

The impact of commercial concentrated feedingstuffs usage on the profitability of milk production

Wpływ żywienia przemysłowymi paszami treściwymi na opłacalność produkcji mleka

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Abstract

Intensification of milk production is associated with an increase in the number of dairy cows and milk yielding. In order to maintain high milk yield and quality of the produced raw material it is very important to adjust the appropriately balanced dose of feeds. Production of good quality own roughage is a valuable and cheap source of food for animals, but it may be insufficient to provide high milk yielding. As a result, it is necessary to buy commercial concentrated feedingstuffs (mainly protein concentrates and concentrated compounds) which may lead to an increase of production costs. Intensification of milk production in the economic aspect is justified only in the case of a simultaneous increase in the profitability of this production, which is the relation of the production value and incurred costs. For the economic purpose of milk production the way of feeding the dairy cows should also result from economic calculation and the purchase of commercial feedingstuffs must be economically justified. This article attempts to answer the question whether the increased consumption of commercial concentrated feedingstuffs and increased direct costs are justified by achieved economic results from milk production. The accountancy data were collected according to the methodology of the AGROKOSZTY and Polish FADN system among dairy farms. Grouping of the surveyed farms concerned a level of commercial feedingstuff quantity which (as shown by statistical analysis) was strongly correlated with milk yielding. The designated groups (with small level and high level of usage of commercial feedingstuffs) were analysed in terms of direct costs and labour input as well as the level of income from the activity. The economic results of the surveyed farms showed that the higher costs incurred for the purchase of commercial feedstuffs in the group with high usage of commercial feedingstuffs (average herd in the group was 30 dairy cows with milk yielding of 6,000 liters per cow) did not allow to achieve much better economic results than in the group with small usage of commercial feedstuffs (average herd in group was 15 cows with milk yielding of 5,200 litres per cow).

Keywords: commercial feedingstuffs, milk production, profitability

Streszczenie

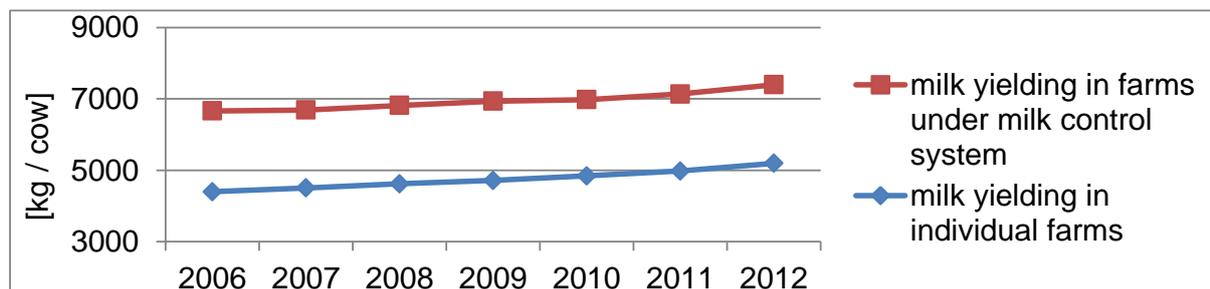
Intensyfikacja produkcji mleka jest bezpośrednio związana ze wzrostem liczby krów mlecznych i ich wydajności jednostkowej. W celu utrzymania wysokiej wydajności mlecznej i wysokiej jakości wytwarzanego surowca bardzo ważne jest, aby dostosować odpowiednio zrównoważoną dawkę żywieniową. Produkcja dobrej jakości własnych pasz objętościowych jest cennym i tanim źródłem pokarmu dla zwierząt, ale może być niewystarczająca, aby zapewnić wysoką wydajność mleczną. W rezultacie, koniecznością może być zakup przemysłowych pasz treściwych, głównie pełnoporcjowych pasz i koncentratów białkowych, które mogą prowadzić do zwiększenia bezpośrednich kosztów produkcji mleka. Intensyfikacja produkcji mleka w aspekcie ekonomicznym jest uzasadniona tylko w przypadku jednoczesnego wzrostu opłacalności tej produkcji, która jest relacją poniesionych kosztów do wartości produkcji. Z tego powodu sposób żywienia krów mlecznych powinien również wynikać z kalkulacji ekonomicznej a zakup pasz przemysłowych musi być ekonomicznie uzasadniony. Niniejszy artykuł jest próbą odpowiedzi na pytanie, czy zwiększone zużycie treściwych pasz przemysłowych i związany z tym wzrost kosztów bezpośrednich mają uzasadnienie w osiągniętych ekonomicznych wynikach z produkcji mleka. Dane rachunkowe zostały zebrane zgodnie z metodologią systemu AGROKOSZTY i Polskiego FADN wśród gospodarstw mlecznych. Zastosowano grupowanie badanych gospodarstw według poziomu zużycia przemysłowych pasz treściwych, które jak wynika z analizy statystycznej, było silnie skorelowane z uzyskiwaną wydajnością mleczną. Wyznaczone grupy (o małym i wysokim poziomie wykorzystania przemysłowych pasz treściwych) poddane zostały analizie pod względem kosztów bezpośrednich i nakładu pracy, jak i poziomu dochodu z działalności. Wyniki badań wykazały, że wyższe koszty poniesione na zakup przemysłowych pasz treściwych w grupie gospodarstw (utrzymujących średnio 30 krów mlecznych o wydajności jednostkowej 6000 litrów) nie skutkowało uzyskaniem znacznie lepszych wyników ekonomicznych niż w grupie z niewielkim zużyciem przemysłowych pasz treściwych (utrzymujących średnio 15 krów o wydajności jednostkowej 5200 litrów).

Słowa kluczowe: opłacalność, produkcja mleka, przemysłowe pasze treściwe

Introduction

Recently the dairy sector in Poland underwent significant changes due to restructuring processes. The farms taking part in marketable milk production often had to undergo major modernisations, which was directly reflected in the concentration and increase in the scale of production. The scale of production is recognised as one of the major factors determining the economic effects of milk production. On the other hand, the concentration process of dairy cattle breeding leads to a decrease in the unit costs of production and an increase in the efficiency and competitiveness of milk production (Komorowska, 2006). Dairy farms in Poland are more and more specialised, whereas the concentration processes and an increased scale of marketable production lead to a decreasing number of dairy

farms. It is estimated that in 2004-2012 the number of dairy farms supplying raw milk to the market dropped by 60.6%. The reduction of herds and the decrease of dairy cows population in Poland is compensated by the systematic increase of their milk yielding - Figure 1.



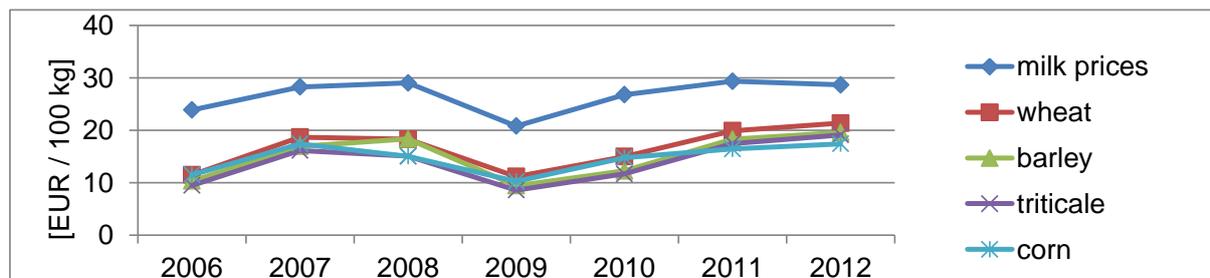
source: International Committee for Animal Recording (2013a and 2013b), www.icar.org

Figure 1. Milk yield in individual farms and under milk control farms in Poland

Figure 1. Wydajność mleczna w gospodarstwach utrzymujących stada krów pod oceną wartości użytkowej w Polsce

The basis of adult cattle feeding is roughage, succulent and dry feedstuffs, while concentrated feedstuffs supplement the dose of feed. Although, maintaining a high milk yield with production based on roughage is linked to the higher level of usage of concentrated feedstuffs (Ziętara, 2007), which often causes an increase in the usage of commercial feedstuffs from purchase. Concentrated feedstuffs are mainly used to ensure the necessary supply of nutrients and bioactive compounds to meet the food needs of highly productive animals.

Together with the development of the dairy sector, the whole commercial feed market displayed a significant dynamic of production growth and currently it presents an increasing quality of produced feedstuffs. Traditionally concentrated feedstuffs are a mix of feedstuff and feed material, such as grain and products of its processing e.g. ground grain, bran, legume seeds, and by-products of the oil-mill industry such as post extraction ground and oil cakes (Brzóska and Podkówka, 2004). The demand for commercial feedstuffs in cattle feeding depends on many factors. Largely, the level of usage of concentrated feedstuffs is dependent on the quality and nutritional value of roughage used for feeding. The higher the quality and value of roughage, the more limited the usage of concentrated feedstuffs. Another important determinant is the level of cow profitability, as well as the structure and size of the heard. The production technology also plays an important role, including the cow keeping and feeding system. The influence of the correct balance of feed dose is important as regards meeting the demand for raw milk quality for the processing. It should be noted that the economic justification for usage of commercial concentrated feedstuffs in cattle feeding will be dependent on the relation of the selling price of raw milk and the price of cereal components, which form the basis for compound feedingstuffs - Figure 2.

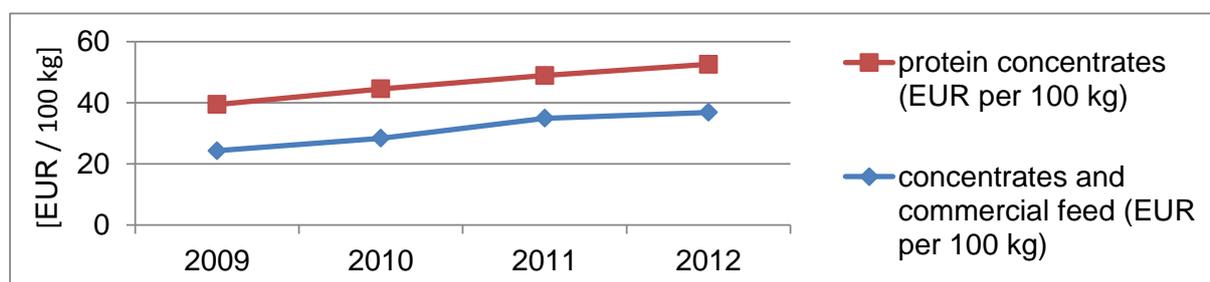


source: GUS, var. bulletins

Figure 2. Selling prices for milk and cereal components in Poland

Figure 2. Cena sprzedaży mleka I ziarna zbóż w Polsce

The increase in cereal prices cause the prices of finished products in the feed industry to rise as well, which causes a more strict and economic cattle feeding with purchased concentrated feedstuffs. The prices of protein concentrates and compound feedingstuffs show a fixed increasing trend presented in Figure 3.



source: GUS, unpublished data

Figure 3. Prices for concentrated feedingstuffs for dairy cows in Poland

Figure 3. Ceny koncentratów dla krów mlecznych w Polsce

Recently the situation on the dairy market was not that good for milk producers. The constantly raising costs of milk production, which overlapped with the constantly dropping prices of milk, were observed. Unfavourable relations of production costs and milk prices should force dairy cow breeders to analyse the costs of milk production. In such conditions, milk producers search for possibilities of reducing the costs of milk production while maintaining the optimal conditions of milk production.

Scientific research confirms the dependency of income on the possibilities of reducing direct production costs. Those costs, mainly the costs of feedstuffs usage, play a significant role in shaping the profitability of dairy farms, while the economic manner of feeding is the main factor in making decisions on dairy farms. The study made an attempt to answer the question: if the costs incurred on purchasing concentrated commercial feedstuffs are economically justified and result in significant effectiveness of milk production?

Materials and methods

Real accountancy data, collected in 2009 on farms which maintained dairy cows, formed grounds for those observations. The surveyed farms kept agricultural accountancy according to the Polish FADN system. First of all they were market-oriented entities, as well as economically stronger than the average farms in the country. Based on usage level of commercial feedingstuffs (protein concentrates and compounds) two groups of farms were designated and chosen for the study. Group A consisted of 42 surveyed farms with a high (about 50%) usage of commercial concentrated feedstuffs, while in group B (42 farms) had a trace (less than 0.1%) usage level of commercial concentrated feedstuffs.

Specific accountancy data were collected according to the systematic assumptions of AGROKOSZTY system. As regards the researched activity of dairy cows, a gross margin methodology was used (Augustyńska-Grzymek et al., 2000). It is the first income category, when calculating it the direct costs incurred on the production are deducted from the production value. In case of the dairy cow activity, the production value (per one dairy cow) makes up an aggregate value of sold milk, weaned calves and cull dairy cows. Average annual transaction prices are used for evaluating production value. Production value does not include the value of manure and slurry which are produced on the farm.

Direct costs in case of dairy cows, include: livestock replacement, feedingstuffs purchased and produced on the farm, rents for the use of forage area (rented for a period up to 12 months), animal insurance, veterinary medicines and services and specialist costs (e.g. specialist expenses, services as well as hiring labour force for specialised tasks). Moreover, all own- and paid- labour inputs related to works directly linked to dairy cow activity is registered. This helps to specify the labour intensity of the dairy cows activity in the accounting year. Information concerning e.g. forage area, annual average number of dairy cows, from accounting data collected in the same farm for the FADN system are gathered. The gross margin without the additional payment is calculated as follows:

Total production value – Direct costs = Gross margin without subsidies

The article made also an attempt to specify the direct profitability, as a relation of production value to the direct costs (in percent). Moreover, the study used selected indexes of economic performance, i.e. competitiveness of the gross margin (as a relation of total direct costs to the gross margin without subsidies), the labour intensity (as a relation of total labour input to the 1 liter of produced milk) and economic labour productivity (as a relation of total production value to the 1 hour of labour input).

Results and discussions

The general informations concerning the designated groups of farms with high usage of commercial feedstuffs (group A) and low usage of commercial feedstuffs (group B) were presented in Table 1.

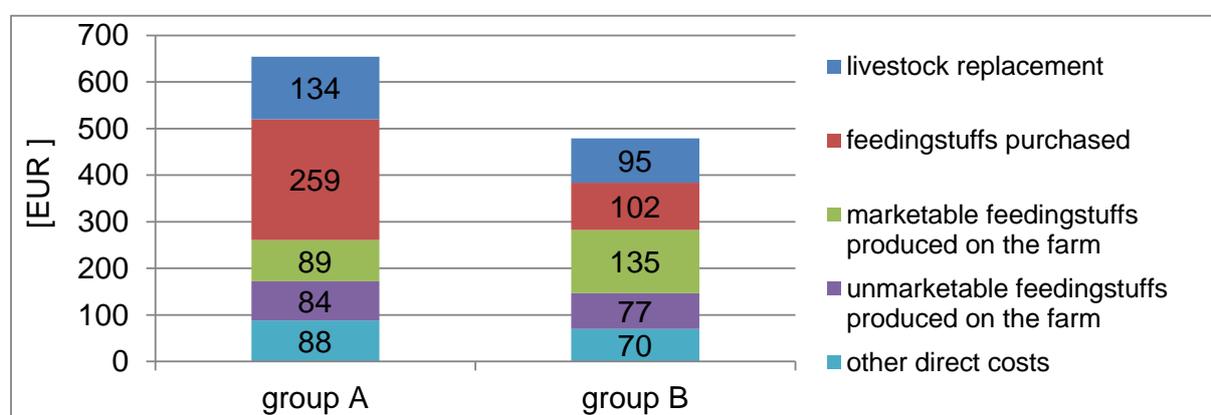
Table 1. General informations of surveyed groups with different usage of commercial feedingstuffs in 2009

Table 1. Charakterystyka badanych grup gospodarstw o różnym zużyciu pasz przemysłowych w 2009 roku

Specification		Group A	Group B
Number of surveyed farms		42	42
Forage area	(ha per cow)	0.56	0.58
Annual average number of dairy cows	(heads per farm)	30	15
Milk yielding	(liters per cow)	6037	5236
Annual selling milk price	(EUR per liter)	0.23	0.22
Total labour input	(hours)	108	161

source: author's own compilation based on the data of the Agrokoszty system

Both groups (A and B) had at their disposal similar forage area, although in the group A the dairy cow's herd was two times larger. It was connected with lower level of total labour input (32.9% less operating time spent on each dairy cow than in group B). If we look at the milk yielding, in farms of group A milking (per cow) was higher by 15.3% than in group B. Additionally, for the purpose of these considerations, the relationship between the amount of commercial concentrated feedingstuff (protein concentrates and concentrated compounds) and milk yield of cows in the entire surveyed sample (167 dairy farms) in 2009 was examined by statistical methods (Tatarzycki, 2007). Pearson correlation factor for these two variables is 0.52 which indicates a significant positive correlation between the variables (the correlation is statistically significant at the significance level of 0.05).

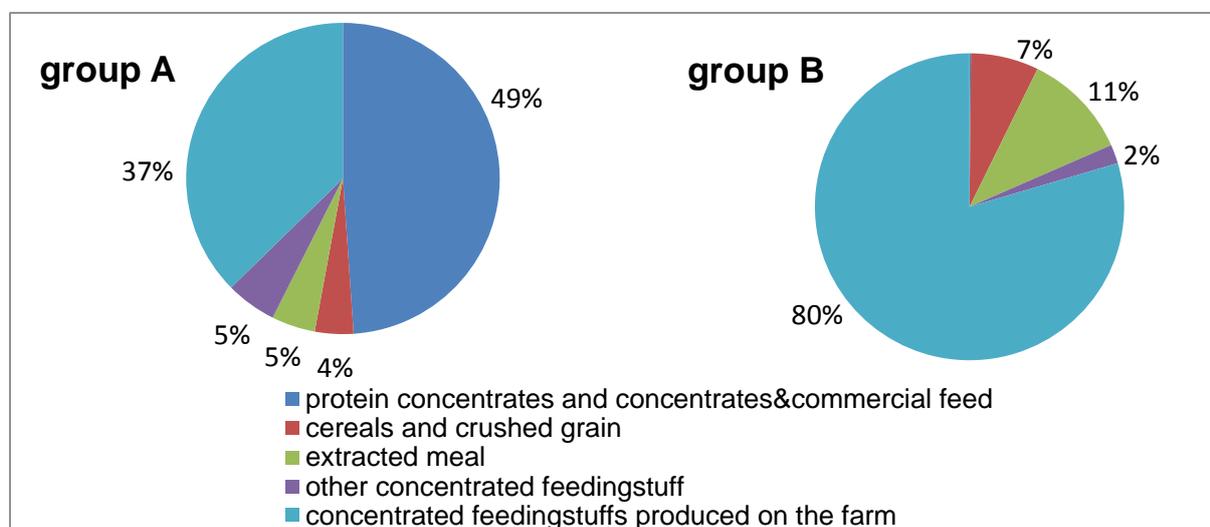


source: author's own compilation based on the data of the Agrokoszty system

Figure 4. Direct costs of milk production (per dairy cow) in surveyed groups with different usage of commercial feedingstuffs in 2009

Figure 4. Koszty bezpośrednie (na krowę mleczną) w badanych grupach gospodarstw o różnym zużyciu pasz przemysłowych w 2009

Among direct costs of milk production (Figure 4), costs of total feedingstuffs had the biggest share – 66.1% and 65.6% respectively for the group A and the group B. Farmers in the group A spend on average 2.5 times more money on purchasing of feedingstuffs than in the group B. In general, per dairy cow, the expenditures in the group A was higher by 175 Euro.



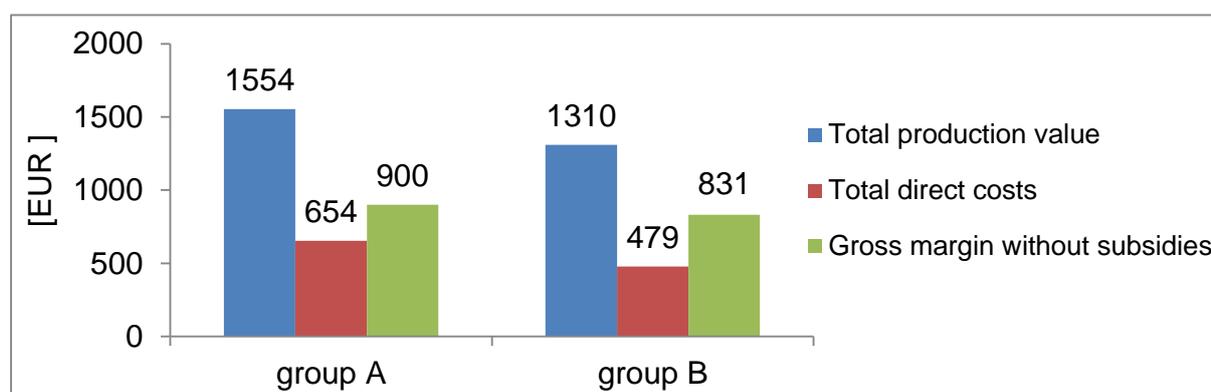
source: author's own compilation based on the data of the Agrokoszty system

Figure 5. The structure of direct costs incurred in concentrated feedingstuffs in surveyed groups with different usage of commercial feedingstuffs in 2009

Figure 5. Struktura kosztów bezpośrednich w badanych grupach gospodarstw o różnym zużyciu pasz przemysłowych w 2009

Differences between the costs of feeding in the surveyed groups are more visible due to the structure of direct costs of concentrated feedingstuffs. In the case of farms in group A crucial impact on the level of these costs was the cost of purchased feedingstuffs but also a large share was informative feed produced on the farm. In group B farmers used the concentrated feedingstuffs from own production and it became the biggest costs of concentrated feedingstuffs – Figure 5.

The level of gross margin without subsidies in surveyed groups was shown on the figure 6. The group A with the higher total production value (due to higher milk yielding) achieved the higher level of the gross margin (without subsidies) but only 8.3% higher than in the group B. The direct costs of milk production in the group A were higher (mainly due to higher costs of commercial feedingstuffs) by 36.5% than in the group B.



source: author's own compilation based on the data of the Agrokoszty system

Figure 6. The gross margin without subsidies in surveyed groups with different usage of commercial feedingstuffs in 2009

Figure 6. Nadwyżka bezpośrednia bez dopłat w badanych grupach gospodarstw o różnym zużyciu pasz przemysłowych w 2009

In order to assess the economic efficiency a few measures was used (Table 2). Due to lower level of direct costs the direct profitability index and the competitiveness of gross margin index were better in the group B. The farmers from that group spent by 20.5% less money to obtain 1 EUR of gross margin (without subsidies). In the group A the indexes of labour intensity and economic labour productivity were much more better due to lower labour input involved in the production.

Table 2. The selected economic efficiency measures of milk production in surveyed groups with different usage of commercial feedingstuffs in 2009

Table 2. Wybrane wskaźniki efektywności ekonomicznej w badanych grupach gospodarstw o różnym zużyciu pasz przemysłowych w 2009

Specification		Group A	Group B
Total production value / Total direct costs (direct profitability index)	(%)	238	274
Total direct costs / Gross margin without subsidies (competitiveness of gross margin index)	(EUR)	0.73	0.58
Total labour input / 1 liter of produced milk (labour intensity index)	(hours)	0.018	0.031
Total production value / 1 hour of labour input (economic labour productivity index)	(EUR)	14.33	8.14

source: author's own calculation based on the data of the Agrokoszty system

Conclusions

The results of the study in groups of dairy farms with diversified consumption of commercial concentrated feedingstuffs (protein concentrates and concentrated compounds) show that:

- 1) in group A (with the higher consumption of commercial concentrated feedingstuffs) were calculated:
 - higher gross margin per dairy cow (but only by 8.4%),
 - lower labour intensity and labour productivity indexes.
- 2) in group B (with the slight consumption of commercial concentrated feedingstuffs) were calculated:
 - the higher direct profitability index (due to lower direct costs by 26.8%),
 - higher competitiveness of gross margin (calculated per dairy cow),
 - lower direct costs incurred per 1 liter of produced milk.

The research conducted shows that the profitability of milk production strongly depended on the direct costs level in case of not so large difference in milk yielding level (only by 15.3%) between surveyed groups of farms. The use of commercial concentrated feedingstuffs and associated higher direct costs must be reflected in a corresponding increase in the appropriate high milk yield. In dairy farms with average milk yield (not differed significantly from the average milk yielding) it is more economically justified to provide additional nutrition of concentrated feedstuffs based on own production at the farm or purchasing less expensive commercial feedingstuffs (i.e. food industry by-products).

The analysis of direct costs is crucial because the economic system of feeding is the main element of managing the milk production. Reasonable usage of concentrated feedstuffs is beneficial for maintaining a high and stable milk production, characterised by a regular composition and full technological suitability for the processing needs. It is important to note that in such conditions the genetic potential of animals is better utilized with the simultaneous limitation of metabolic illnesses and the beneficial impact on the health condition, which is directly connected with the lower costs of animal medicines and veterinary services. Excessive feeding with concentrated feedstuffs may often results in disturbance in breeding and in increasing of the costs connected with feeding. In such conditions milk production becomes less profitable and increasing milk yield of cows causes the reduction of the utilization period of cows, which may affect the higher costs of livestock replacement.

The economic justification of usage of high level of concentrated feedstuffs is proved by other study that indicate a close correlation between the usage of concentrated commercial feedstuffs and the high level of cow's milk yielding, as well as large scale of production on the farm together with the best use of own forage area ensuring appropriate quality of roughage.

References

- Augustyńska-Grzymek, I., Goraj, L., Jarka, S., Pokrzywa, T., Skarżyńska, A. (2000) Metodyka liczenia nadwyżki bezpośredniej i zasady typologii gospodarstw rolniczych. FAPA, Warszawa.
- Brzóska, F., Podkówa, W. (2004) Żywnienie zwierząt i paszoznawstwo. Wyd. PWN, Warszawa, p.p. 32–38.
- Główny Urząd Statystyczny (2007) Skup i ceny produktów rolnych w 2006 r. [Online] Warszawa: GUS. Available at: http://www.stat.gov.pl/gus/5840_1725_PLK_HTML.htm?action=show_archive [Accessed 10 October 2013].
- Główny Urząd Statystyczny (2008) Skup i ceny produktów rolnych w 2007 r. [Online] Warszawa: GUS. Available at: http://www.stat.gov.pl/gus/5840_1725_PLK_HTML.htm?action=show_archive [Accessed 10 October 2013].
- Główny Urząd Statystyczny (2009) Skup i ceny produktów rolnych w 2008 r. [Online] Warszawa: GUS. Available at: http://www.stat.gov.pl/gus/5840_1725_PLK_HTML.htm?action=show_archive [Accessed 10 October 2013].
- Główny Urząd Statystyczny (2010) Skup i ceny produktów rolnych w 2009 r. [Online] Warszawa: GUS. Available at: http://www.stat.gov.pl/gus/5840_1725_PLK_HTML.htm?action=show_archive [Accessed 10 October 2013].
- Główny Urząd Statystyczny (2011) Skup i ceny produktów rolnych w 2010 r. [Online] Warszawa: GUS. Available at: http://www.stat.gov.pl/gus/5840_1725_PLK_HTML.htm?action=show_archive [Accessed 10 October 2013].
- Główny Urząd Statystyczny (2012) Skup i ceny produktów rolnych w 2011 r. [Online] Warszawa: GUS. Available at: http://www.stat.gov.pl/gus/5840_1725_PLK_HTML.htm?action=show_archive [Accessed 10 October 2013].
- Główny Urząd Statystyczny (2013) Skup i ceny produktów rolnych w 2012 r. [Online] Warszawa: GUS. Available at: http://www.stat.gov.pl/cps/rde/xbcr/gus/rl_skup_ceny_produkow_rolnych_2012.pdf [Accessed 10 October 2013].
- International Committee for Animal Recording (2013a) www.icar.org. [Online] Available at: http://www.survey-icar.org/cow_survey/Poland_PFHB/01_productionpol_interface/Results/results_page.asp [Accessed 10 October 2013].
- International Committee for Animal Recording (2013b) www.icar.org. [Online] Available at: http://www.survey-icar.org/cow_survey/Poland_PFHB/041_all_breeds_cowspol_interface/Results/results_page.asp [Accessed 10 October 2013].

Komorowska, D. (2006) Koncentracja produkcji mleka w Polsce Zeszyty Naukowe
SGGW - Ekonomia i Organizacja Gospodarki Żywnościowej, nr 61.

Tatarzycki, P. (2007) Statystyka po ludzku. Wydawnictwo Złote Myśli.

Ziętara, W. (2007) Ekonomiczne i organizacyjne problemy produkcji mleka przy
wysokiej wydajności mlecznej krów. Roczniki Nauk Rolniczych, Seria G, t.
93, z. 2.