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Comparison of potential effects on the profitability of the US MPP application on dairy farms in Veneto (Italy) and Wielkopolska (Poland)

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1 ABSTRACT

At the beginning of 2014, the US agricultural policy introduced a form of insurance to guarantee the specific income for dairy producers called the Dairy Margin Protection Program (DMPP). This system controls the volatility of prices of both milk and production, with no distorting effects on the market. Joining the DMPP program is voluntary but with the obligation to remain in the insurance system until the end of the program. The program ensures a share of the perceived income, chosen annually by the producer, of a quantity of reference milk assigned to the individual producer on a historical basis. The insurable theoretical income is defined monthly by the difference between the average milk price and the income over feed costs calculated based on a standard diet. Farmers who are members of the DMPP program are entitled to compensation when the theoretical milk income is below the level of income coverage chosen by the producer for a two-month period. The present thesis describes the operating mechanism of the US DMPP by setting a simulation on two e European regions with comparable characteristics: Veneto (Italy) and Wielkopolska (Poland). The aim is to evaluate the program's costs and the effects on the profitability on dairy farms in the period 2007 to 2017. Results showed that there is a significant difference between the two analysed regions, especially with regards to the amount of economic aid of the European Union to farmers using the DMPP. At the end, the DMPP approach showed a more efficient way to protect farmer's income with a financial instrument that reduce significantly the risk of profit loss.

2 INTRODUCTION

2.1 The milk price in the European market

In 1970s and early 1980s the effects of the first European Common Agricultural Policy (CAP) based on the guaranteed price levels produced a milk oversupply. The European Community decided to sustain the agricultural production with a system of import duties and export subsidies. With this method it was possible to keep an average price of European raw matters higher than the same in the global market with the aim to increase the production. The differences between the prices was paid by European subsidies using the money collected from importation fee.

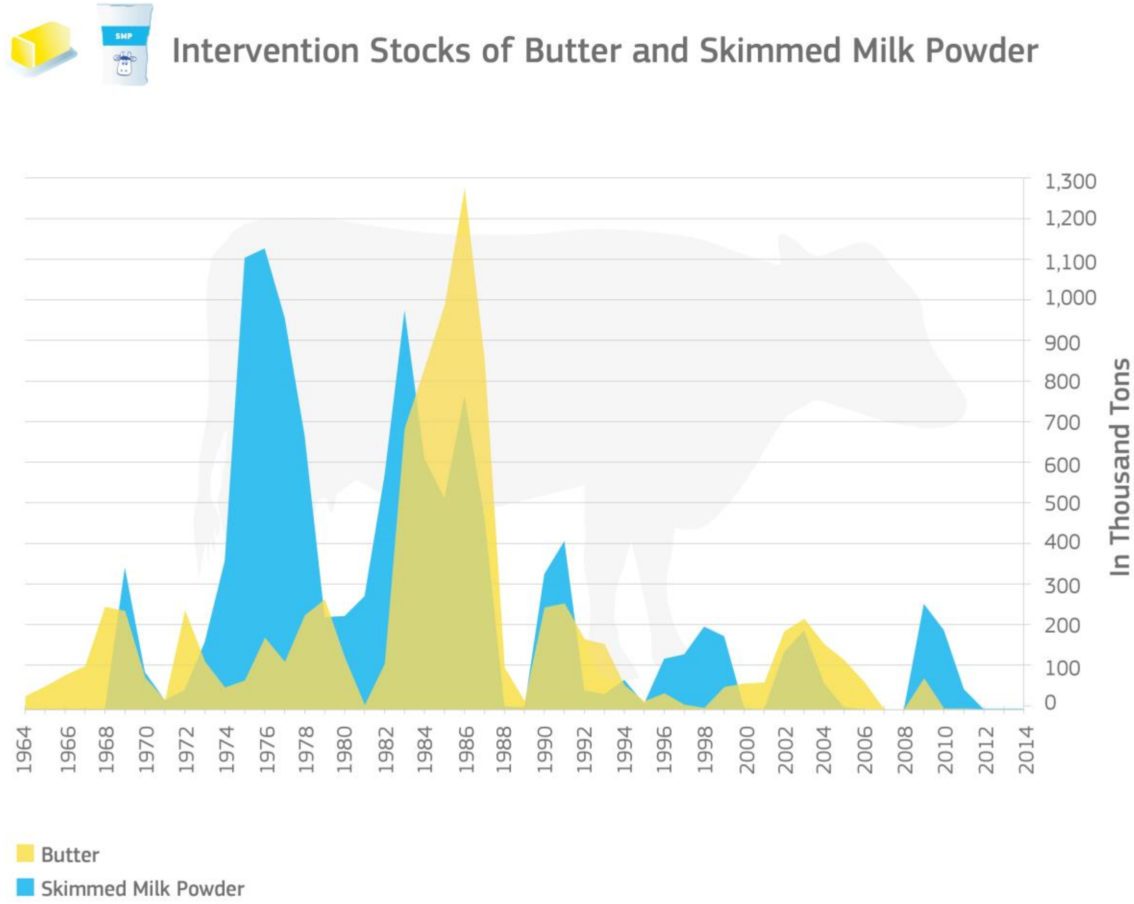
This kind of approach boosted the development of European agriculture during all the sixties and seventies. As result of this, the production of corn and wheat increased three times than the beginning of the century. After a so big expansion, the agricultural system began to produce more than what the market required. To face the problem, the European Economic Community started a campaign of stoking, collecting all the surplus matters to prevent a fall of agricultural market's prices. Consequently, at the beginning of the eighties the stocks become so big that the situation was very difficult to manage, especially for perishable raw matters as milk and butter.

In 1984 the milk quota regime was introduced to prevent an eventual increasing of public expenditure due to stockage costs, in order to address the growing stocks of butter and milk powder.

This system limited the milk supply by setting a defined quantity of producible milk for every European country called "Quota". Quotas were assigned to the farmers depending on their necessity and milk production. The producers had to buy an annual producible quantity of milk and they had to pay a bill in case of overproduction. Money collected in this way was used to cover the storage costs. Due to this program the quantity of stocked milk products decreased drastically since 1985 and it remained manageable for the whole duration of the system (Figure 2.1.

During the nineties, after the fall of the Berlin Wall, the geopolitical situation changed because the countries of central Eastern Europe started strong commercial relations with the European countries. The result of this was the availability of raw materials at a lower price than the European one, meaning that the aid system based on price support was no longer effective. Successive policy reform exercises see a reduction in the system of guaranteed prices and in return farmers were paid a Direct Payment to stabilise revenues.

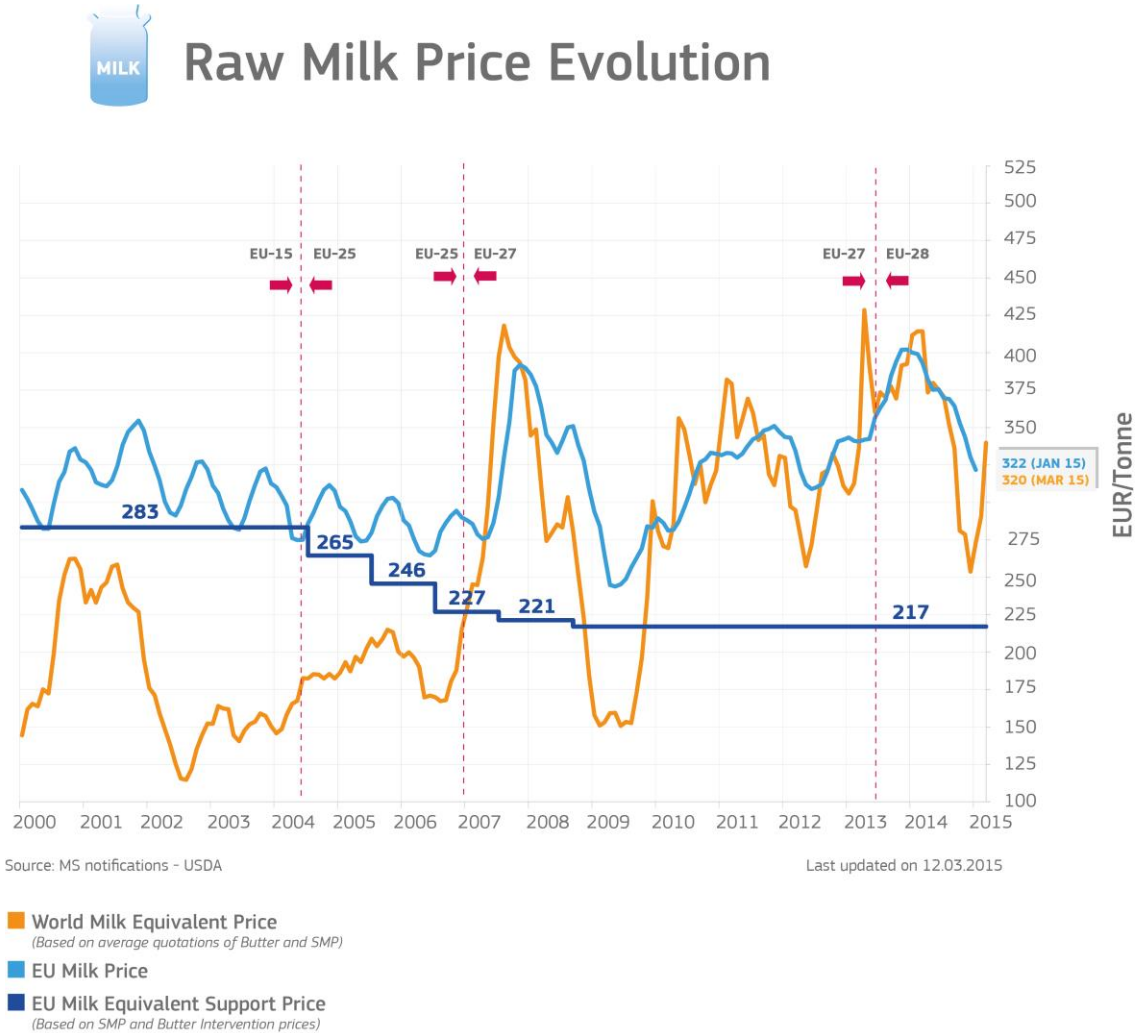
Figure 2.1 Development of public storage of skimmed milk powder and butter during the use of intervention stocks from 1964 to 2014 (Source: Agriculture and rural development, European Commission official site).



Meanwhile market and social changes caused the industrialization of the European dairy sector, with the increasing of the average number of animals per herd and the decrease of the number of farms.

For this reason, since 1998 a commission has considered the possible abolishment of quotas to leave the regulation of milk price only at the market factors, boosting the production in Europe. This decision was also encouraged by the positive trend of milk price in the rest of the world that prospected a nice future for the dairy sector (Figure 2.2). In 2003, after the Luxemburg agreement, the CAP “Midterm review deal” agrees that milk quotas should be abolished in 2015. The decision was not so easy because the increase of dairy production would cause a fall of the milk price in the European dairy market. It would not be a problem for the big farms, but it could be a great trouble for most European milk producers that have not big farms.

Figure 2.2 Trend of average milk prices in European countries(blue) and in the rest of the world(orange) (Source: Agriculture and rural development, European Commission official site).



The 2008 CAP “health check” confirmed the end of quotas in 2015 and agrees gradual increase in quotas over 5 year to allow EU dairy producers to benefit from an estimated rising world demand for dairy products in those years.

2.2 The adoption of DMPP

In response to a worldwide macroeconomic and dairy recession in 2009, both EU and United States introduced new dairy policy instruments. The European parliament included in 2012 the “Milk Package”, the measures have focused on giving new rules on contracts improving collective bargaining for producers and public support for private storage of dairy commodities.

In US the new Farm Bill introduced in 2014 the Margin Protection Program for Dairy Producers (DMPP). The American agricultural policy has introduced this form of insurance to guarantee the specific income for dairy producers. The program aims to protect farmers from the volatility of prices of both milk and production, with no distorting effects on the market. Unlike previous price support programs, the DMPP is the first of its kind to recognize that both the price of milk and the cost of feed inputs are important to protect producer profitability. Therefore, protecting a margin between these two components would insure an adequate return to cover non-feed costs.

Previous Farm Bill programs provided limited support for larger dairies, whereas the DMPP program provides a two-tier cost structure but eliminates CAPS based on farm size or adjusted gross income.

Farmers who are members of the DMPP program are entitled to compensation when the theoretical milk income is below the level of income coverage chosen by the producer for a two-month period.

The first DMPP program started in August 2014 and ended on 31 December 2018. The USDA decided to renew the program with several changes and it still works until 2028.

2.3 How MPP works

It is a "safety net" protection network that provides the producers of milk for compensation when margins are below the annual margin level chosen by the producer himself.

The objective of the entire program is to protect the company assets and not to guarantee a profit to individual producers. The program supports the “margin” not the “price of milk” and it serves to support producers if they occur low or "catastrophic" levels prolonged for long periods. In this way it is possible for the farmer to protect the farm patrimony in case of market failure or critic situation of dairy sector. This also improves the possibility of making investment ensuring from bankrupt.

The membership in the DMPP is voluntary but with the obligation to remain in the insurance system until the end of the program. All milk producers can participate, regardless of company size.

Dairy producers have the option to purchase DMPP at coverage levels from $4.00/cwt to $8.00/cwt, depending on their risk preference and financial position. They may also choose to insure from 25% to 90% of their milk production history as determined by the high previous annual milk marketing. Subsequently the quantity of insurable company milk can grow proportionally to the growth of production of the U.S. The milk produced beyond this quota is not insurable.

The “income” or margin is calculated “monthly” from USDA (US Department of Agriculture) and it is obtained from the difference between the average monthly milk price and the average cost of feeding. It is a national average margin, not an individual margin, which means that every farmer in every part of the country must refer at the same value, and the cost of feeding was determined based on a medium food ration decided by the USDA using the price of row matters on the American market. The insurable theoretical income is defined monthly by the difference between the average milk price and the feed cost index calculated on the basis of a standard ration.

Indemnities are financed with premiums paid by farmers who join the program and in case of insufficient resources by the Federal Government.

No spending limits have been established but the fixed registration fee is € 100/year and it automatically guarantees the coverage level of 8 €/100 kg. To be compensated the margin calculated monthly must fall below the guaranteed margin level chosen by the farmer for a two-month period. The power cost is calculated using a formula developed by the association of the milk producers. Low levels of coverage are highly incentivized for both small and large companies. To purchase higher levels of protection the fee is greater, ever related with the quantity of isurated milk. That means for big farms ensuring their production at the higher level of coverage is more expensive than the small one because the premiums above the coverage level of € 15/100 kg of milk it’s higher than the other lower levels and ensuring the entire production for big farms would have a huge cost.

2.4 Is DMPP applicable in the European Union?

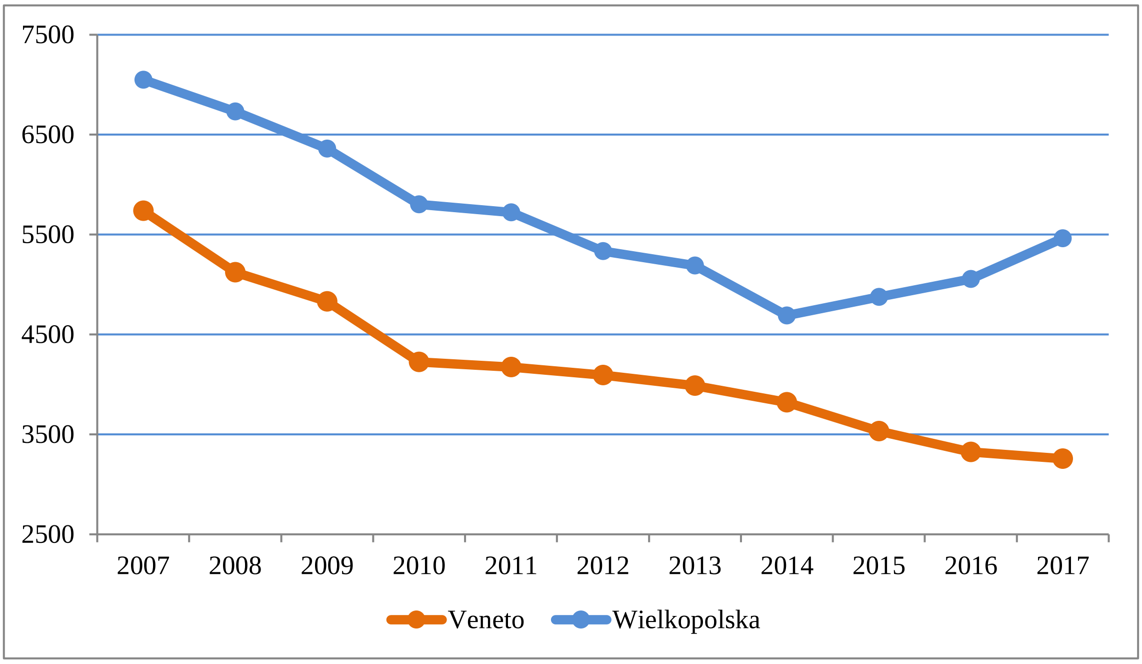
DMPP is an easy tool to apply as it is based on calculation of a national average margin, not to a singular farm. The calculation of compensation is greatly simplified, transparent and the bureaucracy is minimal (Reid, 2015). Coverage levels and premiums are fixed until the end of program regardless of market changes. This allows the farmers to carefully evaluate when enter the system depending on its predictions. It is an instrument that does not have the objective of guaranteeing a profit but to limit losses by supporting strongly the insurance of low margins (8-13 €/100 kg) with premiums very reduced. Safety net systems are foreseen within the first one pillar of the CAP (regulation 1305/2013) but until today have not been applied. No spending limits have been set for the program in America. As already happened in the past, it is probable that we will align ourselves with the American system, reducing direct payments in favor of other solutions such as safety nets. For example, a potential European DMPP version would use the established milk quota as base of historical milk production. (Bolzonella, Taff: 2014)

2.5 Comparison between the structure of Italian and Polish dairy sector

Poland is the 4th biggest milk producer in the European Union. Farmers are expanding their farms and the export is booming. Also, other dairy processors are doing well, and they can invest more compared to the rest of Europe (Parzybut, 2016). Also, milk consumption is on the rise in Poland. In 2016 consumption of all dairy products in Poland increased by 4.5% (Główny Urząd Statystyczny, 2016) despite of Italy, where the dairy products recorded a loss of 3.8%(ISTAT,2016).

Veneto has not achieve the self-sufficiency in the supply of milk, the value of self-supply has gone from 72% in 2009 to 87% in 2017. In recent years it has been around 82% but there are still 20 peremptory points to self-sufficiency. (CLAL, 2019) In Poland instead farmers produce around 30% more milk than the domestic consumption (Malak-Rawlikowska; 2016). The Polish dairy sector is therefore forced to export the surplus in the form of milk powder, butter and cheese. The most important production in Veneto is Aged cheese that adsorb 45% of the entire production, in particular Grana Padano (25%) that also constitutes most of the export of the region (CLAL, 2019). In Poland only the 25% of the entire production is processed, but the consumption of yoghurt, aged cheese, processed cheese, milk desserts and cream cheese is growing. Moreover, in Poland more dairy producers are interested on shortening the milk production chain and to encourage the on-farm processing of milk (Malak-Rawlikowska; 2016).From what concerns the collected database, the situation between Veneto and Wielkopolska looks very different. In Veneto the number of dairy farms has declined since 2007, due to generational changes and the increase of average herd size. On the other side after a previous moment of decreasing, where the decline of number of farms reach the impressive value of 60% between 2004 and 2015 (Malak-Rawlikowska, 2016), the polish milk production is increased and renewed due to the modernisation of the entire dairy sector. Now the situation in Wielkopolska is opposite, in fact the number of dairy farms is increasing. This growth is boosted by the possibility to earn a good price for the milk and to a nice future perspective of the entire Polish economy (Figure 2.3).

Figure 2.3 Trend of the number of dairy farms in Veneto and Wielkopolska regions from 2007 to 2017 (Source: Veneto A.Pro.La.V.; Wielkopolska P.F.H.B.iP.M)



Also, data show the increase of the number of farms because the legislation over the years has become stricter and thus a large number of small farms decided to join the regional breeders' federation or close.

Overall, the percentage of dairy farms with an average herd size over 150 animals in Veneto region has slightly increased from 2007 to 2017. This trend underlines that a better and punctual organization is needed and that the farmers in this kind of herds are specialized and more competent, which means it is easier to apply the DMPP in this region. Besides large farms, there is a large number of little and local farms more aligned with a family-run approach. This also could be a big part of the possible users of the program because they can use it as a form of insurance in case they have also a second job. On the Polish front, the positive trend encouraged the investments and a larger number of farms is growing the herd size, but there is still a high number of thiny and familiar farms that represents the majority in Poland. To have an idea, the average herd size in Veneto is around 100 (figure 2.4), in Poland is 40 cows (figure 2.5).

Figure 2.4 Distribution (%) of dairy farms in Veneto region according to the average size between 2007 and 2017 (Source: A.Pro.La.V.).

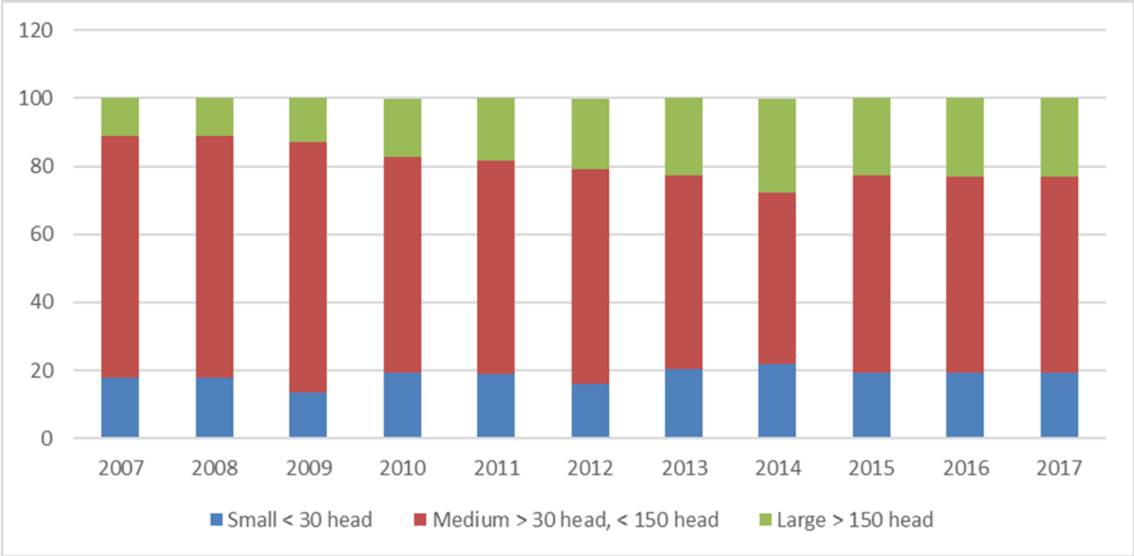
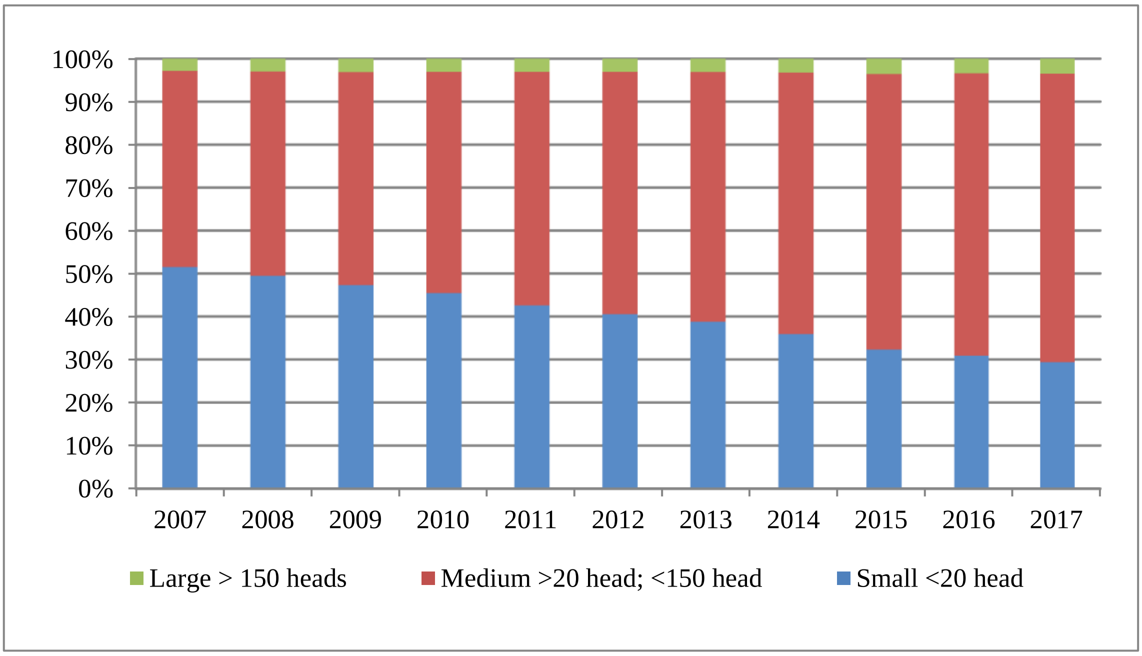


Figure 2.5 Distribution (%) of dairy farms in Wielkopolska region according to the average size between 2007 and 2017(Source: Wielkopolska P.F.H.B.iP.M).



3 AIM

The aim of this work is to evaluate the possibility to apply a program that is widely used in the U.S. in a European contest despite the large differences between U.S. and European market like the use of different currencies in the Union’s market and the lack of a standard diet to set on the calculation of the margin.

The evaluation of the trend of both raw material and milk prices is the base of this study to understand if it is possible to use the same model of program in different regions of Europe (like Veneto and Wielkopolska).

Also, it is necessary to apply the DMPP formula to the European Union market to estimate the effects with an analysis of costs and benefits for the farmers.

Finally, this work compares the percentage of risk reduction at lower and higher coverage levels.

4 MATERIALS AND METHODS

4.1 The Polish and Italian dairy market

During this study we discovered that, despite Veneto and Wielkopolska have comparable “working factors”, there are several differences in terms of climate, market and currency that influence the results of the program. The period that we analysed spanned 11 years, and this gave us a wide perspective on the trend of dairy market in Europe and an overview on the possible developments of the program. Specifically, the years between 2007 and 2017 were chosen because this period included the economic crisis of 2009 and the season of the fall of the milk price in Europe after the end of the quotas system. Moreover, this period was the nearest to the present situation and provided us a realistic vision on the future of the entire program.

The methodology is based on monthly collection of average prices of raw matters available on the local markets. It was collected the prices of milk, corn, soybean meal and alfalfa hay in Veneto and milk, corn, soybean meal and meadow hay in Wiekopolska.

The Italian milk data were collected by the Chamber of Commerce of Lodi and, for what concerns the raw materials, the Chamber of Commerce of Bologna. The Polish data are all based on Wielkopolski Osrodek Doradztwa Rolniczego w Poznaniu databases.

To evaluate the application of DMPP and test its reliability, a sample of farms with different structure and herd size of both regions was chosen. For not having a distorting idea of the program’s operation, were considered Farms that maintained almost the same herd size during the 11 years of the study. To obtain the average annual productions of the farms in the sample it was chosen the databases of the “Associazione Regionale Produttori Latte del Veneto” (A.Pro.La.V.) and “Polska Federacja Hodwcòw Bidla i Producentòw Mleka” (P.F.H.B.iP.M). Data were used to provide the idea of the target of the program, keeping in mind the type of the average farm for each region.

After collecting all the data throughout the eleven years and having completed the database, it was possible to implement the MPP on the two regions. It was settled an average milk production in those two regions based on the average production of the polish and Italian samples. Than it was calculated the value of insurable milk quantity per year. After these preliminary calculations we have moved directly to the calculation of the IOFC and finally it was possible to calculate the amount of economic aid from the program to the breeders based on the level of insurance theoretically chosen.

4.2 The Database

The following tables show all the collected datas about the average monthly prices of raw materials from 2007 to 2017. They are all expressed as € per 100kg to confront both the trends of polis and Italian market.

Table 4.1 Monthly price of raw milk in Veneto and Wielkopolska regions from 2007 to 2017(Source: Camera di commercio di Lodi; Wielkopolski Osrodek Doradztwa Rolniczego w Poznaniu).

Average Italian monthly price of raw milk (Euro/100kg)											
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
January	32.8	42	36.02	33.16	39	40.7	40	42	34.87	31	38.3
February	32.8	42	34.87	33.16	39	40.7	40	44.5	35	28.5	38.12
March	32.8	42	34.54	33.16	39	40.7	40	44.5	34.75	24.87	36.25
April	33.16	38.09	31.66	33.16	39	36	40	44.5	32.75	22.75	33.92
May	33.16	38.09	31.66	33.16	39	36	40	44.5	31.75	24.75	36.75
June	33.16	38.09	31.66	33.16	39	38	40	44.5	33.75	28.87	41.62
July	33.16	39.59	30.43	36.6	40.2	38	40	42	35.87	33.25	43.15
August	33.16	39.59	30.45	37	40.2	38	42	42	35.37	34.35	43.92
September	35.16	39.59	30.73	37	40.2	38	42	39	34.87	37.8	43.58
October	38	38.59	31.83	37	40.3	38	42	39	35.62	41.35	43
November	38	38.09	31.93	37.5	40.3	38	42	38.5	34.75	43.5	42.29
December	38	38.09	31.78	38	40.3	39.5	42	34.62	32.87	41.12	40.17
Average Polish monthly price of raw milk (Euro/100kg)											
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
January	28.19	36.43	25.72	29.90	33.62	37.13	36.12	44.94	35.74	32.70	38.62
February	28.43	35.27	25.40	29.90	33.97	37.10	36.18	44.36	35.32	32.04	38.77
March	28.69	34.11	25.46	29.87	35.06	36.97	36.66	43.97	35.40	30.97	38.46
April	28.78	32.45	25.65	29.56	35.22	34.92	36.95	42.55	34.06	29.94	38.30
May	28.82	30.70	25.40	29.56	34.81	34.09	36.77	40.92	32.91	29.30	38.50
June	29.08	29.78	25.27	29.85	34.90	33.32	37.29	39.70	32.29	29.24	38.90
July	29.81	28.54	25.09	30.01	34.89	33.07	37.97	39.19	31.73	29.62	39.48
August	30.99	27.74	25.03	30.35	35.20	33.01	38.89	37.49	31.54	30.68	40.86

September	33.53	27.29	25.63	31.18	35.46	33.69	40.46	36.47	31.82	32.70	42.40
October	35.54	26.56	26.89	32.70	36.00	34.46	41.83	36.38	32.77	35.19	43.41
November	37.96	26.38	29.06	33.67	37.11	35.58	43.88	36.41	33.11	37.93	44.24
December	38.65	26.02	30.67	34.61	37.81	36.77	45.03	36.12	33.02	39.77	44.60

Table 4.2 Monthly price of corn grain in Veneto and Wielkopolska regions from 2007 to 2017(Source: Camera di commercio di Bologna; Wielkopolski Osrodek Doradztwa Rolniczego w Poznaniu).

Average Italian monthly price of corn grain (Euro/100kg)											
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
January	17.25	24.86	13.3	14.47	24.35	20.17	24.58	18.4	16.1	17.15	17.5
February	17.02	23.35	13.37	14.53	24.18	20.77	23.56	18.62	15.7	17.17	17.64
March	16.79	22,7	12.9	14.51	24.3	20.89	22.47	19.92	16.1	16.98	17.86
April	16.37	22.72	13.17	15.26	25.55	21.42	22.85	19.64	16.5	17.62	17.85
May	16.77	22.67	15.67	15.5	26.02	21.29	22.82	19.87	16.06	18.35	17.9
June	17	22.27	15.66	15.72	27.08	20.77	23.87	19.4	15.85	19.92	18,2
July	18.55	22.58	14.17	16.75	27.07	22.75	22.02	19.42	17.52	18.7	18.75
August	22.48	17.45	12.88	19.45	21.35	27.25	20.66	19.15	17.45	18	18.26
September	24	15.12	12.63	20.21	20.9	28.77	18.55	16.31	17.2	16.76	17.9
October	22.49	13.83	13.55	20.55	19.07	24.96	18.56	15.98	17.2	16.92	17.52
November	23.02	13.07	14	21.25	19.15	25.8	18.72	16.02	17.35	17.42	17.58
December	24.3	12.22	14.14	22.79	19.29	25.35	18.5	15.9	17.07	17.4	17.6
Average Polish monthly price of corn grain (Euro/100kg)											
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
January	18.09	22.96	11.99	14.39	24.24	21.89	26.35	19.70	16.05	19.50	17.08
February	18.42	24.03	13.69	14.88	25.59	22.37	25.42	19.14	16.28	19.79	18.13
March	17.53	23.54	14.69	14.60	26.35	22.86	24.67	19.47	16.50	19.11	18.50
April	17.33	23.67	14.64	14.34	26.78	24.59	25.18	19.84	16.59	19.09	19.14
May	17.23	22.57	16.06	15.36	27.84	25.76	25.10	20.67	16.13	19.48	19.95
June	16.76	22.23	18.47	16.42	28.16	25.24	23.84	21.01	16.18	20.19	20.24
July	17.01	21.86	18.40	17.21	27.96	25.43	24.41	21.36	17.46	20.49	20.05
August	20.07	20.80	16.29	19.48	28.73	25.84	22.90	21.94	18.75	19.68	21.00
September	22.54	15.79	14.42	21.57	18.01	20.80	21.78	18.55	16.79	15.57	19.48
October	20.90	9.42	12.17	17.92	16.80	19.48	16.19	13.60	15.84	13.32	14.01
November	19.73	9.50	11.29	18.52	17.69	20.80	16.80	12.91	17.30	14.01	14.46
December	20.61	10.71	13.13	19.68	19.68	23.51	18.61	14.93	19.02	16.37	16.03

Table 4.3 Monthly price of soybean meal in Veneto and Wielkopolska regions from 2007 to 2017(Source: Camera di commercio di Bologna; Wielkopolski Osrodek Doradztwa Rolniczego w Poznaniu).

Average Italian monthly price of soybean meal (Euro/100kg)											
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
January	22.65	34.27	33.42	32.97	37.57	32.17	43.61	45.47	40.25	31.87	37.55
February	23.15	35.45	33.45	31.8	36.02	33.65	43.5	46.5	39.72	30.7	37.47
March	25.39	36.55	31.32	31.12	33.7	35.77	43.67	47.2	40	30.77	35.91
April	22.67	35.87	32.59	32.17	31.42	39.35	42.97	48.11	39.71	33.97	34.15
May	22.95	34.97	37.8	33.3	26.02	43.25	49.03	47.17	36.65	39.65	33.65
June	23.95	38.55	36.4	33.2	30.95	44.3	47.9	43.87	36.1	41.95	33.13
July	24.97	37.17	34.33	32.13	31.3	52.32	46.12	39.43	39.29	39.95	32.35
August	25.65	33.65	34.55	33.71	31.1	54.95	44.61	40.6	36.05	36.45	30.15
September	28.37	31.95	32.75	33.55	31.27	52.2	47.12	37.85	35.4	34.13	30.6
October	32.55	28.75	31.69	33.02	30.57	48.59	48.59	38.07	35.37	34.37	31.12
November	32.87	28.5	32.9	34.6	29.9	47.85	46.85	40.1	34.85	35.32	31.23
December	34.32	27.35	33.49	36.73	29.97	47.12	45.71	39.62	32.17	36.37	32.65
Average Polish monthly price of soybean meal (Euro/100kg)											
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
January	25.30	31.68	34.04	38.77	41.61	40.43	53.90	52.48	48.94	46.34	46.57
February	25.53	32.15	36.88	38.30	42.55	40.66	53.43	51.77	49.65	45.39	46.57
March	26.48	32.62	35.70	37.35	42.32	40.90	52.01	52.01	48.94	44.92	46.81
April	25.30	33.33	40.66	36.88	41.61	42.32	51.77	52.72	49.17	44.21	46.34
May	25.30	33.81	41.84	37.35	41.61	44.44	51.77	52.48	49.41	45.39	46.34
June	25.06	33.81	42.79	38.06	40.90	47.04	52.25	52.96	48.70	47.52	44.44
July	25.06	33.57	42.55	38.53	40.90	49.41	52.72	51.54	47.04	48.23	44.21
August	25.06	33.57	41.84	38.53	39.48	53.19	53.43	49.17	47.04	47.99	43.26
September	28.13	33.57	40.43	38.77	41.13	53.43	53.19	49.65	47.28	47.28	43.26
October	30.73	33.81	39.95	38.53	41.13	53.90	53.19	48.46	47.04	46.34	41.84
November	30.73	34.04	39.48	39.24	41.13	54.14	52.72	48.46	46.81	46.57	42.32
December	31.44	34.28	39.24	39.48	41.13	53.66	52.72	48.46	46.81	46.57	42.32

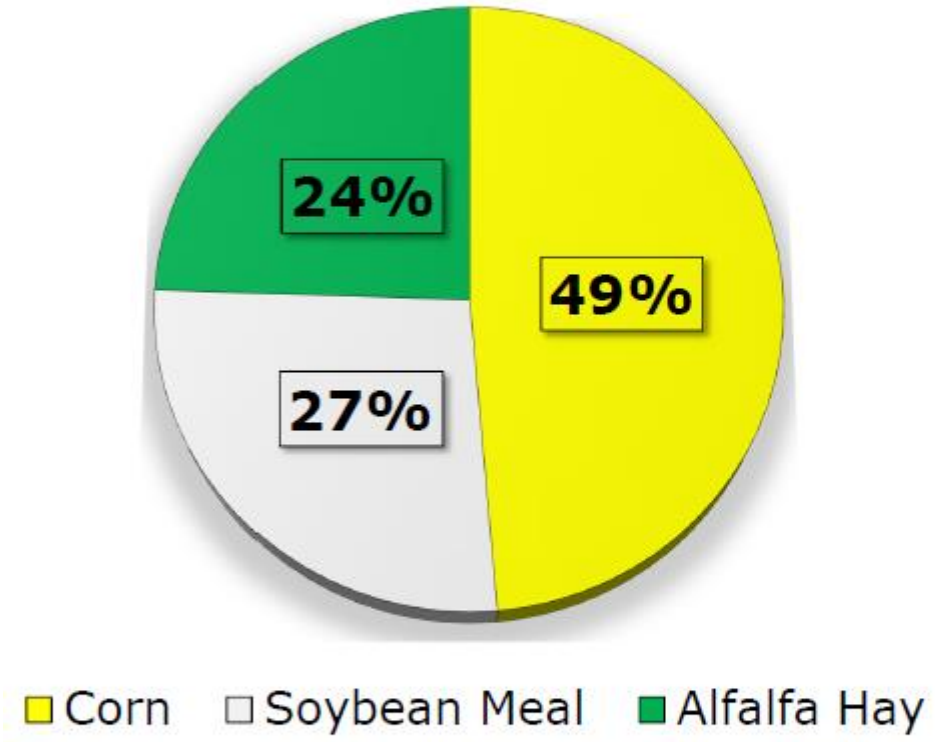
Table 4.4 Monthly price of of all alfalfa and meadow hay prices data in Veneto and Wielkopolska regions from 2007 to 2017(Source: Camera di commercio di Bologna; Wielkopolski Osrodek Doradztwa Rolniczego w Poznaniu).

Average Italian monthly price of alfalfa hay (Euro/100kg)											
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
January	14.9	20.72	23.25	20.75	19.37	22.25	25.15	22.15	22.25	20.75	20.25
February	14.9	21.5	23.25	20.75	19.75	22.62	25.25	22.15	22.25	20.75	20.75
March	14.74	21.8	19.5	20.75	19.75	22.75	25.25	22.15	21.25	20.75	20.75
April	14.7	21.9	19.5	20.75	19.75	22.75	25.25	19.1	21.25	20.75	20.25
May	14.78	19.12	18.75	17.5	18,17	22.75	21.75	23	18.5	20.75	17.25
June	14.9	21.58	20	18	20.75	22.37	24.75	23.25	16.25	18.25	18.35
July	15.27	22.05	20.25	17.7	20.9	23.25	25.37	23.15	17.12	16.25	20.85
August	16.13	22.25	20.25	17.83	21.15	23.91	26.08	22.75	19.08	18.75	21.25
September	16.75	22.25	20.25	17.75	21.25	24.25	26.25	22.75	19.75	18.75	22.75
October	17.44	22.25	20.25	17.75	21.25	24.25	26.55	22.75	19.75	19.75	24.55
November	18.8	22.5	20.25	18.12	21.75	24.37	27.25	23.12	20.25	19.75	25.25
December	19.47	22.75	20.25	18.85	22.25	24.75	22.15	24.12	20.75	19.75	25.42
Average Polish monthly price of meadow hay (Euro/100kg)											
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
January	5.91	6.15	6.38	6.38	6.86	7.57	8.27	8.04	7.57	8.27	7.80
February	5.91	6.38	6.62	6.62	6.86	7.80	8.27	8.04	7.57	8.04	7.80
March	6.15	6.38	6.38	6.62	6.86	8.04	8.98	8.04	7.80	8.04	8.04
April	6.15	6.38	6.62	6.38	6.86	8.27	8.98	8.27	7.80	8.04	8.04
May	6.38	6.38	6.38	6.62	6.86	8.51	8.98	8.04	7.80	8.27	8.04
June	6.15	6.62	6.38	6.62	7.09	8.75	8.75	7.80	7.80	8.04	8.04
July	5.91	6.86	6.38	6.62	7.09	8.75	8.27	7.80	8.04	7.80	7.80
August	6.38	6.86	6.38	6.86	7.33	8.51	8.04	7.80	8.04	7.57	7.80
September	6.15	6.62	6.38	6.62	7.33	8.51	7.80	7.80	8.04	7.80	8.04
October	5.91	6.62	6.15	6.86	7.57	8.75	7.80	7.57	8.04	7.80	8.27
November	6.15	6.62	6.38	6.86	7.57	8.98	8.27	7.57	8.04	8.04	8.27
December	6.15	6.38	6.38	6.62	7.80	8.98	7.80	7.57	8.27	8.04	8.27

4.3 How the DMPP formula works

The DMPP formula is a single national formula and it does not account for regional or farm-level heterogeneity in feed costs or milk composition.

Figure 4.6: Composition of DMPP standard diet as described by USDA (Source: Bozic M., 2016)



The calculation of DMPP begins with the identification of the "standard diet". It was decided to use the same diet used in the US to compare the results on the same level. The standard diet, as reported by the program's author, describes in theory the daily relationship between the quantity of milk produced and the requirement for each raw matter (kg of feed/kg of milk produced) (Figure 4.6). The reference diet is composed of:

- corn grain (49%)
- soy flour (27%)
- alfalfa hay (24%) (Source:USDA DMPP, 2014)

After defining the everyday regular consumption of feed, an average quantity of milk produced daily by a cow was chosen for each country. This value was necessary to calculate the consumption of energy by the cattle and the daily diet intake expressed in kilograms. The diet proposed by the USDA for DMPP was used also in the present thesis for the calculations in Veneto region, whereas we preferred to replace the alfalfa hay with the meadow hay in Wielkopolska region.

4.4 The Income Over Feed Costs (IOFC)

After calculating the average monthly consumption per cattle, the IOFC formula can be applied. The IOFC is defined as the portion of income that remains after paying for purchased and farm-raised feed used to produce milk (Ferreira, 2015). In other words, IOFC is the net income after paying the feed costs. For simplicity, IOFC is typically calculated on a per cow and day basis. The variables of the IOFC formula are:

- Monthly milk price
- 1.0728 x monthly corn price ($/bsh)
- 0.00735 x monthly soybean meal ($/lb)
- 0.0137 x monthly alfalfa hay ($/lb)

Although the international protocol requires the use of the kilogram as a unit of measurement, the USDA has organized the IOFC formula on the American imperial pound system. Then, to allow the calculation, all the datasets were standardized following the US criteria, moving from Euro to US dollars and using bushels and pounds instead of kg, in this way it was possible to use the same formula of USDA. To convert the kilograms in bushels it was considered the official US conversion value: 1 Corn Bushel = 25.4 kg;

For what concerns alfa alfa hay and soybean meal, they are not considered in bushels but in pounds, so the conversion value is: 1 lb = 0.453 Kg

After this standardization work, it was possible to calculate the IOFC using the following formula:

IOFC = corn price * 1.0728 + soybean meal price * 0.00735 + hay price

The value of the raw matter's coefficients is defined by the USDA (Bozic, 2014).

After obtaining the results of the IOFC calculation, it was necessary to convert all the values using the European currency and measures. Pounds and bushels have been converted into kilograms as well as the costs in dollars have been converted into Euros. It was decided to use conventional European measures instead of American ones to contextualize the work done and make the results more understandable. Also, all the graphs of this have been reported in European measures for a question of clarity and simplification.

4.5 The set of IOFC on the three sizes of farm

After obtaining the value of the IOFC per cow, is necessary to multiply the value for the number of cows in the herd. Three three herd sizes were considered:

- Small (less than 20 cows)
- Medium (between 20 and 150 cows)
- Large (more than 150 cows)

Following the calculation of the IOFC margin assessment (€/kg of milk) on those three sizes of farm, the level of insurance coverage has been defined.

It was considered the situation in which the three groups of herds decided to insure them at three different levels:

- 0.07 protection level and 90% of historical production;
- 0.15 protection level and 25% of historical production;
- 0.15 protection level and 90% of historical production.

Assessment of the risk reduction by coverage level was included as well. To be compensated the margin calculated monthly must fall below the guaranteed margin level chosen by the farmer for a two-month period (January-February, March-April, May-June, July-August, September-October, November-December), which is decided by the government. If the crisis does not include the two-month period, then the program does not start. This prevents the abuse of public money allocated for the program and allows its entry into operation only in times of real need.

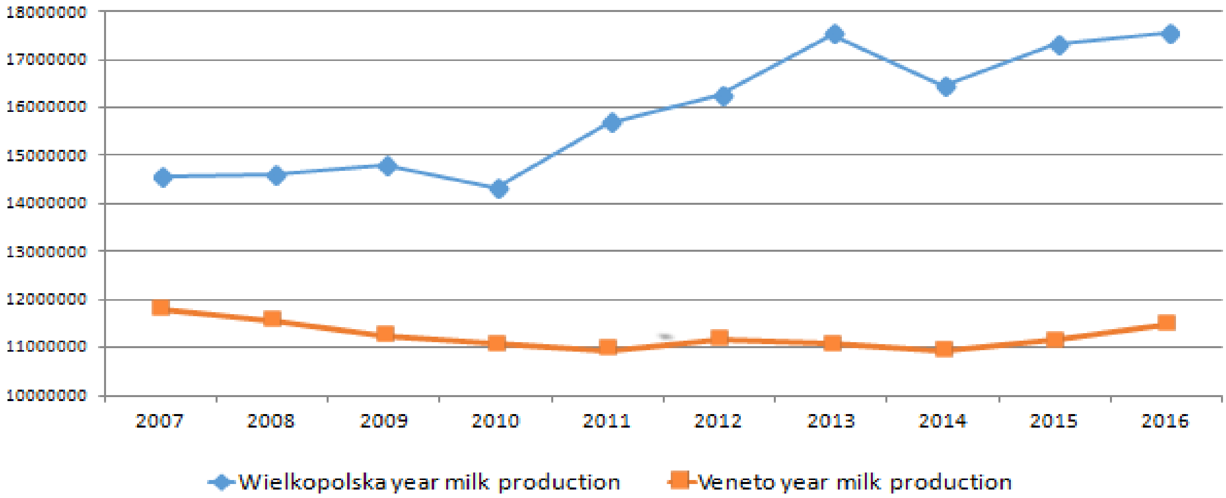
5 RESULTS AND DISCUSSION

5.1 Comparison of milk price and production

There is a significant difference between Veneto and Wielkopolska. According with the collected data the production of milk in the Polish region is much higher than that in the Italian one.

While in Veneto region the dairy production oscillates between 1.1 and 1.2 billion of tons per year, in Wielkopolska it increased from 1.45 to 1.75 billion of tons per year and the value probably will increase in future (Figure 5.7).

Figure 5.7: Comparison between annual milk production in Veneto and Wielkopolska regions (Source: Wielkopolska: G.U.S., Rocznik Statystyczny Rolnitcwa; Veneto: A.Pro.La.V.).

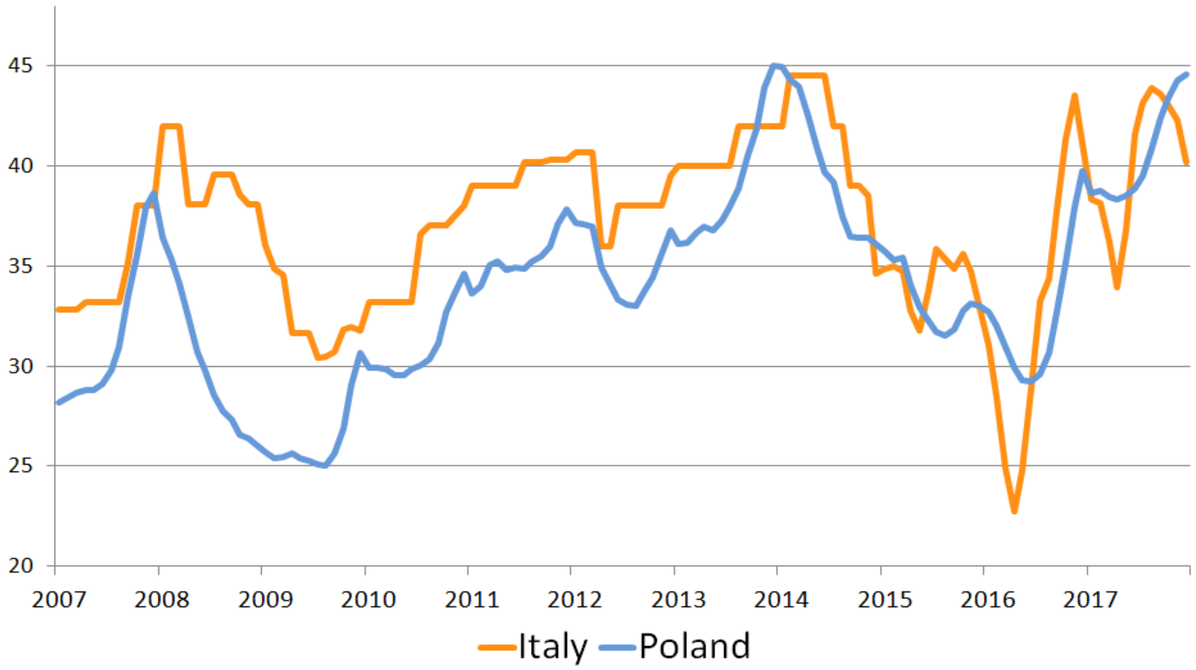


Farms in the eastern part of Europe tend to be smaller (under 150 cows), and most often cultivate forages needed for their herds. In contrast, farms in the western, southwest of Europe are larger, and purchase most of their feed. Despite that, Poland has a higher production than Italy.

Comparing the average values of the milk prices of Veneto and Wielkopolska collected along all the study period, we have a clear vision of the situation.

To compare the income of the two European areas, data were standardized according to the EU market. Each value is expressed as €/100kg. The comparison shows that during the eleven years the trend of the two data series was similar with a correspondence between high and low values. However, the Polish dairy sector resulted more stable and steadier than the Italian one (Figure 5.8).

Figure 5.8 Trend of average milk price in Veneto and Wielkopolska regions from 2007 to 2017 (Source: Camera di commercio di Lodi, Italy; Wielkopolski Osrodek



Doradztwa Rolniczego w Poznaniu, Poland).

It is interesting to see how the situation changes for the two regions over time. At the beginning of 2007 Veneto had a higher milk price (320€/ton) compared with Wielkopolska (270€/ton), and in subsequent years the trends were similar until the shock due to the abolishment of quotas system. From 2015 to 2017 Poland had an average milk price higher than Italy. Moreover, the Polish market trend is steadier than the Italian one which is more affected by market changes.

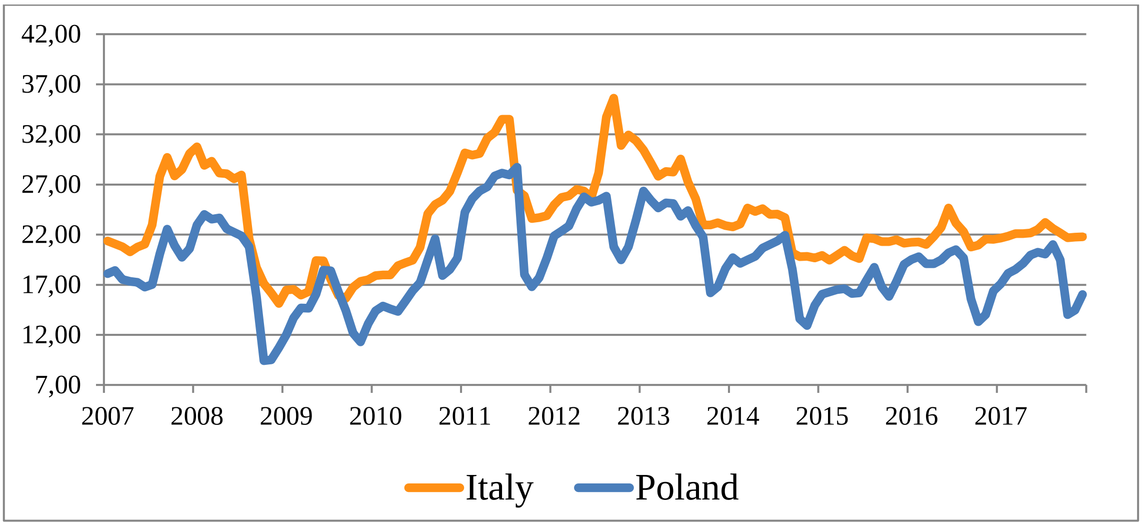
5.2 The raw feed matters, comparison between Italy and Poland

The prices considered are those of the feeds that mostly affects the cost of the ration. To work on standard data, the values are all calculated on a monthly average basis and converted into Euro/100 kg.

5.2.1 The corn grain

Generally, the price of Italian corn grain was higher than that of the Polish one. Furthermore, Veneto and Wielkopolska have a comparable price trend, but it is interesting to observe some values peculiarities: while the Italian trend value has less price fluctuations, the polish one falls periodically, especially during the harvesting season.

Figure 5.9 Trend of Italian and Polish corn grain prices from 2007 to 2017(Source: Camera di commercio di Bologna, Italy; Wielkopolski Osrodek Doradztwa Rolniczego w Poznaniu, Poland).

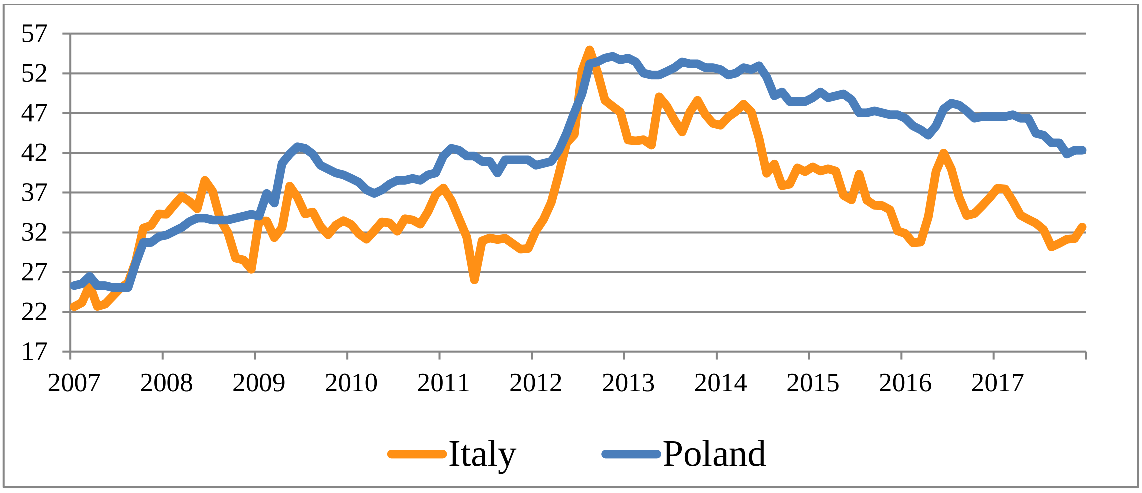


This happens because in Italy most of the corn is imported and the demand for grain is greater than the national production, while in Poland production causes a significant surplus that affects the market price (Figure 5.9).

5.2.2 The soybean meal

In the calculation of the income over feed cost (IOFC) the soybean meal price is the most influential because usually protein is the most expensive part of the diet (Ferreira, 2015). The data collection of Polish and Italian soybean meal has two different trends. The trend of Italian price is usually lower than the Polish one, but it has strong fluctuations which make it unstable. (Figure 5.10)

Figure 5.10 Trend of Italian and Polish soybean meal prices from 2007 to 2017(Source: Camera di commercio di Bologna, Italy; Wielkopolski Osrodek Doradztwa Rolniczego w Poznaniu, Poland).

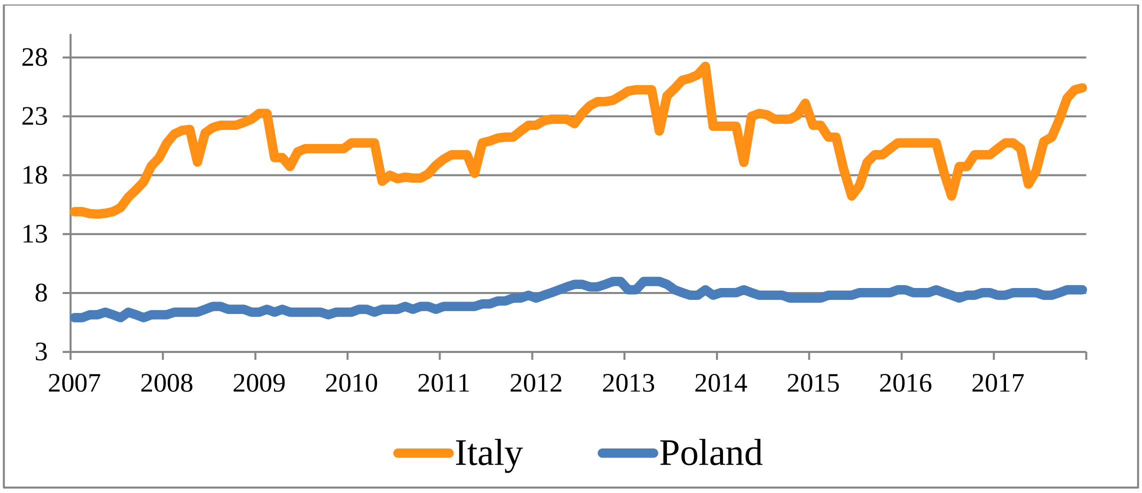


An increase of soybean meal price between 2012 and 2013 caused a shift on the use of other protein sources such as distillation culls and beer threshing. Since then, the trend of price has remained higher in Poland than in Italy, due to the strong importation of soy in Poland.

5.2.3 The alfa alfa and meadow hay

The situation for the fibrous raw matter is more complicated than expected, in fact it was not possible to obtain the data related to the production of alfalfa in Poland because it is not used frequently, and it is not produced in large quantity. So, Poland does not have any trade for alfalfa hay and other species are used in the diet. In order to perform the IOFC calculation, it was decided to replace the alfalfa hay with the meadow hay. This made not feasible the comparison of the trend of their respective prices. (figure 5.11). Anyway, it is worth observing that the price of meadow hay in Poland is much more stable than the price of alfalfa hay in Italy.

Figure 5.11 Trend of Italian alfa-alfa and Polish meadow hay prices from 2007 to 2017 (Source: Camera di commercio di Bologna, Italy; Wielkopolski Osrodek Doradztwa Rolniczego w Poznaniu, Poland).



5.3 The evaluation of IOFC in Veneto region

The calculation of IOFC in Veneto outlines a quite stable situation along the whole period, despite the presence of some critical situations due to market crisis. Two different critical situations, the first one between August and September 2009 and the second one in March 2016, can be observed in Figure 5.12, which shows the comparison between feed costs and milk prices.

Figure 5.12 Feed costs (orange) and milk prices (blue) in Veneto region from 2007 to 2017. (Our elaborations)

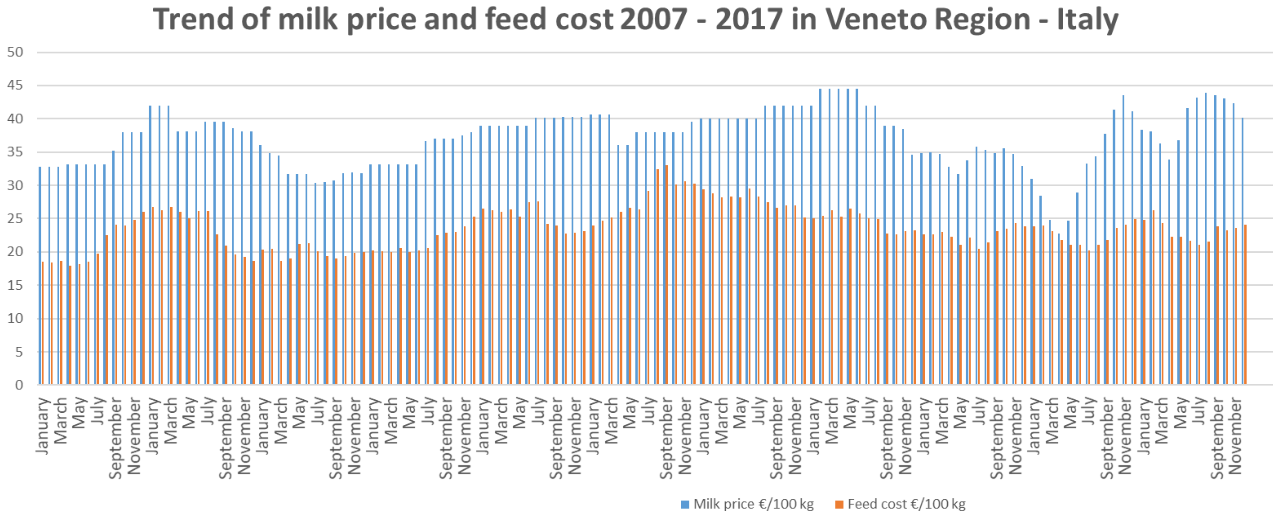
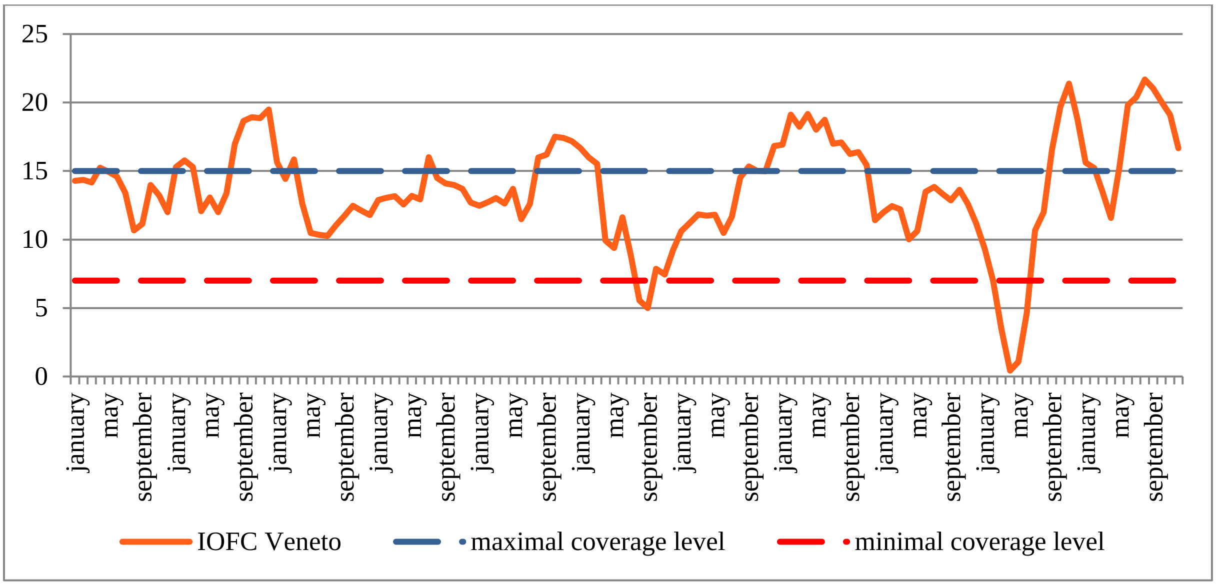


Figure 5.13 shows the trend of the IOFC values. It highlights how the program would work in relation to the different levels of coverage. It is immediate to see how in 2009 the value of the IOFC has fallen below the minimum coverage level due to a huge increment of price that determinate the IOFC value decreasing. Even more serious is the second crisis where in 2015 there was a fall of milk price after the abolition of milk quotas.

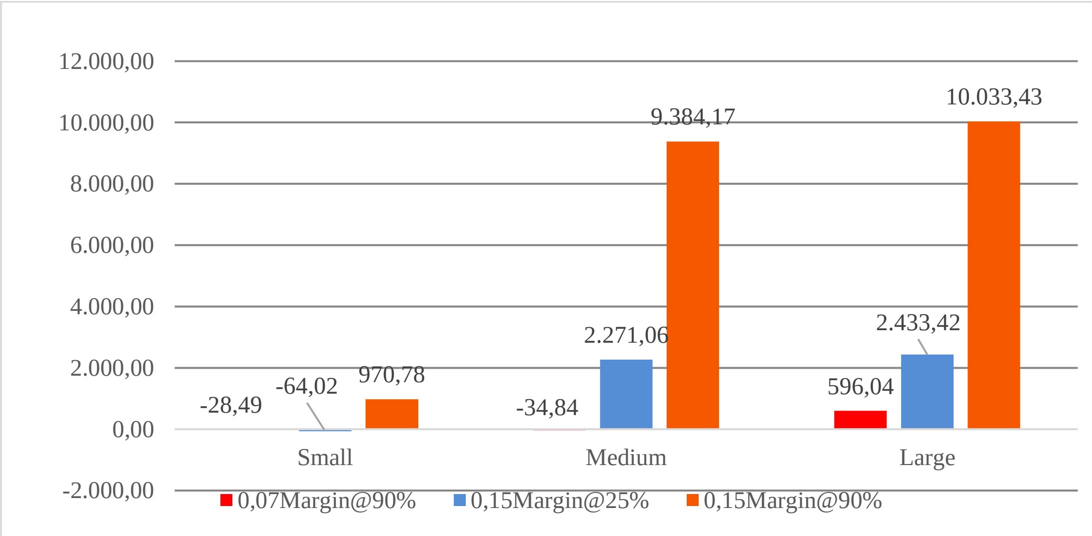
Figure 5.13 Trend of the IOFC in Veneto region from 2007 to 2017. The two lines describes the maximum and the minimum level of protection in the DMPP program. The blue one is the higher level (0.15 Euro), and the red line is the lower level (0.70 Euro).



5.4 The situation in Veneto

Figure 5.14shows the value of the ratio between the sum of the money received and the amount paid to enrol in the insurance program throughout the entire period. The three series of columns represent the farms analysed divided by category: small (from 1 to 20 cows), medium (from 21 to 150) and large (more than 150 cows).

Figure 5.14 Comparison between the three farm size classes and the amount of potential DMPP income. The three columns show the value of the theorical income that would be played for the three different levels of protection in Veneto region. (our elaborations)



The three values show the revenues received for three different selected coverage samples. The first column refers to the minimum level of coverage, the central one to the maximum coverage level but, ensured on 15% of the total milk, and the last the highest level of coverage.

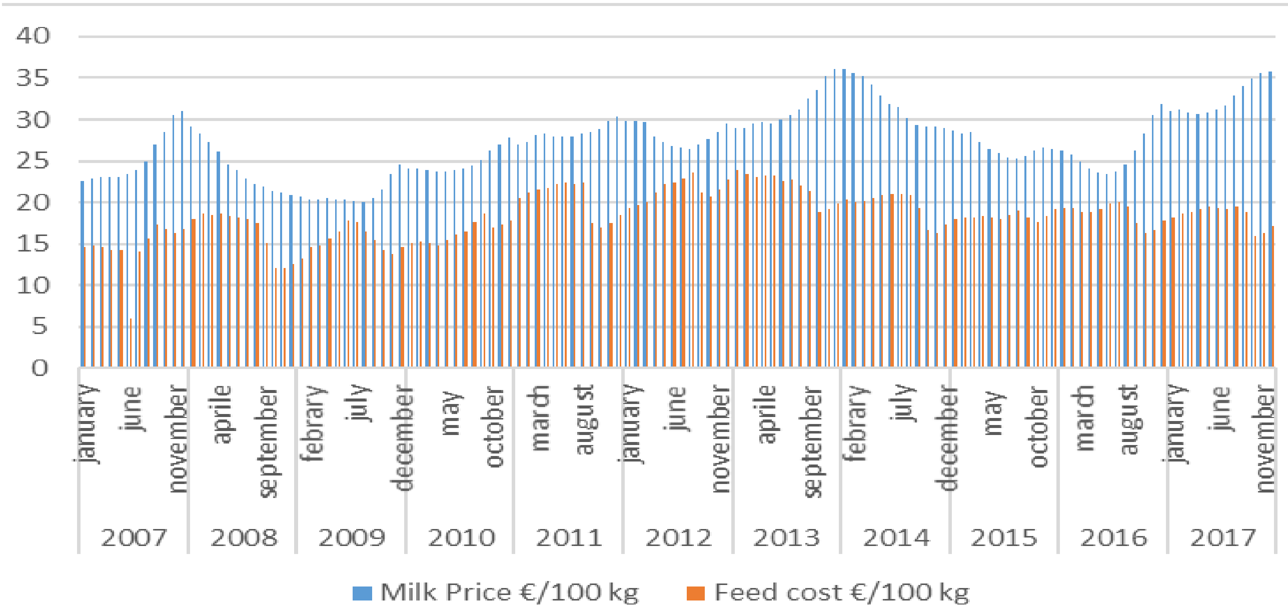
It's clear that for small and medium-sized farms ensuring at lowest level is not convenient, in fact the cost of insurance is higher than the premium received.

Otherwise the larger farms have a good reward in all the three insurance levels, but the DMPP regoulamentation leads to pay a much bigger fee to ensure a greater quantity of milk. It means a higher insurance cost to purchase the higher protection level than the minimal one which does not make it economically sustainable.

5.5 The evaluation of IOFC in Wielkopolska region

In Wielkopolska the situation is more complicated because the price of milk has a more volatile trend. This changes a lot from year to year and varies over a much longer period. On the other hand, the cost of raw materials changes much more quickly increasing and falling many times during the analysed period (Figure 5.15). The ratio between feed costs and milk price has a lower average value compared with that found in Veneto.

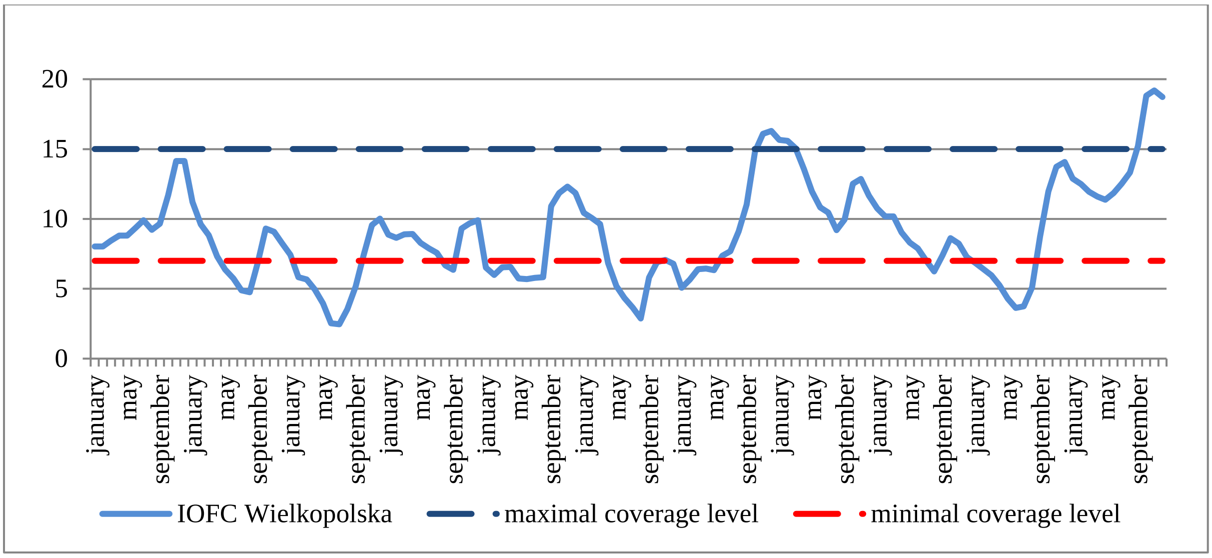
Figure 5.15 Comparison between feed costs (orange) and milk prices (blue) in



Wielkopolska region from 2007 to 2017 (our elaborations).

This complicated situation can have an explanation: if we consider the fact that prices in Poland are not established in Euro but in Zloty, it is possible to explain in part the reason for the continuous fluctuations in the markets. In fact, the Zloty is a currency less strong than the Euro (€1 = 4.23 zlt) and at the domestic market level there are currency fluctuations at lower values than the European one. If we look at the trend of the calculated value of the IOFC, this is translated into a continuous up and down of the value throughout the analysed period.

Figure 5.16 Trend of the IOFC in in Wielkopolska region from 2007 to 2017. The two lines describes the maximum and the minimum level of protection in the DMPP program. The blue one is the higher level (0.15 Euro), and the red line is the lower level (0.70 Euro) (Our elaborations).

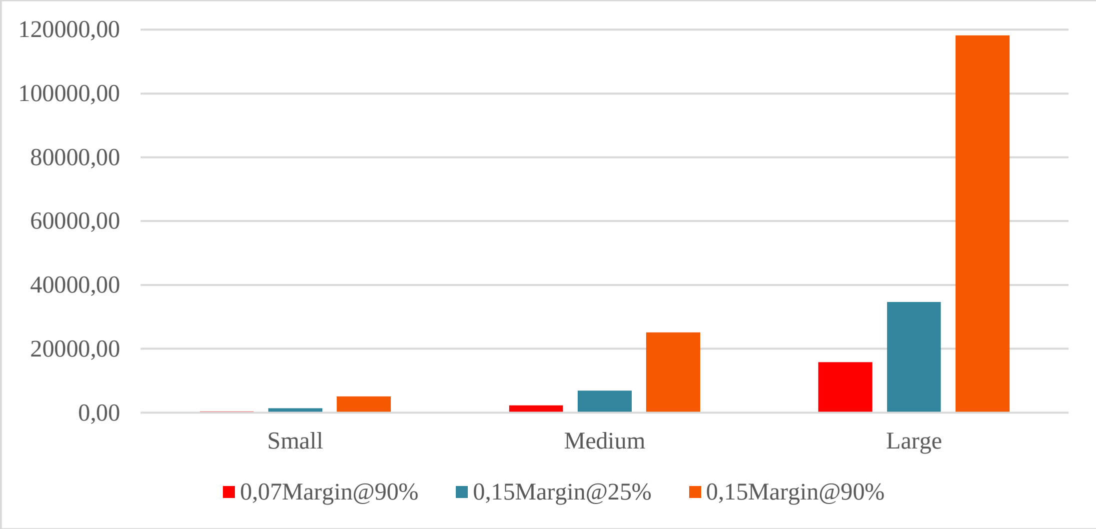


For this reason, the value of the IOCF does not have a linear trend and falls many times below the minimum level of coverage (Figure 5.16).

5.6 The situation in Wielkopolska

In Wielkopolska the more volatile feed costs trend and the instable milk price give a more complicated situation than Veneto. For this reason, the value of the IOCF does not have a linear trend and falls many times below the minimum level of coverage.

Figure 5.17 Comparison between the three farm size classes and the amount of potential DMPP income. The three columns show the value of the theorical income that would be played for the three different levels of protection in Wielkopolska region (our elaborations).

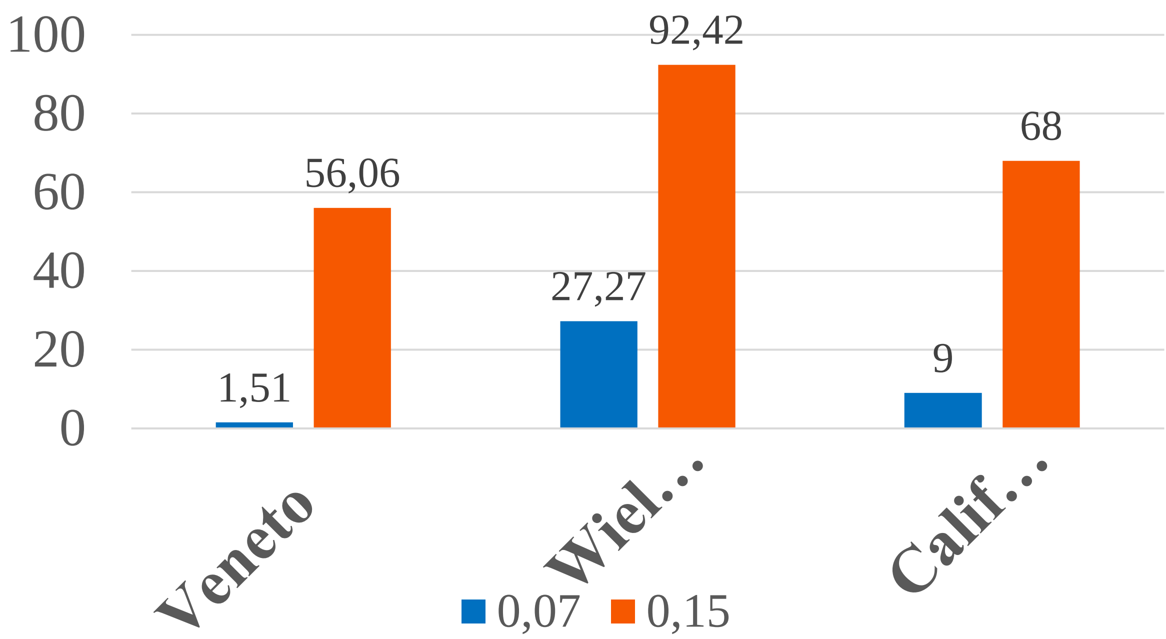


The Polish case is not comparable with the Italian because comparing with the data collected in Italy and maintaining the same parameters, Polish farmers collect much more money than the Italian ones. All three classes of farms always get a lot of money despite the quantity of produced milk (Figure 5.17). In such a situation the system that favours small and medium-sized companies expires and the prize received becomes closely linked to the quantity of milk produced. In short, more it produces, more it earns.

5.7 Comparison between the risk reductions

At the end, a comparison was made between the lower and higher coverage level risk reduction intended as the number of times that IOFC fall down the chosen coverage level. This is the value that allows us to understand the efficiency of the program and standardize its operation with other countries (figure 5.18). The comparison shows that the potential compensation produced by DMPP in Veneto at the higher protection level is aligned with the American trend, but it is much lower at the lower ensuring level. Conversely, in the Wielkopolska case both higher and lower ensuring levels are such higher than the American sample.

Figure 5.18 Comparison of the cost of risk reduction in Veneto, Wielkopolska and California at the minimum and maximum level of coverage. The values are expressed as a percentage (California: Bozic et al., 2014; Veneto and Wielkopolska: our elaborations)



The minimal level of coverage for the two regions must be changed to have the same payment level with the DMPP program in both European countries.
To reach the same level of California's risk reduction, the minimum level of coverage must be:

- 0,10 €/100 kg in Veneto **(+0,03 €/kg)**
- 0,04 €/100 kg in Wielkopolska **(-0,02 €/kg)**

5.8 Brief comparison with the US DMPP

The newly introduced DMPP program has been relatively effective in the United States. Only a fraction of milk production in the United States has been protected at a sufficiently large coverage level to offer significant support in environments with very low margins such as those experienced in 2009 and 2012 (Bozic, 2015). Despite this, the program was extended by the US government with a new and renewed formula.

A situation similar to that was found in this study has already been found by American researchers in different States of the USA. Richard (2017) found evidence revealing MPP impact differences due to milk and feed market differences across the dairy production regions in the US. Farms in the north-east and Upper Midwest are different from those in the west, southwest and the southeaster United States. This not only in terms of size but also in farm structure and types of feed used. To understand how the USDMPP worked in both situations it was decided to use a value called "margin base", defined as the difference between the Income over Feed Cost (IOFC, the monthly portion of income from milk sold that remains after paying for feed costs) and the DMPP monthly income.

Using accounting data from Genske, Mulder and Co. (2014), Bozic found that "margin base" value tends to be more positive in the Upper Midwest, and negative in California and Idaho. This has caused some concerns about using a single national MPP-Dairy margin formula also in the US.

Moreover, Newton, Thraen, and Bozic (2015) analyzed how fixed premiums shift the producer's decision-making from one of authentic risk management approach to one where "maximizing expected program returns" is an underlying driver of participation. In conclusion of both Newton, Thraen, and Bozic (2015) and Richard (2017), understanding returns to various coverage levels becomes important before the program becomes a financial speculation tool.

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6 CONCLUSIONS

The application of the US levels of coverage led to a higher risk reduction in Wielkopolska than Veneto region, due to the lower IOFC in Wielkopolska. The results in Veneto show that for small and medium-sized farms ensuring at lowest level is not convenient, in fact the cost of insurance is higher than the premium received.

On the other hand, larger farms have to pay much more than the small and medium-sized one to be ensured at the highest protection level, due to a greater production of milk.

This leads the smaller farms to choose higher levels of coverage, and large farms to choose the lowest level of protection giving more help to small and medium-sized farms that need it most.

In Wielkopolska the more volatile feed costs trend and the instable milk price give a more complicated situation than Veneto. For this reason, the value of the IOCF does not have a linear trend and falls many times below the minimum level of coverage.

It means that compared with the data collected in Italy and maintaining the same parameters, Polish farmers collect much more money than the Italian ones. It follows that the situation is not comparable with the Italian one. In fact, all three classes of farms always get a lot of money despite the quantity of produced milk. In such a situation the system that favours small and medium-sized companies expires and the prize received becomes closely linked to the quantity of milk produced. In short, more it produces, more it earns.

The heterogeneity of milk prices and feed costs doesn’t have to present an insurmountable obstacle for implementing the DMPP in the EU. Except for few countries (Malta, Cyprus, Greece, and Finland) most EU countries have very similar dynamics of dairy milk prices. However, this study showed that it is not possible to use a unique program because it would risk favouring some countries in Europe compared to the others due to the different production factors.

A larger point to be made here is that insurance policies like DMPP can only address *short-term* inadequacies of profit margins and not solve long-term structural disadvantages. In general, an average stable market framework makes DMPP effective, intended as an instrument capable of remedying a momentary crisis and not as a long-term payment method.

However, expectations regarding the forthcoming consolidation and spatial restructuring of EU dairy sector necessitate complementing short-term risk management program like DMPP with supports for gradual transition towards more market-friendly environment.

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