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## ECONOMIC ASPECTS OF ANIMAL WELFARE IN MILK PRODUCTION

### EKONOMICZNE ASPEKTY DOBROSTANU ZWIERZĄT W PRODUKCJI MLEKA

**Key words:** animal welfare, net farm income, milk production, dairy farming

*Słowa kluczowe:* dobrostan zwierząt, dochód rolniczy netto, produkcja mleka, hodowla bydła mlecznego

**Abstract.** The paper aims to examine the influence of selected animal welfare aspects on the net farm income. Data used in the study were collected under the EDF (European Dairy Farmers) program in 280 farms representing 22 European countries. It was analyzed using the variance and covariance analysis. Following animal welfare aspects were taken into consideration: access to pasture, frequency of milking, culling rate, period between calvings and milk yield. Combinations of each two aspects were also taken into account. Milk production is one of the most important branches in Polish agriculture. Net farm income obtained by milk producers are influenced by factors related to animal welfare. It was found, that farms providing animals with access to pasture are characterized by lower culling rate and milk yield than farms not providing animals with access to pasture. At the same time farms providing animals with access to pasture obtain higher net farm income. The limitation in revenue causes by decreased in milk yield is recompensed by savings in costs. It might be supposed, that this result is related both, to improved health status of animals, and lower costs of feeding. That confirms, that access pasture is a very important determinant of net farm income. Another important factor determining net farm income in milk production is culling rate. Farms characterized by higher culling rate obtain lower net farm income.

## Introduction

Milk production is one of the most important branches in Polish agriculture. It provides 15,7% of agriculture global production in Poland [Rocznik Statystyczny 2008]. Development of that branch depends on many factors, e.g. tradition, environmental conditions and neighborhood of the market. There are also many legal regulations in agriculture. Milk production is regulated for example by milk quotas system and cross-compliance standards. Some requirements implemented in cross-compliance standards are connected with animal welfare.

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 after Pisula 1999]. The animals' rights to be treated humanely in accordance with their nature and natural environment are very important here [Benson, Rollin 2004].

Provisions related to animal welfare are perceived rather as farm development constrains, because of imposing an additional restrictions and obligations for farmers. Results of numerous studies indicate, that upgraded animal welfare standards can increase livestock production costs by 5-30% [Blandford 2006, Bennett 1997 after Mitchell]. However, there are also some advantages from those requirements like higher prices for products [Kołacz 2000] and benefits in production characteristics and efficiency, as well as increase in amount of production [Kołacz 2006]. It was found, that cows treated gently produce 600 kg milk/year (13%) more than animals treated brutally [Walczak 2005]. It raises important implications for the economics of farms [Lewandowski 2008b], however, an overall impact on farms income is not always clear.

Animal welfare in rural production is a very actual problem. The first animal welfare requirements in European Union were implemented within the legal directive in nineties. Later, the Luxembourg Common Agricultural Policy reform in 2003, included the animal welfare requirements in cross-compliance standards. The Community Action Plan on Animal Welfare is another manifestation of the ongoing discussion [Malak-Rawlikowska et al. 2010]. That issue has been also widely discussed at the forum of European Commission. The general conclusion was, that there is a need to clarify and upgrade existing animal welfare standards. That idea is supported by 77% of European Union citizens [Cozzi et al. 2008].

The economic aspects of animal welfare, are however, not sufficiently explored in the available literature. There are many articles describing the impact of selected welfare parameters on the health and productivity of animals, but only a few publications refer to the economic performance and farms' income. For this reason, it is reasonable to undertake the research in this field.

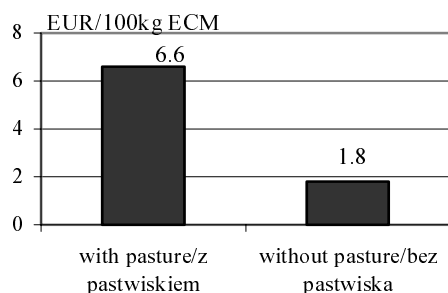
The paper aims to examine the influence of selected animal welfare aspects on net farm income.

### Material, methodology and results

Data used in the study were collected under the EDF (European Dairy Farmers) program in 280 farms representing 22 European countries. It was analyzed using the variance and covariance analysis. Following animal welfare aspects were taken into consideration: access to pasture, frequency of milking, culling rate, period between calvings and milk yield. Combinations of each two aspects were also taken into account.

It was found, that there is no statistically significant difference between net farm income (EUR/100 kg ECM – Energy Corrected Milk) derived by groups of farms characterized by various levels of frequency of milking and periods between calvings. Other factors have statistically significant influence on the net farm income. Taking into account combinations of factors there is a statistically significant difference between the net farm income derived by groups of farms isolated due to access to pasture and milk yield.

The mean net farm income derived by farms with and without pasture is shown on the Figure 1. Farms providing animals with access to pasture obtain higher net farm income than farms not providing animals with access to pasture. The difference is 4.8 EUR/100 kg ECM. It is a very significant positive impact. Providing animals with access to pasture is resulting in an additional net farm income of 9600 EUR per year for farm maintaining 25 dairy cows and producing 200 thous. kg ECM. It might be supposed, that this result is related both, to improved health status of animals, and lower costs of feeding. Keeping dairy cows year-round inside the building raises many implications



**Figure 1. Net farm income depending on access to pasture**

*Rysunek 1. Dochód rolniczy netto w zależności od dostępu do pastwiska*

Source: own study

*Źródło: opracowanie własne*

**Table 1. Culling rate and milk yield depending on access to pasture**

*Tabela 1. Współczynnik brakowania krów i wydajność mleczna w zależności od dostępu do pastwiska*

Access to pasture/ Dostęp do pastwiska	Culling rate [%]/ Współczynnik brakowania krów [%]	Milk yield [kg/cow/year]/ Wydajność mleczna [kg/krowa/rok]
Yes/Tak	24.6	7141.5
No/Nie	30.8	8492.8

Source: own study

*Źródło: opracowanie własne*

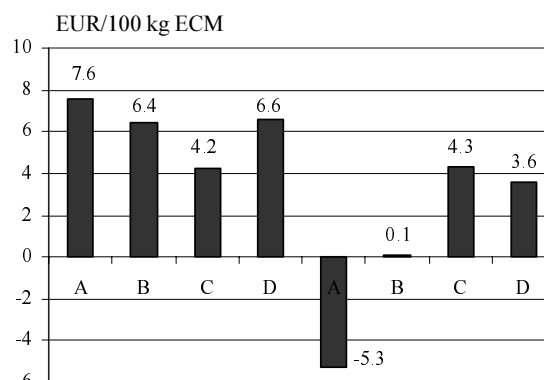
for animal welfare, including: predisposition to various diseases and behavioral changes, limitation of movement, increased stress levels [Sossidou et al. 2004]. Lack of pasture and limitation of movement affects the incidence of lameness [Lewandowski 2008a] and reproduction [Grzegorzak et al. 1983]. On the other hand, regular access to pasture or outdoor run increase health of animals [Keil et al. 2006, Loberg et al. 2004]. Farmers providing animals with access to pasture can achieve significant savings in costs of feeding and veterinary treatment, which translates into increased profitability of milk production.

It is shown in Table 1, that access to pasture influences a culling rate and milk yield. All differences are statistically significant. Farms providing animals with access to pasture are characterized by the culling rate lower by 6.2% (20%) and milk yield lower by 1351.3 kg/cow/year (16%) than farms not providing animals with access to pasture. At the same time farms providing animals with access to pasture obtain higher net farm income. Benefits from pasture are in this case bigger than costs. The limitation in revenue causes by decreased in milk yield is recompensed by savings in costs of treatment and feeding.

The mean net farm income obtained by groups of farms isolated due to access to pasture and milk yield is shown on the Fig. 2. Not all differences are statistically significant. Farms not providing animals with access to pasture and characte-

rized by the lowest milk yield obtain net farm income lower than all other groups of farms, except those not providing animals with access to pasture and characterized by the second lowest milk yield. The difference is about 8.9-12.9 EUR/100 kg ECM per year. There are higher costs of feeding and veterinary treatment in the case of farms not providing animals with access to pasture. In the same time farms from the analyzed group do not receive benefits from higher milk yield. That causes in negative net farm income. In the case of other groups of farms not providing animals with access to pasture those negative effects are recompensed by higher revenue due to milk yield. Farms not providing animals with access to pasture and characterized by the second lowest milk yield obtain net farm income lower than farms providing animals with access to pasture and characterized by the lowest milk yield. That confirms the conclusion, that access pasture is a very important determinant of net farm income. All other differences in net farm income are not statistically significant. There is no difference in net farm income obtained by farms not providing animals with access to pasture and characterized by the highest milk yield and farms providing animals with access to pasture and characterized by the lowest milk yield. The difference in milk yield is substantial. Furthermore, farms from the first group receive much higher revenues than those from the second group. However, that higher revenues do not guarantee higher net farm income. It is another confirmation of the pasture importance as a determinant of net farm income in milk production.

The mean net farm income derived by farms isolated due to culling rate is shown on the Figure 3. Culling rate is another important factor determining net farm income in milk production. Farms characterized by higher culling rate obtain lower net farm income. The biggest difference is between farms characterized by the lowest and the second lowest culling rate – 3.5 EUR/100 kg ECM. In the case of farm mentioned above it would result in net farm income difference of 7000 EUR per year. The difference between farms characterized by the lowest and the highest culling rate – 6.5 EUR/100 kg ECM – would result in net farm income difference of 13000 € per year. Culling rate could be decreased by providing animals with better conditions, e.g. access to pasture, ability to regular movement, high quality of feed, friendly stuff. Cows living in better conditions produce more milk and are less lucky to get sick or injury. That extends their life. In addition, veterinary costs are also reduced.



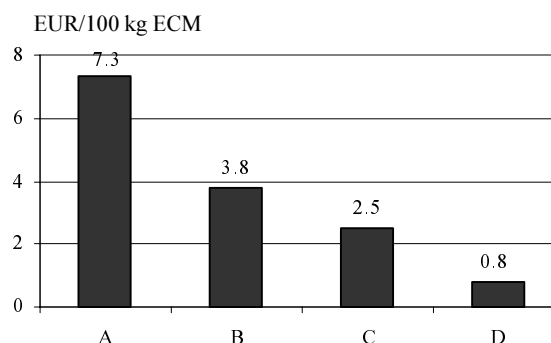
Milk yield [kg/cow/year]/Wydajność mleczna [kg/krowę/rok]:  
A: <7058, B: 7058-8236, C: 8236-9213, D: >9213

**Figure 2. Net farm income depending on access to pasture and milk yield**

*Rysunek 2. Dochód rolniczy netto w zależności od dostępu do pastwiska i wydajności mlecznej*

Source: own study

Źródło: opracowanie własne



Culling rate/Współczynnik brakowania krów

A: 20%, B: 20-28%, C: 28-34%, D: >34%

**Figure 3. Net farm income depending on culling rate**  
*Rysunek 3. Dochód rolniczy netto w zależności od współczynnika brakowania krów*

Source: own study

Źródło: opracowanie własne

## Conclusions

Presented research confirmed the impact of animal welfare on net farm income obtained by dairy farms. Although provisions related to animal welfare are perceived rather as farm development constrains, there are also many advantages from those requirements. It was found, that farms providing animals with access to pasture obtain higher net farm income than farms not providing animals with access to pasture. It results in an additional net farm income of 9600 EUR per year for farm maintaining 25 dairy cows and producing 200 thous. kg ECM. Access to pasture influences a culling rate and milk yield. Farms providing animals with access to pasture are characterized by the culling rate lower by 6.2% (20%) and milk yield lower by 1351.3 kg/cow/year (16%) than farms not providing animals with access to pasture. At the same time farms providing animals with access to pasture obtain higher net farm income, what confirms, that access pasture is a very important determinant of net farm income. There is no statistically significant difference in net farm income obtained by farms not providing animals with access to pasture and characterized by the highest milk yield and farms providing animals with access to pasture and characterized by the lowest milk yield. The difference in milk yield is substantial. However, higher revenues due to higher milk yield do not guarantee higher net farm income. Another important factor determining net farm income in milk production is culling rate. Farms characterized by higher culling rate obtain lower net farm income. All results show, that factors associated with animal welfare, like access to pasture, culling rate and combination of access of pasture and milk yield, have significant impact on net farm income. Dairy farms provide animals with better life conditions can receive savings in costs and benefits in revenues.

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### **Streszczenie**

Celem opracowania było zbadanie wpływu wybranych aspektów dobrostanu zwierząt na dochód gospodarstw rolnych. Dane wykorzystane w badaniu zostały zebrane w ramach programu EDF (European Dairy Farmers) w 280 gospodarstwach reprezentujących 22 kraje europejskie. Do analizy danych wykorzystano metodę analizy wariancji i kowariancji. Pod uwagę wzięto następujące aspekty dobrostanu zwierząt: dostęp do pastwiska, częstotliwość doju, współczynnik brakowania krów, okres międzywycieleniowy i wydajność mleczną. Kombinacje każdego z dwóch aspektów również zostały wzięte pod uwagę. Produkcja mleka jest jedną z najważniejszych gałęzi polskiego rolnictwa. Na dochód rolniczy netto osiąganym przez producentów mleka wpływają m.in. czynniki związane z dobrostanem zwierząt.

Stwierdzono, że gospodarstwa zapewniające zwierzętom dostęp do pastwiska charakteryzują się niższym współczynnikiem brakowania krów i wydajnością mleczną niż gospodarstwa, które nie zapewniają zwierzętom dostępu do pastwiska. Jednocześnie gospodarstwa te uzyskują wyższy dochód rolniczy netto. Zmniejszenie przychodów spowodowane niższą wydajnością mleczną jest rekompensowane przez oszczędności w kosztach. Można przypuszczać, że jest to związane zarówno z poprawą zdrowotności zwierząt, jak i niższymi kosztami żywienia. Potwierdza to, że dostęp do pastwiska jest bardzo ważnym czynnikiem wpływającym na dochód rolniczy netto gospodarstw mlecznych. Innym ważnym czynnikiem jest współczynnik brakowania krów. Gospodarstwa rolne charakteryzujące się wyższym współczynnikiem uzyskują niższy dochód rolniczy netto.

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