Oilseed rape production in Poland for food, feeding and non-food purposes

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Oilseed rape is the major oilseed crop cultivated in Poland as one of the few edible oil crops that can be cultivated as a summer form in the cooler agricultural regions as well as a winter crop in the more temperate zones. Oilseed rape covers 95,2% of the total acreage of oil crop cultivation (the average of the last three years). Other oilseeds are of minor importance but they play a significant role either in local markets or as raw material for special products. These are mustard, soybean, poppy, sunflower, linseed.

Grain production

The acreage of winter and summer rapeseed harvested in 2003/2004 was 538,2 thousand of hectares, of which 8,4% of acreage constitutes summer rapeseed. Yield of seeds is estimated at the level of 29,9 dt/ha. The total harvest of seeds in 2004 was 1609,2 thousand tons. It means that it was 102,9% higher in comparison with 2003. It was a result of very limited losses of plantations after winter, smaller acreage of summer rapeseed which yields lower and climatic conditions very favorable for rapeseed development.

Table 1

Production of winter and summer rapeseed in Poland in 1998-2004

Year	Sowing acreage winter rapeseed	Harvest acreage				Yield	Total harvest
		winter rapeseed	summer rapeseed		total		
	[1000 ha]	[1000 ha]	[1000 ha]	[%]	[1000 ha]	[t/ha]	[1000 tons]
1998	400.9	376,0	90,0	19,3	466,0	2,36	1099,1
1999	454.5	442,2	103,1	18,9	545,3	2,08	1131,9
2000	383.6	371,7	65,1	14,9	436,8	2,19	958,7
2001	416.3	412,6	30,6	6,9	443,2	2,40	1063,6
2002	422.4	401,3	37,7	8,6	439,0	2,17	952,7
2003	504.1	345,3	81,0	19,0	426,3	1,86	793,0
2004	500,3	492,8	45,4	8,4	538,2	2,99	1609,2
Average	440,3	406.0	64.7	13.7	470.7	2,269	1086,9

Source: GUS (Chief Central Statistical Office) Annuals

Rapeseed production is concentrated in relatively big farms with access to the complex technology and ability to gain large amount of uniform commercial material. On average over 70% of the whole winter rapeseed acreage and almost 85% of summer rapeseed are situated in farms of minimum 50 ha of arable land; about 95% of acreage with winter and summer forms of rapeseed is located in farms larger than 10 ha.

In the whole country rapeseed is grown in 40-45 thousand of farms, that is 2,0-2,2% of total number of farms. The progress in concentration of this crop is observed, because this value was two times higher 25 years ago.

Varieties

Only double low varieties of rapeseed are cultivated in Poland. Seeds which constitute raw material for oil mills must be of good quality, and they cannot contain more than 2% of erucic acid in oil and 18μM of total glucosinolates/g of seeds or 25μM of alkenyl glucosinolates/g of dry defatted matter.

At present 54 double low varieties of rapeseed are registered in Polish Catalogue: 42 winter rapeseed varieties and 12 summer rapeseed varieties. Among winter rapeseed varieties 32 are open pollinated varieties, 6 restored hybrids (F_1) and 4 composite hybrids (F_{1z}). Polish breeding of hybrid varieties is based on CMS *ogura* – INRA system. Hybrids originating from foreign countries are created using CMS *ogura* – INRA system as well as MSL – NPZ Lembke system.

Polish varieties are the following: Bazyl, Batory, Bojan, Bosman, Gara, Kana, Kaszub F_{1z}, Lubusz $F_{1z,}$ Marita, Mazur F_{1z}, Pomorzanin F_{1z}. The remaining varieties originate from other countries, mainly from France and Germany.

Among summer varieties only two have been bred in Poland, whereas the others are German, French and Swedish varieties. Similar to winter rapeseed, open pollinated varieties dominate, and only two composite hybrids are registered: Polish variety Margo F_{1z} and French variety Jura F_{1z}.

When sowing winter rapeseed in autumn 2004 hybrid varieties constituted 17% of sold seeds, out of which Polish composite hybrids made 12%. Open pollinated varieties which take the largest part in cultivation are: Lisek (25%), Californium (20%), Bazyl (15%) and Kana (5%).

Processing

The processing capacity of oil mills working in Poland is 1,3 mln tons of seeds per year. It means that the average production of recent years was not high enough to satisfy present needs of our oil industry. Only the production of 2004 was a little higher than the needs.

It seems that, after the period of considerable increase of vegetable oil consumption in the last decade of the 20th century, now its level is stable (Fig.1). However, the increase of oilseed rape seeds production is desirable for the development of bio-fuel production on the basis of fatty acid esters. The oil from varieties grown in Poland, both Polish and foreign, meets the European standards for the row material for bio-fuel production. Furthermore, the increase of meal production which accompanies rapeseed processing for bio-fuel will reduce a very high deficit of fodder protein.

In recent years the acreage of rapeseed cultivation does not assure overproduction of seeds necessary for the processing to obtain bio-fuel. The development of bio-fuel production is scheduled for the near future because Poland, as the member of European Union, is obliged to realize European Directives, which promote the use of renewable energy.

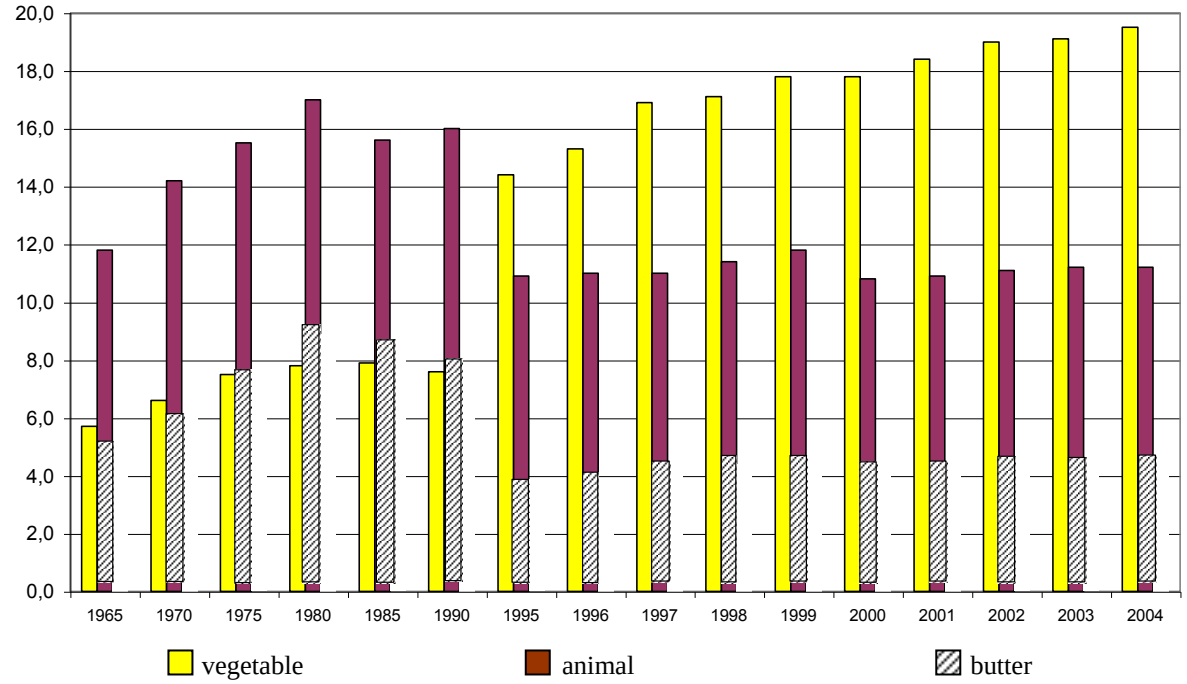

Fig.1. Fat consumption in Poland in kg per capita (according to balance data)

About 6 mln tons of diesel oil is used yearly in Poland. Therefore, to achieve in 2010 the possibility of 5,75% the admixture of bio-components in the oil (bio-diesel) it needs 345 thousand tons of methyl esters. It is equivalent to approximately 800 thousand tons of seeds. With average yield 2,3 ton/ha the acreage of rapeseed cultivation should be increased of 350 thousand ha**.**

The considerable increase of oilseed rape seeds production is possible by:

- The increase of acreage of rapeseed cultivation,
- Introduction of high yielding varieties into production (hybrids),
- Introduction of new technologies of cultivation.

Rapeseed production is concentrated mainly in the western part of Poland. However, it is possible to increase the acreage of rapeseed cultivation. Out of over 14 mln ha of arable land about 4mln ha is suitable for rapeseed production (these are soils where wheat and barley yield faithfully). In order to conform agro-technical standards rapeseed can be grown on the same field once for 4 years, consequently the acreage of rapeseed cultivation in Poland can be increased to about 1-1,2mln ha. Besides, 2mln ha of arable land yearly are fallow lands, but only 4% of this area is good and medium soils, on which rapeseed can be grown.
The increase of rapeseed acreage will be profitable from the agronomic point of view, because the present acreage is too small since it constitutes only about 4% of arable soil.

At present the scarcity of home protein raw materials for fodder production is increasing due to the ban on the use and import of flours of animal origin. As a consequence, the ban resulted in the increase of import of soybean and sunflower meal (Table 2). At the same time rapeseed meal, which is the main source of high protein fodder in Poland (recently about 60%), is not used sufficiently (only about 60%). However, Poland is an important producer and exporter of rapeseed meal (Table 3). Limited use of rapeseed meal as fodder

stimulates investigations which aim at further reduction of anti-nutritive compounds in rape seeds, such as aliphatic glucosinolates, fibre and flavonoids.

Table 2

Import of soybean meal, sunflower meal and others

Years	Import of meals (1000 tons)		
	Soya meal	Sunflower meal and others	Total
1998/1999	893,8	1,6	895,4
1999/2000	891,3	22,4	913,7
2000/2001	1084,3	99,2	1183,5
2001/2002	1428,3	111,0	1539,3
2002/2003	1404,1	170,8	1574,9
2003/2004	1535,5	185,0	1720,5
2004/2005*	1540,0	190,0	1730,0

*forecast
Source GUS Annuals

Table 3

Production, export and utilization of rapeseed meal in Poland

Years	Rapeseed meal (1000 tons)			
	Production	Export	Utilization in Poland *(%)*	
1998/1999	521	245,2	**282,8**	*54,3*
1999/2000	474	212,5	**261,5**	*55,2*
2000/2001	492	188,2	**303,8**	*61,7*
2001/2002	474	230,3	**249,7**	*52,7*
2002/2003	504	187,1	**323,9**	*64,3*
2003/2004	450	157,9	**298,1**	*66,2*
2004/2005*	680-740	250-300	**430-440**	*63,2-59,5*

*forecast
Source: GUS Annuals

The possibility of processing rapeseed oil into methyl esters and of adding them as bio-components to diesel oil creates new opportunities to the use of rapeseed oil for non-edible purposes.

On January 2004 in Poland a bill was passed about bio-components used in liquid fuel. However, it cannot be put into practice, because according to the ruling issued by Constitutional Tribunal, obligatory addition of bio-components to fuels is against the Constitution. Therefore, a special Committee of bio-fuels within the Ministry of Agriculture , is working on regulations.

In spite of legislative problems, at present a technological start of the first bio-refinery in Poland is taking place. The refinery in Trzebinia in Silesian Province will soon begin the production of methyl esters. The processing capacity of the refinery amounts to 100 thousands

tons of esters and 11 thousands ton of pharmaceutical glycerin annually. As a result of its development, the capacity will increase by 50%. The refinery in Trzebinia will make use of rapeseed oil and also of used plant oils and fatty acids. Rapeseeds will be provided by Polish suppliers, with whom the refinery has already signed long-lasting contracts. Initially produced bio-components will be sold exclusively to the German market. In the future, however, they will be sold to Denmark and Norway.

The second bio-refinery is being built by "Biopal" company in Borek Wlkp. in Wielkopolska Province. Its processing capacity will be 20 thousands tons of methyl esters annually. Execution of other bio-refinery plants is planned for 2005 and 2006.

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