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## MILK PURCHASE IN TWO DISTRICT DAIRY COOPERATIVES IN THE WIELKOPOLSKA REGION IN 2003-2005

**Summary.** The aim of the study was to analyse milk purchase in the years 2003-2005 in terms of selected factors, in two District Dairy Cooperatives based in the Wielkopolska region. In the analysed period in Dairy Cooperatives A and B more intensive restructuring processes of the raw material base were observed in comparison to changes occurring throughout the country. In the years 2003-2005 the number of suppliers of Dairy Cooperatives A and B decreased, while the volume of purchased milk was gradually increasing. In successive years the number of suppliers selling annually the lowest amounts of milk was decreasing, while the percentage of bigger suppliers was increasing. The percentage of purchased raw material of the highest quality class “extra” was increasing. The most advantageous value of the coefficient of seasonality of milk purchase was found for Dairy Cooperative A. Purchasing prices for milk in Dairy Cooperatives A and B were higher than national prices, which was most probably determined by the high percentage of extra class milk in the purchased milk, as well as good financial standing of both cooperatives.

**Key words:** milk purchase, dairies

### Introduction

Milk production, both worldwide and in Poland, belongs to the primary sectors of animal production. Poland ranks 8th in milk production worldwide (2.7% share), while in the European Union-25 with the production level of approx. 11.8-11.9 million ton milk annually Poland ranks 4th after Germany, France and Great Britain. The first two years of the functioning of Polish dairy industry within the European Union were very advantageous. Export developed, increasing to 2 billion l raw milk equivalent and the surplus in foreign trade of dairy products almost doubled in comparison to 2003, exceeding the value of 660 million euros (SEREMAK-BULGE 2006 a).

However, the situation on the European milk market causes some concern. Milk quotas cause certain anxiety among milk producers and employees in the dairy industry. Poland was granted the wholesale quota of 8.5 million ton milk for the years 2004/5-2007/8, the quota of direct sale of approx. 0.5 million ton and the reserve quota in the same amount.

At present it turned out that in Poland approx. 20 thousand farmers have not been certified to sell milk. There will be two additional conditions to be met in the future, i.e. the adaptation of the farm to the environmental protection standards and assurance of animal welfare. Most probably it will be very difficult for the smallest suppliers (WIECZORKIEWICZ 2007).

In 2004 the reform was initiated in the system of milk market regulation in the European Union. It consists in the reduction of market support through a reduction of state intervention purchase prices, as well as the levels of direct subsidies compensating for the price drop and the maintenance of milk quotas until 2014/15 (SEREMAK-BULGE 2006 b). The objective of this reform is to gradually reduce prices in the EU member countries to the world price levels and to improve competitiveness of the EU dairy sector to facilitate gradual limitation of market support and to have the milk market more and more subjected to market economy principles.

In EU countries intensive restructuring processes occur at stable production levels. The population of dairy cattle is decreasing and milk yields of cows are increasing, the number of farms keeping cows is decreasing and as a result the concentration of milk production and supplies is increasing and the technological efficiency of milk production is improving.

When analysing milk purchase in selected District Dairy Cooperatives it may be interesting to compare the direction of changes occurring in these purchasing entities with processes observed in the dairy sector of a given region as well as those occurring nationwide.

The aim of the study was to analyse milk purchase in the years 2003-2005 in terms of selected factors in two District Dairy Cooperatives in the Wielkopolska region.

## **Material and methods**

Source material for the study consisted of milk purchase documentation for the years 2003-2005 from District Dairy Cooperatives A and B based in the Wielkopolska region (names of those District Dairy Cooperatives were replaced with letter symbols). Data concerned the number of suppliers and the amounts of purchased milk, quality of purchased milk, the structure of milk purchase in terms of the share of suppliers in supply ranges, the share of milk purchase in quarters of the year, the value of the coefficient of seasonality in milk purchase (the ratio of the highest monthly supply to the lowest one within a year), and monthly milk prices. All the data were analyzed in terms of year and they were supplemented with nationwide data.

In the statistical calculations the *FREQ* procedure of the SAS®... (2002) statistical software package was used.

## Results and discussion

Table 1 presents data concerning the number of suppliers and the volume of milk purchase in Dairy Cooperatives A and B, and in Poland. The number of milk suppliers of Dairy Cooperatives A and B and nationwide in successive years was decreasing systematically. Assuming the number of entities supplying milk in 2003 as 100%, it may be stated that in 2005 a bigger number of suppliers of Cooperative B was eliminated (16.95%) than the number of milk producers selling milk to Cooperative A (a decrease by 7.96%). When comparing data for the analysed period a bigger dynamics of decrease in the number of milk suppliers was observed nationwide, since in 2005 (284 thousand) there were by 20% fewer suppliers than in 2003 (355 thousand).

Table 1. The number of suppliers and milk purchase at Dairy Cooperatives (OSM) A and B and in Poland in the years 2003-2005

Tabela 1. Liczba dostawców oraz skup mleka w OSM A i B oraz w Polsce w latach 2003-2005

Year	OSM A				OSM B				Poland			
	suppliers		milk purchase		suppliers		milk purchase		suppliers		milk purchase	
	N	%	million (l)	%	N	%	million (l)	%	thousand	%	million (l)	%
2003	540	100	19.368	100	4 939	100	102.629	100	355	100	7 316	100
2004	509	94.26	20.495	105.82	4 246	85.47	114.539	111.60	310	87.32	7 769	106.19
2005	497	92.04	23.645	122.08	3 608	73.05	135.060	131.60	284	80.00	8 583	117.32

When analysing milk purchase an opposite trend is observed, i.e. an increase in the amount of purchased raw material in successive years of the study. In Poland in 2005 (8583 million l) by 17.32% more milk was purchased than in 2003 (7316 million l), similarly for Cooperatives B and A the purchase of milk was by 31.6 and 22.08% higher. SEREMAK-BULGE (2006 a) was of the opinion that in spite of the progress in the organization and technology of milk production after 1989 the distance between Poland and the EU countries in terms of the organization and technology of milk production has not decreased. In Poland in 2004 the statistical cow herd consisted of 3.9 animals, while in EU-25 it was 16.4 animals. The Polish head count of dairy cows constitutes approx. 12% head count in the EU, while the volume of milk production amounts to only 8.4% milk produced in the extended European Union. In Poland in 2004 the average purchase of milk per one entity was 26.2 thousand ton, and in the Wielkopolska region it was 29.2 thousand ton. In the years 2002-2005 the number of wholesale suppliers of milk decreased by 22%, while the head count of cows decreased by 3.5%, whereas mean milk yield increased by almost 14% (BABUCHOWSKI and SEREMAK-BULGE 2005).

When comparing quality classes of purchased milk in the analysed period in Dairy Cooperatives A and B (Table 2) a systematic decrease was observed in the share of class I and unclassified milk in milk purchase, with a simultaneous increase in the amount of raw material of class extra. It needs to be emphasized that the quality of milk

Table 2. Quality classes of purchased milk at Cooperatives (OSM) A and B in the years 2003-2005

Tabela 2. Klasy jakościowe skupionego mleka w OSM A i B w latach 2003-2005

Year	Quality classes of milk					
	extra		class I		unclassified	
	OSM A (%)	OSM B (%)	OSM A (%)	OSM B (%)	OSM A (%)	OSM B (%)
2003	51.47	87.90	38.80	9.00	9.73	2.30
2004	88.79	93.30	11.14	5.00	0.07	1.70
2005	99.12	97.00	0.36	2.50	0.52	0.50

purchased by Dairy Cooperative A improved considerably, as in 2003 only 51.7% milk was classified as class I, while in 2005 it was already over 99%. In both dairies in 2005 a low share of unclassified milk (0.5%) was recorded in the purchase volume. In 2005 the percentage of extra class milk purchased by Polish dairies was over 90%.

Tables 3 and 4 present the structure of milk purchase at Dairy Cooperatives A and B in terms of the share of selling entities in individual supply ranges. Within several years of the study in both economic entities identical trends are observed, i.e. the share of producers selling lowest amounts of raw material decreases, while the percentage of suppliers offering the biggest amounts of milk increases. An increase in the share of milk suppliers in 2005 in comparison to 2004 was observed starting from the annual supply amounting to over 18 thousand l in Cooperative A and in B from 15 thousand l. On average, in 2004 nationwide one supplier sold annually to a dairy cooperative 21.4 thousand l milk, while in the Wielkopolska region – over two times more, which indicates high concentration of production in this province. In the Wielkopolska region a bigger number of producers is also found, which supply to the dairy over 400 thousand kg milk annually (236 suppliers). The number of suppliers per one purchasing entity (644) is also by 50% lower than the national mean (SEREMAK-BULGE and HRYSZKO 2006). KUPCZYK (2006) expressed a positive opinion on the restructuring processes occurring in the Polish dairy sector and raw material base, and thus increased concentration

Table 3. The structure of milk purchase at Dairy Cooperative A in terms of the share of suppliers in individual purchase ranges in the years 2003-2005

Tabela 3. Struktura skupu mleka w OSM A według udziału dostawców w poszczególnych przedziałach w latach 2003-2005

Year	Percentage of suppliers in purchase ranges (l)				
	≤ 18 000	18 001-36 000	36 001-72 000	72 001-144 000	> 144 000
2003	39.82	29.63	19.82	7.95	2.78
2004	31.63	30.65	22.59	11.98	3.15
2005	22.94	30.78	27.16	13.28	5.84

Table 4. The structure of milk purchase at Dairy Cooperative B in terms of the share of suppliers in individual purchase ranges in the years 2003-2005

Tabela 4. Struktura skupu mleka w OSM B według udziału dostawców w poszczególnych przedziałach w latach 2003-2005

Year	Percentage of suppliers in purchase ranges (l)					
	≤ 14 999	15 000-29 999	30 000-44 999	45 000-59 999	60 000-75 000	> 75 000
2003	57.76	24.44	8.75	3.77	1.82	3.46
2004	46.66	26.59	12.27	5.84	3.09	5.56
2005	30.76	31.26	16.30	8.01	4.60	9.06

of herds, changes in the structure of supplies and improved quality of purchased milk. In the opinion of that author changes towards concentration and improved quality are also consistent with trends found previously in EU-15, where until recently it was believed that it is advisable for a farm to produce at least 50 thousand l milk annually and this guaranteed decent profits to milk producers. At present as a result of globalization of scientific and technological progress this limit increased to 200 thousand l/year.

A characteristic phenomenon in milk production are seasonal fluctuations. Changes in production, and as a result also in milk purchase and supply on the market cause a disproportion in the entire dairy economy. The phenomenon of seasonality of milk production and supply is found in all countries, also those well-developed, but in Poland it is extremely high. The most important factors promoting seasonality of milk production include lactation period, genetic and physiological factors, date of calving, feeding regime and management of cows, as well as seasonality of increase in the head count of milking cows. As it was shown in studies in Poland most cows calve in the 2nd and 3rd quarter of the year, and only approx. 40% in the 1st and 4th quarters. In cows calving in the autumn or winter total milk production is usually by 10-20% higher than in those calving in the spring-summer season (JUSZCZYK 2001). Table 5 presents the share of purchased milk in terms of quarters of the year. In Poland the percentage of milk purchased in the 2nd and 3rd quarters of the year in relation to the 1st and 4th quarters was similar, amounting to 54.7 to 45.2% in 2003 and 2005, and 54.2 to 45.7 in 2004. At Dairy Cooperative A between 2004 and 2005 a considerable decrease was observed in

Table 5. The share of milk purchase in the spring-summer and autumn-winter seasons in Dairy Cooperatives (OSM) A and B and in Poland in the years 2003-2005 (%)

Tabela 5. Udział skupu mleka w okresie wiosenno-letnim i jesienno-zimowym w OSM A i B oraz w Polsce w latach 2003-2005 (%)

Years and quarters	OSM A			OSM B			Poland		
	2003	2004	2005	2003	2004	2005	2003	2004	2005
II and III	58.9	58.7	51.7	53.92	53.6	54.46	54.7	54.2	54.7
I and IV	49.1	49.3	48.2	46.08	46.24	45.54	45.2	45.7	45.2
Differences	9.8	9.4	3.5	7.84	7.36	8.92	9.5	8.5	9.5

the difference between milk purchased in the 2nd and 3rd quarters in relation to that purchased in the 1st and 4th quarters (9.4 to 3.5%, respectively). In turn, in Dairy Cooperative B, when comparing 2004 with 2005, an opposite trend was observed, i.e. a slight increase in the difference between the share of milk purchased in the analyzed quarters.

An essential parameter in the analysis of seasonality of milk purchase is the index of seasonality (Table 6). It is the ratio of the highest purchase level in a month to the lowest. The most advantageous value of this parameter (1.21) was found for Dairy Cooperative A, and the lowest (1.42) for Cooperative B in 2005. The trend in changes of this index in the course of 3 years was disadvantageous for Dairy Cooperatives A and B. In Poland this parameter remains similar, amounting in 2005 to 1.41. According to JUSZCZYK (2001) a decrease of this index below 1.5 is an indicator of a proper development trend in milk production and purchase, decreasing the seasonality of purchase.

Table 6. The coefficient of seasonality in milk purchase in Dairy Cooperatives (OSM) A and B and in Poland in the years 2003-2005

Tabela 6. Wskaźnik sezonowości w skupie mleka w OSM A i B oraz w Polsce w latach 2003-2005

Year	OSM A	OSM B	Poland
2003	1.17	1.34	1.42
2004	1.19	1.36	1.36
2005	1.21	1.42	1.41

Table 7 contains average monthly purchasing prices of milk for Dairy Cooperatives A and B, and nationwide. The lowest milk prices were recorded in the spring and summer months, while the highest in winter months. It was shown that in the years 2003-2005 mean milk purchasing prices in both analysed purchasing entities were higher than national prices. The difference between a higher price paid for 1 l milk by Cooperative A and the mean national price in 2003 was 8 grosz, while in 2004 7 grosz, with Cooperative B offering more for 1 l milk. In 2005 both processing plants purchased milk on average at identical prices, i.e. 0.96 grosz per 1 l and it was by 4 grosz more than the national mean.

Prior to the accession to the EU differences in milk purchasing prices were approx. 35-40% to the disadvantage of Poland, while at the end of 2004 they decreased to approx. 10-15% (SEREMAK-BULGE 2006 a).

A general regularity observed in market economy is a slower increase in food prices than that of the general level of prices for consumer goods and a decreasing share of the farmer in the retail prices of foodstuffs. It is an objective process, being a source of increasing profit inefficiency of farming (SEREMAK-BULGE and REMBEZA 2006). In the opinion of MURAWSKI (2006), the elimination of milk quotas would reduce income of producers, with small farms losing most (this would accelerate structural changes), while in case of bigger specialized farms burdened with loans, a reduction of income may make it difficult for them to remain on the market.

Table 7. Mean monthly prices of milk purchase at Dairy Cooperatives (OSM) A and B and in Poland in the years 2003-2005

Tabela 7. Przeciętne miesięczne ceny skupu mleka w OSM A i B oraz w Polsce w latach 2003-2005

Months	Milk price (PLN/l)								
	2003			2004			2005		
	OSM A	OSM B	Poland	OSM A	OSM B	Poland	OSM A	OSM B	Poland
I	0.81	1.00	0.73	0.81	0.82	0.79	0.96	1.10	0.97
II	0.81	0.67	0.73	0.81	0.82	0.79	1.00	1.10	0.96
III	0.81	0.67	0.73	0.81	0.84	0.80	0.95	0.96	0.96
IV	0.77	0.67	0.72	0.81	0.84	0.80	0.95	0.95	0.93
V	0.77	0.70	0.69	0.81	0.89	0.82	0.95	0.95	0.91
VI	0.77	0.69	0.67	0.81	0.93	0.84	0.94	0.94	0.90
VII	0.77	0.69	0.66	0.81	0.95	0.86	0.95	0.93	0.89
VIII	0.77	0.69	0.67	0.81	0.94	0.87	0.95	0.97	0.89
IX	0.77	0.70	0.69	0.81	0.95	0.89	0.95	0.97	0.90
X	0.77	0.71	0.72	0.96	0.97	0.92	0.97	0.96	0.92
XI	0.81	0.74	0.77	1.10	1.00	0.96	0.99	0.91	0.94
XII	0.81	0.76	0.79	1.10	1.10	0.96	0.99	0.91	0.96
Mean	0.79	0.73	0.71	0.87	0.92	0.85	0.96	0.96	0.92

## Conclusions

1. In the analysed period increasingly intensive restructuring processes could be observed in the raw material base of Dairy Cooperatives A and B in comparison to the changes occurring nationwide.

2. In the years 2003-2005 the number of suppliers to Dairy Cooperatives A and B decreased, while the volume of milk purchase was increasing gradually.

3. In successive years the number of producers selling the lowest amounts of milk annually was decreasing, while the share of bigger suppliers was increasing.

4. In purchase the percentage of raw material of the highest quality class extra was increasing.

5. The most advantageous value of the coefficient of seasonality for milk purchase was found for Dairy Cooperative A.

6. Purchasing prices of milk at Dairy Cooperatives A and B were higher than national prices, which was probably the result of the high share of extra class milk purchased, as well as good financial standing of both cooperatives.

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## SKUP MLEKA W DWÓCH OKRĘGOWYCH SPÓŁDZIELNIACH MLECZARSKICH WIELKOPOLSKI W LATACH 2003-2005

**Streszczenie.** Celem pracy była analiza skupu mleka w latach 2003-2005 z uwzględnieniem wybranych czynników w dwóch Okręgowych Spółdzielniach Mleczarskich zlokalizowanych w Wielkopolsce. W analizowanym okresie w OSM A i B zaobserwowano bardziej intensywną restrukturyzację bazy surowcowej w porównaniu ze zmianami zachodzącymi w kraju. W latach 2003-2005 zmniejszała się liczba dostawców do OSM A i B, natomiast sukcesywnie wzrastała wielkość skupu mleka. W kolejnych latach malała liczba sprzedających najmniej mleka w ciągu roku, a rósł udział dostawców większych. W skupie sukcesywnie wzrastał procent pozyskanego surowca w klasie najwyższej – ekstra. Najkorzystniejszą wartością współczynnika sezonowości skupu mleka charakteryzowała się OSM A. Ceny skupu mleka w OSM A i B były wyższe od krajowych, co najprawdopodobniej było uwarunkowane wysokim udziałem zakupionego mleka w klasie ekstra, a także dobrą sytuacją finansową obu spółdzielni.

**Słowa kluczowe:** skup mleka, mleczarnie



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