	39.26	36.76	36.06	+2.30	P<0.001
Flight distance (cm)	96.16	56.22	92.76	59.78	-3.40	NS
Thin (BCS 1+2) (%)	6.21	4.17	6.43	5.28	+0.22	NS
Lameness (%)	5.48	5.68	6.74	4.32	+1.26	NS
Unlimited water (% farms)	100	-	100	-	0	NS
Diarrhoea (%)	2.18	1.79	2.78	2.47	+0.61	P<0.005
Reared together (% farms)	100	-	100	-	0	NS

Table 5. **Welfare measures taken for heifers in 2010 and 2011 and the difference between the observations in the two years**

Measure	2010		2011		Differ.	Sig.
	Mean or % of farms	Std. dev.	Mean or % of farms	Std. dev.		
Water – No./1m of trough	52.69	25.76	56.25	23.62	+3.56	NS
Obviously ill (%)	3.77	4.21	3.26	3.80	-0.51	P<0.05
Dirty flanks (%)	21.70	19.29	20.70	16.68	-1.00	NS
Dirty hindlimbs (%)	41.41	29.11	35.61	25.05	-5.80	P<0.001
Dirty udder (%)	42.06	37.17	36.34	33.23	-5.72	P<0.001
Hair loss (%)	5.11	3.55	4.13	2.96	-0.98	NS
Non-hock injuries (%)	5.57	4.48	7.60	6.17	+2.03	P<0.001
Hock and knee lesions (%)	8.38	10.49	9.75	8.91	+1.37	P<0.05
Neck rail injuries (%)	35.74	31.30	33.42	29.97	-2.32	P<0.005
Flight distance (cm)	88.88	23.52	84.52	25.71	-4.36	NS
Thin (BCS 1+2) (%)	5.16	5.17	7.20	5.96	+2.05	P<0.05
Fat (4+5) (%)	11.52	8.60	10.26	7.29	-1.26	P<0.05
Lameness (%)	7.46	4.91	7.65	3.81	+0.19	NS
Adaptation period(% farms)	24	-	24	-	0	NS

Table 6. **Welfare measures taken for dry cows in 2010 and 2011 and the difference between the observations in the two years**

Measure	2010		2011		Differ.	Sig.
	Mean or % of farms	Std. dev.	Mean or % of farms	Std. dev		
Water – No./1m of trough	36.32	22.85	34.45	19.23	-1.87	NS
Obviously ill (%)	3.51	3.45	4.91	3.62	+1.40	P<0.05
Dirty flanks (%)	21.85	24.06	16.90	18.02	-4.95	P<0.001
Dirty hindlimbs (%)	37.38	26.44	34.73	21.75	-2.66	NS
Dirty udder (%)	21.62	30.75	15.24	18.38	-6.38	P<0.001
Hair loss (%)	10.51	8.91	11.66	8.38	+1.15	NS
Non-hock injuries (%)	11.65	13.86	12.93	13.42	+1.28	P<0.05
Hock and knee lesions (%)	15.28	13.03	16.75	13.39	+1.47	P<0.05
Neck rail injuries (%)	43.56	23.53	38.79	22.20	-4.77	P<0.001
Flight distance (cm)	97.12	38.26	98.40	36.47	+1.28	NS
Thin (BCS 1+2) (%)	13.17	9.41	18.62	12.29	+5.45	NS
Fat (4+5) (%)	17.85	10.29	22.31	12.92	+4.46	NS
Lameness (%)	24.90	9.33	28.30	10.73	+3.40	NS

Table 7. **Welfare measures taken for lactating cows in 2010 and 2011 and the difference between the observations in the two years**

Measure	2010		2011		Differ.	Sig.
	Mean or % of farms	Std. dev.	Mean or % of farms	Std. dev.		
Water – No./1m of trough	44.83	23.47	42.56	22.69	-2.27	NS
Obviously ill (%)	4.13	2.97	5.58	4.38	+1.46	P<0.001
Dirty flanks (%)	26.85	27.22	20.19	18.08	-6.66	P<0.001
Dirty hindlimbs (%)	50.14	33.17	43.62	29.88	-6.52	P<0.001
Dirty udder (%)	24.73	26.69	20.97	23.56	-3.76	P<0.001
Hair loss (%)	13.19	11.05	14.09	11.11	+0.90	NS
Non-hock injuries (%)	14.17	16.30	14.35	13.33	+0.18	NS
Hock and knee lesions (%)	18.24	14.57	23.03	19.28	+4.79	P<0.001
Neck rail injuries (%)	49.30	35.68	45.63	35.11	-3.66	P<0.001
Flight distance (cm)	87.92	42.49	82.86	34.90	-5.06	NS
Thin (BCS 1+2) (%)	27.28	16.21	40.40	14.07	+13.13	P<0.001
Fat (4+5) (%)	15.65	11.36	5.89	3.42	-9.76	P<0.001
Lameness (%)	27.31	13.51	35.29	10.88	+7.98	P<0.001
SCC (x1000)	422.76	137.59	429.48	139.44	+6.72	NS
Conception rate (%)	35.08	9.49	34.36	11.21	-0.72	NS
Lifespan (No.)	2.42	0.26	2.47	0.24	+0.05	NS
Culling (%)	20.06	13.65	21.11	12.24	+1.05	NS
Mortality (%)	4.86	6.84	4.80	5.65	-0.06	NS
Idling (%)	11.34	7.04	13.72	8.69	+2.38	P<0.001
Grooming brushes (%farms)	36	-	36	-	0	NS

One of the behaviours was found very sporadically: beating animals. Additionally, there were no correlations found between animal based measures and environmental factors. The study aimed to check what kinds of welfare improvements are possible if farmers are only informed about cattle welfare. *Clarkson et al*. (1996) and *Whay* (2002) reported that in most of the welfare issues farmers underestimate problems on their farms. One of the major tasks for those seeking to improve farm animal welfare is to improve farmer perception of the problem (*Webster*, 2005a).

Hypothesis 1: 'Hungarian Holstein-Friesian cattle have an acceptable standard of welfare.'

The 25 Holstein-Friesian herds observed do not necessarily represent the welfare conditions of cows throughout Hungary. However, the study probably constitutes the largest independently-observed assessment of the welfare of dairy cows to have been carried out in Hungary. This report considers whether the aims of the Five Freedoms and expectations of dairy welfare principles has been realised for Holstein-Friesian cattle on Hungarian dairy farms. No major problems were encountered in collecting the management and environment-based data. This is likely because questionnaires were thoroughly developed and tested before this experiment. Studies typically report that between 25% and 50% of farmers contacted will not participate in studies of animal health (*Wells et al*., 1996; *Frei et al*., 1997**;** *Whay et al*., 2003). In the current

study only 2 out of 27 farmers (7%) did not want to follow the project and rejected any cooperation after a few months.

Hypothesis 2: 'Advice voluntarily given about animal welfare will significantly improve specific, measurable, attainable, relevant and time-limited welfare measures of Hungarian Holstein-Friesian herds.'

After voluntary advice was given, welfare improvements were possible only with some measures. Farmers were able to decrease the number of dirty cattle and improve the conditions of younger calves, heifers and lactating cows. On the other hand more animals got injured and ill probably because of introducing cattle to new buildings and new facilities which were implemented between visits. The first reason that improvement was possible only with some measures was the money issue. Even some projects in the study were financed by EU funds and they mainly focused on making the dairy industry more efficient in production, but not always according to welfare standards. On many farms, managers had to choose between better and worse solutions. This is understandable because animal welfare is based on making compromises. This is also possible that farmers simply did not have an interest in improving the welfare of their cattle. Either because they were managers and all decisions are made by owners avoiding unnecessary expenditures or because they are overwhelmed with other issues on the farms which are prohibiting them from concentrating on improving welfare. From the point of view of the decision making process there were differences observed in the capabilities of particular businesses for investments and improving the welfare of cattle. In the case of the European Union subsidies, taking bank loans or making investments on their own, large private and state enterprises with diversity of production areas (animals, plants, agricultural services, retail, transport, etc.) found it easy to invest in improving efficiency and the well-being of cattle. Smaller private farms were next in order of making investments, afterwards, the smallest private farms and smaller state farms were the last because of a lack of funds and limitations of legal aspects of cooperative statuses. It is common to employ seasonal workers on dairy farms in Western Europe, in the USA and Australia. Employment takes usually place during harvesting, when engineering projects are carried on or when not enough labour is on the farm for some other reasons. On the other hand, experience shows that Hungarian farm managers are not very keen to employ extra farmhands (*personal communication and experience*). This is usually explained by complicated employment procedures, lack of money for extra vacancy or simply becoming accustomed to old methods. Time pressure, cost-cutting policies or changing weather conditions during other activities leaves little room for workers to focus on everyday activities with animals.

Voluntarily given advice to farmers resulted in highly significant improvements in cleanliness of all cattle groups. The advice also resulted in significantly to highly significant improvements of body conditions of thin younger calves, fat heifers and fat lactating cows. There was significantly less evidence of obviously-ill heifers reported and from very to highly significantly less neck rail injuries among heifers, dry and lactating cows. A decrease in the welfare was observed in older calves with highly significantly dirtier hindlimbs, highly significant and significantly higher number of thin heifers and lactating cows, respectively. A higher number of older calves with diarrhoea and more dry and lactating cows being obviously ill were estimated. More lameness and idling behaviours were found in lactating cows. A higher number of hock and knee lesions was discovered among older calves, heifers, dry and lactating cows. Finally, more neck rail injuries among older calves with more non-hock injuries in heifers and dry cows were observed. A total of 18 positive and 14 negative measures were discovered after providing farmers with dairy welfare solutions.

Conclusions

Assessment of Hungarian Holstein-Friesian cattle proved that welfare status in 25 Hungarian herds was comparable to those reported in relevant publications. There were better and worse farms, but there were no uniquely bad and uniquely good farms. Average welfare measures were not drastically different to those found in the literature. 25 Holstein-Friesian dairy farms were better managed in aspects like fewer cows with hair loss, non-hock injuries, hock and knee lesions and shorter flight distance. Similar distributions with other authors were found with dirty hindlimbs, dirty udders, bedding lameness, mortality and culling of lactating cows, lifespan and mortality of calves. The worst results in comparison to already-presented studies were dirty flanks. Voluntarily given advice to farmers affected in highly significant improve in cleanliness of all groups of cattle and from significantly to highly significantly improve of body conditions of thin younger calves, fat heifers and fat lactating cows. There were significantly less obviously-ill heifers reported and from very to highly significantly less neck rail injuries among heifers, dry and lactating cows. Decrease in welfare was observed in older calves with highly significantly dirtier hindlimbs, highly significant and significantly higher number of thin heifers and lactating cows, respectively. A higher number of older calves with diarrhoea and more dry and lactating cows being obviously ill were estimated. More lameness and idling behaviours were found in lactating cows. A higher number of hock and knee lesions was discovered among older calves, heifers, dry and lactating cows. Finally, more neck rail injuries among older calves with more non-hock injuries in heifers and dry cows were observed. A total of eighteen positive and fourteen negative measures were discovered after providing farmers with dairy welfare solutions. Estimates found in the study confirm that farmers made compromises between improved cleanliness with better body conditions and ill cattle with injuries.

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