Edyta Gajos, Sylwia Małażewska

Warsaw University of Life Sciences – SGGW, Poland

DAIRY CATTLE WELFARE ASPECTS IN MAZOWIECKIE AND PODLASKIE PROVINCE

ASPEKTY DOBROSTANU BYDŁA MLECZNEGO W WOJEWÓDZTWIE MAZOWIECKIM I PODLASKIM

Key words: welfare, dairy cattle, economic outcomes

Słowa kluczowe: dobrostan, bydło mleczne, wyniki ekonomiczne

Abstract. The aim of this article was to examine the level and other various aspects of dairy cattle welfare in Mazowieckie and Podlaskie province, as well as to indicate existing differences. The research was conducted in 2012 on a sample of 150 farms. Based on the survey, it was found that the overall level of welfare is higher in Mazowieckie than in Podlaskie province. At the same time the milk yield achieved in farms located in Mazowieckie province was lower than in farms located in Podlaskie province. This relationship was similar in the case of veterinary costs. Finally, the level of gross margin achieved from farm per cow was higher in Mazowieckie than Podlaskie province.

Introduction

The issue of farm animal welfare has been widely discussed at the forum of the European Commission in recent years. The general conclusion was that there is a need to clarify and increase existing animal welfare standards. The first animal welfare requirements in the European Union were implemented within a legal directive in the 1990's. Later, the Luxembourg Common Agricultural Policy reform included animal welfare requirements in cross-compliance standards (in 2003). Their fulfilment determines, among others, receipt of direct payments to farmers. The Community Action Plan on Animal Welfare is another manifestation of the ongoing discussion [Malak-Rawlikowska et al. 2010]. At the forum of the European Commission the need to clarify and upgrade existing animal welfare standards was widely discussed. That idea is supported by 77% of European Union citizens [Cozzi et al. 2008].

The concept of animal welfare has been defined in many different ways [Herbut, Walczak 2004, Kołacz, Bodak 1999, Malak-Rawlikowska et al. 2010]. Welfare is sometimes defined in relation to animals' ability to control their environment [Broom 1986] or in relation to their ability to adapt to environmental conditions [Broom 1996]. It is also defined as animals' feelings [Duncan 1996] or a state in which animals can live in harmony with their environment [Hurnik 1995 by Pisula 1999]. The animals' rights to be treated humanely in accordance with their nature and natural environment are very important here [Benson, Rollin 2004].

Changes in welfare standards can bear important implications for the economics of farms [Lewandowski 2008]. Indicators of production, such as milk yield and weight gain, are very sensitive markers of animal health and, therefore, the level of their welfare. Healthy animals have better production results [Kołacz 2006]. It was found that about 30% of differences in production results between the different observed dairy cattle herds were associated with the level of fear that animals feel towards people [Walczak 2005]. According to other research, the fear factor in front of people is responsible for a 19% of difference in yields [Breuer et al. 2000]. It was also shown (in the experimental conditions) that cows treated more gently were characterized by milk yield higher by 600 kg than animals treated roughly. This was an increase of 13% [Walczak 2005].

The influence of air temperature on animals' productivity can be also noted. If the temperature is outside the optimal range (6-25°C in closed buildings, and -10-25°C in open buildings [Walczak 2005]) cows spend more energy to maintain a normal body temperature which means a reduction in the amount of energy allocated to milk production [Sossidou et al. 2007]. Cattle are one of the farm animals which easier tolerate lower than higher temperatures [Walczak 2005].

Such a significant impact of dairy cattle welfare on production and economic results of farms indicates the need for research into the welfare of Polish dairy farms. The aim of the study was to examine the level (and other various aspects) of welfare and to indicate existing differences between farms located in Mazowieckie and Podlaskie province.

Material and methods

The study was conducted using a questionnaire survey among dairy farmers in Mazowieckie and Podlaskie province. It included 150 farms (75 from Podlaskie and 75 from Mazowieckie). Surveys were conducted in March 2012 and collected data and opinions related to 2011. The study sample had characteristics of representativeness, because it was constructed using a quota method – the structure of the sample was the same as the structure of the whole population. These specific regions were selected because they are leaders in milk production in terms of the number of dairy farms, the number of cows, as well as stocking and milk production per 1 ha [*Charakterystyka gospodarstw*... 2008, *Rocznik statystyczny*... 2008]. Milk production was the main activity in studied farms. Milk sales accounted for about 70% of total revenue. Another 10% of revenue came from the sale of cattle. Farms in Podlaskie province were more specialized than in the Mazowieckie province. These farms took 75% of revenue from the sale of milk, while farms from Mazowieckie province took 75% of revenue from the sale of milk and cattle together. The share of farms with low (10-19 cows) and medium scale (20-49 cows) farming in the study sample was very similar – and equal to less than 45%, while the share of large-scale farming (50 or more cows) equalled 12%. These proportions vary slightly in different provinces. In the Mazowieckie province the polarization of farms was clearly visible. Milk yield in the surveyed farms average equalled to less than 6000 kg per year, per cow. It was about 250 kg higher in the farms of Podlaskie (5750 kg than of Mazowieckie province (5500 kg).

Structure analysis and other simple statistical measures were used in order to analyze collected data. The significance of differences between selected groups of data was checked by statistical tests – variance and covariance analysis. It was assumed, that there is a significant difference if p-value equals 0.1 or less.

Results and discussion

In Mazowieckie province there were about 513 thousand cows (26.1 cows per each 100 ha of agricultural land) and the milk production was about 1323 litres per 1 ha of agricultural land. In Podlaskie province there were about 473 thousand cows (44.3 cows per each 100 ha of agricultural land) and the milk production was about 2097 litres per 1 ha of agricultural land. There were 234 thousand and 81 thousand individual farms respectively. They both provided 23.2% of general agricultural market output and 24.6% of animal agricultural market output. It is worth noticing that the share of the general agricultural market output related to milk production equalled 21.0% in Mazowieckie and 59.3% in Podlaskie province [*Rocznik Statystyczny*… 2013].

Table 1 shows the types of barns owned by the surveyed farms. The structure significantly differs between regions (p-value 0.05). The vast majority of them had only tie-up cowsheds – almost 80% of the total sample. The remaining 20% had various types of loose cowsheds (10% had only a loose cowsheds, another 10% both loose and tie-up cowsheds). Differences between studied provinces were significant. In Podlaskie region almost 90% of farmers had tie-up cowsheds only, while in Mazowieckie region, this percentage was slightly above 70%. This means that in the Podlaskie province only 10% of farmers were using loose cowsheds. Meanwhile in Mazowieckie

Table 1. Types of barns owned by the surveyed farms
Tabela 1. Rodzaje obór posiadanych przez badane gospodarstwa [%]

Barn type/*Rodzaj obór*	Types of barns/*Rodzaje obór [%]*		
	general/ *ogółem*	mazowieckie	podlaskie
Tie-up + loose with dens designed/*Uwięziowa + wolnostanowiskowa z wydzielonymi legowiskami*	0.7	1.4	0.0
Tie-up + loose without dens designed/*Uwięziowa + wolnostanowiskowa bez wydzielonych legowisk*	9.4	14.8	4.1
Loose with dens designed + loose without dens designed/ *Wolnostanowiskowa z wydzielonymi legowiskami + wolnostanowiskowa bez wydzielonych legowisk*	0.7	1.4	0.0
Tie-up/*Uwięziowa*	79.7	70.2	89.2
Loose with dens designed/*Wolnostanowiskowa z wydzielonymi legowiskami*	3.4	4.1	2.6
Loose without dens designed/*Wolnostanowiskowa bez wydzielonych legowisk*	6.1	8.1	4.1

Source: own study
Źródło: opracowanie własne

province this percentage was three times higher. Keeping dairy cows year-round inside the buildings raises many implications for animal welfare, including: susceptibility to various diseases and behavioural changes, limitation of movement, increased stress level [Sossidou et al. 2004]. It was already found in 1983 that keeping cattle year-round in buildings has a negative effect on their reproduction. Aspects such as the lack of pasture, stressors and adverse environmental conditions should be mentioned [Grzegorzak et al. 1983]. The biggest negative consequences are observed in the case of keeping cows in buildings throughout the year. However, keeping them in tie-up cowsheds without any possibilities of movement for even only half a year has a significant impact on the health and productivity of animals. The other type of barns – free range ones are better in this case because they allow animals to move even in the absence of access to pasture or an open run. It was found that farms with only tie-up cowsheds were characterized by a lower average milk yield per cow (4509 litres) than farms with loose cowsheds or both types of barns (6425 litres). These differences are also clear when considering individual provinces – Mazowieckie (5211 litres and 6145 litres respectively) and Podlaskie (5565 litres and 7139 litres respectively).

There are also significant differences between the regions in the conditions prevailing in the barns. Slotted floors in barns were applied by 13.3% of farmers in Mazowieckie and 18.7% of farmers in Podlaskie province. Slotted floors are not beneficial to animals' health, because they are not used with any bedding materials. There was a lower frequency of position changes from standing to lying and vice versa, suggesting that the cows kept on such ground have difficulties with standing up and lying down [Haley et al. 2001]. This was confirmed by the other studies which indicated that the majority of motor disorders occur in barns with concrete and scraper floors. [Beaudeau et al. 2000, by Herbut, Walczak 2004]. In terms of bedding materials, in both provinces, only 1.3% of farmers did not use them, and 96% used natural ones or both natural bedding materials and mats and mattresses. This is an advantageous solution from an animal welfare point

Table 2. Continuous access to water in barn
Tabela 2. Stały dostęp do wody w oborze

Specification/ *Wyszczególnienie*	Continuous access to water/ *Stały dostęp do wody [%]*		
	cows/ *krowy*	heifers and bulls/ *jałówki i byczki*	calves/ *cielęta*
General/*Ogółem*	98. 7	92.0	83.3
Mazowieckie	97.3	93.3	86.7
Podlaskie	100.0	90.7	80.0

Source: own study
Źródło: opracowanie własne

Table 3. Cowshed conditions rating made by farmers
Tabela 3. Ocena warunków panujących w oborach dokonana przez rolników

Specification/ *Wyszczególnienie*	Cowshed conditions assessments/*Ocena warunków panujących w oborach*			
	temperature/ *temperatura*	pollination/ *zapylenie*	humidity/ *wilgotność*	ammonia smell/ *zapach amoniaku*
General/*Ogółem*	4.18	4.27	4.09	4.17
Mazowieckie	4.27	4.35	4.29	4.33
Podlaskie	4.09	4.19	3.88	4.01
P-value	0,07	0,14	0,00	0,01

Source: own study
Źródło: opracowanie własne

of view, because straw is the best bedding material for cattle [Walczak 2005]. Farrowing crates, providing safety to the nascent cow and separated from the rest of the herd place, were used by 45.3% farmers in Mazowieckie and 42.7% farmers in Podlaskie province. It is important to ensure adequate ventilation to provide animals with good microclimate conditions in barns. In the vast majority of farms (93.3% in Mazowieckie and 96.0% in Podlaskie) natural ventilation was used. This type of ventilation does not require any additional equipment to work properly. In the others farms mechanical ventilation was used, which should be equipped with an alarm system indicating failure, the lack of electricity and emergency ventilation. However, only a third of these farms had adequate facilities.

Table 2 shows the percentage of farms in which animals of different age groups had constant access to water in the barns. Cows had continuous access to water for all farms in the Podlasie province and 97.3% of farms in the Mazowieckie province. Heifers and bulls had permanent access to water in 90.7% and 93.3% of farms respectively and calves 80.0% and 86.7% of farms respectively. A larger proportion of farms in Podlaskie province provided cows with continuous access to water, whilst the other age groups were provided with continuous access to water Mazowieckie province. However, the differences are not statistically significant (p-value between 0.19 and 0.55).

Table 3 presents an assessment of cowsheds conditions made by farmers. Farmers evaluated each of the four aspects on a scale from 1 (very bad) to 5 (very good). Generally, farmers pointed out that the conditions in their cowsheds are good. It may be noted that farmers from Mazowieckie province assessed conditions in their cowsheds higher than farmers from Podlaskie province.

Access to pasture is another important aspect related to the level of dairy cattle welfare. All described differences between regions are statistically significant – p-value < 0.05 in each case. 69.3% of farmers from Mazowieckie province and 52.0% of farmers from Podlaskie province provided their animals with access to pasture. These percentages apply to the use of pastures by cows. Other age groups of cattle had access to pasture in a smaller number of farms. It was found that regular exercise in the open air in the case of cows kept in tie-up systems significantly improves their health [Keil et al. 2006, Loberg et al. 2004]. For this reason, access to pasture significantly influences the level of animal welfare and veterinary costs. Among studied farms animal treatment costs were lower on farms benefiting from pastures (an average of 211.54 PLN/cow) than on farms that do not use pastures (an average of 254.91 PLN/cow). This relationship was similar for Mazowieckie province, while in Podlaskie province was reversed. Table 4 shows the reasons for not using pastures indicated by farmers (there may be more than one answer). The structure statistically differs between regions (p-value 0.00).

The majority of farmers (54.5%) did not use pasture because they felt that it is too time consuming. In 22.1% of surveyed farms pastures were too far away from them. Almost 30% of farmers believed that pastures are not necessary. This means that this group of farmers had no knowledge about the positive effects of using pastures. Pastures are not necessary for milk production and rearing dairy cattle, but use of them has many benefits. In terms of the differences between groups of farms from individual provinces, more farmers from Mazowieckie province pointed to excessive time-consumption, and less for the other two reasons.

Table 4. Reasons for not using pastures indicated by farmers (there may be more than one answer)
Tabela 4. Powody braku korzystania z pastwiska wskazane przez rolników (istniała możliwość wskazania więcej niż jednej odpowiedzi)

Specification/ *Wyszczególnienie*	Reasons for not using pastures/*Powody braku korzystania [%]*		
	fields too far from the farm/*zbyt duża odległość pól od gospodarstwa*	it is unnecessary/ *jest niepotrzebne*	cast out to pasture takes too much time/*wypędzanie zwierząt na pastwisko zajmuje zbyt dużo czasu*
General/*Ogółem*	22.1	28.6	54.5
Mazowieckie	19.2	26.9	65.4
Podlaskie	23.5	29.4	45.1

Source: own study
Źródło: opracowanie własne

The age of the weaning is as an equally important issue of dairy cattle welfare as access to pastures. An increased amount of milk obtained from cows is a logical consequence of early weaning. Calves can be fed with suitable milk replacer. However, the tested groups of calves separated from their mothers after 6 hours, 1, 4 and 14 days after birth clearly indicate that there are medical indications for later weaning. Furthermore, the calves separated after 14 days showed three times better daily gains than calves separated one day after calving [Weary, Chua 2000, Flower, Weary 2001]. In the surveyed farms calves remained with their mothers for an average period of 4.4 days. This period was much longer in Mazowieckie than in Podlaskie province 7.3 and 2.6 days respectively (statistically significant difference, p-value 0.01). This means that there are reasons to conclude, that in Mazowieckie province calves and heifers had a higher health status and better daily gains.

In terms of the economic aspects of dairy cattle welfare there were no significant differences (p-value > 0.1) in the level of prices received for milk between groups of farms from individual provinces. There were also no significant differences in the parameters characterizing the milk quality, such as fat, protein and somatic cell count. However, there were significant differences in milk yield. It was lower in Mazowieckie than Podlaskie province – 5498 litres and 5753 litres respectively. Veterinary costs were also significantly lower in this region – respectively 148.80 PLN/cow and 308.41 PLN/cow. The gross margin (counted as the difference between revenue and direct costs) from the whole farm per cow achieved by the examined farms was higher in Mazowieckie than in Podlaskie province – respectively 5881.37 PLN/cow and 5201.04 PLN/cow.

Conclusions

The analysis permits to formulate the conclusion that the overall level of welfare on farms in Mazowieckie province was higher than in Podlaskie province. This is indicated by parameters such as: higher percentage of loose cowsheds (respectively 30% and 10%), a higher proportion of farmers using pastures (respectively almost 70% and 52%), lower proportion of cowsheds with slotted floors (respectively 13% and 19%), a longer period of calves staying with their mothers (respectively 7 days and 2.5 days) and many others. At the same time farms from Mazowieckie province recorded a lower milk yield (respectively 5498 litres and 5753 litres). It can be assumed that a number of aspects indicating a higher level of welfare does not support high milk yield. However, it supports reducing veterinary costs which in this group were more than twice lower (respectively 149 PLN/cow and 308.41 PLN/cow). Finally, the level of gross margin achieved from the farm per cow was higher in Mazowieckie than Podlaskie province (respectively 5881 PLN/cow and 5201 PLN/cow).

Bibliography

Benson G.J., Rollin B.E. 2004: *The well-being of Farm Animals. Challenges and Solutions,* Backwell Publishing;
Breuer K. et al. 2000: *Behavioural response to humans and the productivity of commercial dairy cows*, App. Anim. Beh. Sci., 66, 273-288.
Broom D.M. 1986: *Indicators of poor welfare*, British Vet. J., vol. 142, no. 6, 524-526.
Broom D.M. 1996: *Animal welfare defined in terms of attempts to cope with the environment,* Acta Agr. Scand. Anim. Sci., Supplement 27, 22-28.
Charakterystyka gospodarstw rolnych w 2007 roku. 2008: GUS, Warszawa.
Cozzi G. et al. 2008: *Animal welfare as a pillar of a sustainable farm animal production*, Acta Agric. Slovenica, 2, 23-31.
Duncan I.J.H. 1996: *Animal welfare defined in terms of feeling*, Acta Agr. Scand. Anim. Sci., Supplement, 27, 29-35.
Flower F.C., Weary D.M. 2001: *Effects of early separation on the dairy cow and calf 2. Separation at 1 day and 2 weeks after birth*, App. Anim. Beh. Sci., 70, 275-284.
Grzegorzak A. et al. 1983: *Wpływ warunków utrzymania krów na stan ich zdrowia i wydajność w wolnostanowiskowej fermie przemysłowej*, Med. Wet., t. 39, nr 5, 291-293.
Haley D.B. et al. 2001: *Assessing cow comfort: effects of two floor types and two tie stal designs on the behavior of lactating dairy cows*, App. Anim. Beh. Sci., 71, 105-117.
Herbut E., Walczak J. 2004: *Wpływ środowiska na dobrostan zwierząt*, Zesz. Nauk. Przeg. Hod., 73, 19-40.
Keil N.M. et al. 2006: *Effects of frequency and duration of outdoor exercise on the prevalence of hock lesions in tied Swiss dairy cows*, Prev. Vet. Med., 74, 142-153.
Kołacz R. (red.). 2006: *Higiena i dobrostan zwierząt gospodarskich*, Wyd. AR we Wrocławiu, Wrocław.
Kołacz R., Bodak E. 1999: *Dobrostan zwierząt i kryteria jego oceny*, Med. Wet., 3, 147-154.
Lewandowski E. 2008: *Dobrostan i ekonomia*, Farmer, 18.
Loberg J. et al. 2004: *Behaviour and claw health in tied dairy cows with varying access to exercise in an outdoor paddock*, App. Anim. Beh. Sci., 89, 1-16.
Malak-Rawlikowska A., Gębska M., Spaltabaka E. 2010: *Społeczne i prawne aspekty podwyższenia norm dobrostanu bydła mlecznego w wybranych krajach europejskich i w Polsce*, Rocz. Nauk Roln., seria G, t. 97, z. 1, 28-42.
Pisula W. 1999: *Dobrostan zwierząt użytkowych, wybrane zagadnienia psychologii zwierząt,* Przeg. Hod., 1.
Rocznik statystyczny rolnictwa i obszarów wiejskich. 2008: GUS, Warszawa.
Rocznik statystyczny rolnictwa. 2013: GUS, Warszawa.
Sossidou E. (red.). 2007: *Farm Animal Welfare, Environment & Food Quality interaction studies*, National Agricultural Research Foundation, Giannitsa.
Walczak J. (red.). 2005: *Dobrostan bydła a warunki ich utrzymania*, Wyd. IZ, Kraków.
Weary D.M., Chua B. 2000: *Effects of early separation on the dairy cow and calf 1. Separation at 6 h, 1 day and 4 days after birth*, App. Anim. Beh. Sci., 69, 177-188.

Streszczenie

Celem pracy było zbadanie poziomu dobrostanu bydła mlecznego w gospodarstwach w województwie mazowieckim i podlaskim, jak również wskazanie występujących różnic. Badania zostały przeprowadzone w 2012 roku na próbie 150 gospodarstw. Na podstawie przeprowadzonych badań stwierdzono, że ogólny poziom dobrostanu jest wyższy w województwie mazowieckim niż podlaskim. Jednocześnie w gospodarstwach z województwa mazowieckiego zanotowano niższą wydajność mleczną krów. Relacja była taka sama w przypadku kosztów weterynaryjnych. Finalnie, nadwyżka bezpośrednia z gospodarstwa w przeliczeniu na jedną krowę była wyższa w województwie mazowieckim niż podlaskim.

Correspondence address
MSc Edyta Gajos, MSc Sylwia Małażewska
Warsaw University of Life Sciences
Faculty of Economic Sciences
Nowoursynowska St. 166
02-787 Warsaw, Poland
e-mail: edyta_gajos@sggw.pl, sylwia_malazewska@sggw.pl