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Globalization Effects in Family Farms: A Case of Mexican Dairy Production

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1. Introduction

The globalization of the socioeconomic system has been a widely debated topic in the last two decades. Many disciplines agree that globalization is a concept that emerges from the new international division of labour. It is common today see a trend to regionalism which is based in the creation of regional trading blocks as a need to become more competitive in world markets and to capture others. In this way many countries or regions take advantage from their competitive and comparative advantages in many areas of commerce.

In 1994, the U.S. established the North American Free Trade Agreement (NAFTA) with Canada and Mexico, as a first step in the integration of the Americas. This union took place despite the fact that Mexico is still a semi-industrialized country compared to the U.S. and Canada. The market integration had a supposing that Mexico would improve technology to get an industrialized country and the same time create jobs and reduces the migration to U.S. Moreover such situation has not changed in the recent time.

The creation of regional trading block established regulations based in the release and the opening of market frontiers. The tariff barriers were gradually reduced allowing the free importation of goods produced in international market, which has been attractive in agricultural sector to Canada and U.S. due to Mexico historically an importer country of milk. This process has exposed Mexico producers to face a high competitiveness in the market. The NAFTA was to Mexico the globalization consolidation pointed out by a fast liberation of their market.

With respect to the Mexican agricultural and dairy sectors, globalization has meant an increase in foreign trade, food imports, and arrival of transnational enterprises which has introduced a system of intensive dairying, though not all at once. However, it also has meant elimination of subsidies to force competitiveness of products for domestic consumption, reduction of budgets of programs of production support and development, and reduction in the number of assistance programs for the poorest sectors in rural areas, which have brought a reduced of profit in the agricultural sector.

Thus, the present chapter has the objective to show, after sixteen years of market liberation in Mexico, how globalization has contributed to deteriorate or to develop of the family dairy production in rural areas; what strategies has implemented to survive and face the competitive challenge; and besides to point out what socioeconomical implications are presented to local, regional and global level.

In those terms, the information presented has been obtained by literature review of national and international data base; and to show the local effects, the Maravatio municipality in the state of Michoacán was a chosen as a case study.

2. Open economy in Mexico

During the early 80's, the prevailing economic model in Mexico experienced serious imbalances that became inevitable adjustment measures to stabilize the economy and change its structure.

Insufficient state revenues that supported public spending forced the authorities to resort to external debt to finance development, creating conditions of extreme weakness for the State and the national productive. The debt crisis manifested in 1982 was the start signal reforms.

From 1983 the production system began the transition to a new pattern of development characterized by reduced State intervention in productive activities, foreign trade liberalization, deregulation of the economy and balance in public accounts (Yúnez-Naude, 1998). The model consisted on insert the Mexican economy into the big international circuits of production and marketing in the context of the globalization of world economy.

Since Mexico entered in the General Agreement on Tariffs and Trade (GATT) in 1986, today called World Trade Organization (WTO), the tariff and nontariff barriers were reduced in order to allow the free importation of goods produced abroad (Janvry & Sadoulet, 1997), subjected to intense competition from domestic producers, favouring market competition. The NAFTA, signed in January 1994 for Mexico, the United States and Canada, was the consolidation of this process.

2.1 Agriculture globalization in Mexico

The inclusion of agriculture in NAFTA has been thoroughly discussed because agriculture plays a vital role in society and the economy in areas dependent on agricultural production. Officially it was argued that market liberalization would promote structural change and agricultural production in Mexico, in contrast, critics maintained that these political reforms would strike Mexican producers and threaten the country's food self-sufficiency. It was feared that the superiority of American agriculture on crop productivity of grains and oilseeds take out Mexican producers from market (Rodriguez & Smith, 1998), in particular maize producers.

The release of the agricultural sector was gradually provided for a period of 15 years (for maize, beans and milk powder). It was set a tariff of 215% for the first year, which fall to reach the total deduction in 2008. Forecasts of the impacts of the trade stated that Mexico would increase its imports of grains and oilseeds, and its exports of vegetables, fruit and calves, which would bring economic benefits to the country.

At the same time, programs and institutions related to agriculture were created. ASERCA (agricultural marketing board) was one of the first programs in 1991; it provides support to producers in the marketing of crops. PROCAMPO in 1993 began to be implemented to

compensate domestic producers from the subsidies received by their foreign competitors. Another program created in 1995 was "Alianza para el Campo" (now Activos Productivos), in order to promote efficiency in production units through substitution of crops for products with comparative advantages potential (mainly basic crops to vegetables and fruits). Other features include decentralization and state-level control programs and the investment contribution by the producers. Different programs generated as a result of trade liberalization policies were created as a transition to address international competitiveness and transform the structure of agricultural production in Mexico.

The main effects expected in the agricultural sector are summarized in the impact on prices and the structure of domestic production. In prices was expected that the law of "one price" for goods traded regulate the market, decrease the prices of imported crops, and the elimination of industrial protection reduced the price of agricultural inputs and, therefore, production costs. The production was expected to be restructured and increased efficiency; particularly domestic producers of imported goods would be forced to compete with producers in Canada and the U.S., thus more competition would carry out more productivity.

2.2 The globalization of dairy production

The emergence of globalization meant for farmers, industrialists and consumers of milk a radical change of scenarios that were developing. Even before the 90's, the milk supply strategy was underpinned by the consumption subsidy, based on price controls and import of dry milk, given by the domestic supply and low prices of dry milk imported, limiting the national dairy development, whose cost was to discourage investment and production. During the 90's, the main actions aimed at boosting national dairy were new mechanisms for exercising the duty-free quota of imported dry milk, the release of milk prices and government support. The government only maintained the subsidized scheme of distribution of milk to social programs. Currently, the process of internalization of the dairy sector, led by transnational corporations, has been accompanied by economic regionalization, as market-sharing mechanism that includes a large amount of goods and services, from inputs such as registered animals, food, semen, embryos, medicine, technology for packaging and industrializing of dairy products, to direct consumer industrial goods, such as not-fat dry milk and whole milk, yogurt, cheeses, desserts, ice cream, as well as patents and consulting. As a result, Mexico is established as a leading importer of dairy products and inputs, and user of technologies established from models developed by neighbouring countries.

From the inclusion of Mexican dairy sector in NAFTA negotiations, producers and manufacturers of U.S.¹ opened broad expectations, since the peculiarities in the trade favoured them, while the outlook for Mexico were difficult; both views had support in many facts such as:

- U.S would have a granting of access of not-fat dry milk duty free for 40 thousand tons per year and would increase annually by 3% (Muñoz et al., 1998).
- Mexican production systems had low competitiveness, while in 1993 Mexico production costs were between 0.793 and 1.43 pesos per litre, the parity price for a liter of rehydrated milk ready for consumption ranged between 0.61 and 0.62 pesos per litre.

¹ The trade on dairy products was only between U.S. and Mexico; Canada keep out a unilateral strategy.

- Lack of competitiveness was not only explained by the inefficiency of the Mexican dairy systems, also by the substantial subsidies to production and exportation that products received by the governments of exporting countries, distorting international markets.
- The sum of these and other features seemed to indicate that under NAFTA, the U.S. would have in Mexico an attractive market to strengthen their participation in dairy products.

3. Context of dairy market

3.1 Milk supply

The growth rate of national production has been around 2.6% yearly in the period leading into force on NAFTA (1995-2009), in 2009 dairy productions increased to 10,549 thousand of milk liters; this production has been insufficient to meet domestic demand, and therefore it must be supplemented by imports of not-fat dry milk, whey and cheese which have amounted 30-35% of national availability in the last years (Álvarez, 2009). This means that the national dairy system is depended on supply from other countries that have proved to contain systems more competitive than Mexican.

Growth of milk production in Mexico has been quite variable (Table 1). The greatest growth period matches with the beginning of NAFTA, that is the period when intensive systems in the country have been supplied of enhanced feed for livestock, genetic resource, agrichemicals and many inputs and equipment which are required for the rapid growth of intensive farming, and this is leading to these production systems are becoming the mainstay of growth in Mexican dairy. In contrast, the most difficult periods for national dairy match with those of major instability in the domestic market, and when the prices were less attractive to import multiple inputs that are required in intensive systems.

Year	Thousands of milk litres	Growth	Year	Thousands of milk litres	Growth
1995	7,398,598		2003	9,784,355	1.3%
1996	7,586,422	2.5%	2004	9,873,755	0.8%
1997	7,848,105	3.4%	2005	9,854,805	0.0%
1998	8,315,711	6.0%	2006	10,088,551	2.2%
1999	8,877,314	6.8%	2007	10,345,983	2.6%
2000	9,311,444	4.9%	2008	10,589,481	2.4%
2001	9,472,293	1.7%	2009	10,549,038	-0.4%
2002	9,658,282	2.0%	2010	10,711,619	1.5%

Table 1. Dairy production in Mexico 1995-2009
Source: Sistema de Información Agroalimentaria y Pesquera (SIAP) (2011)

These growth’s variations of domestic dairy production are reflect from the high price of commodities and raw materials for production process. This situation are originated from external factors that are located in the international arena, as the U.S. economic crisis, the high oil prices and other key products for the global economy. In addition, emerging economies like China and India has also been crucial in the increase of demand for a vast number of food products worldwide.

The attention to the effects of climate change has also affected the productive systems, as in the case of deviation of maize for producing biofuel that has triggered a shortage, and therefore, an increase of maize prices at the international market. This has meant a raise in production costs of animal production systems, especially the intensive, where the corn and other grains are consumed in large quantities. From the complete volume used between 50 and 60% of corn imports are intended for livestock, where dairy sector takes a third portion in corn consumption. The problem in grains prices get worst due to fertilizers and agrichemicals as well show a soar price as a result of oil prices increase.

International market shocks, which are characterized by high prices and scarcity, have been a major cause of slow growth of domestic production records in recent years and, in consequence, have decreased the international competitiveness; above, essentially highlighted the vulnerability of intensive systems in the international setting and, therefore, the variation in domestic growth supply. However, it should be noted that the Mexican dairy system is very diverse and, for that reason, not only depends on the intensive systems; for this reason, it is important to make a brief review of major systems developed in the country

3.1.1 Dairy production systems

National milk production has, as a column a technological and productive heterogeneity, which is mainly caused by socio-economic polarity of dairy systems. These can be differed in four from the most modern as the intensive and semi-intensive to most backward as double-purpose and family systems. Specialized intensive systems work under the Holstein model and have, as their biological axis, specialized animals from that breed; they have highly specialized technology, conducts specialized in preventive medicine practices, reproduction, breeding and feeding for high yields and regular in time, which facilitates the vertical integration with industry-to-eat plenty of milk and dairy products. It takes place mainly in the highlands, and arid and semi-arid north areas in the country. Within the national livestock inventory of dairy cows intensive systems represent only 17 %, and they supply more than a half of national production (Table 2).

Characteristics	Production systems			
	Intensive	Semi intensive	Double porpoise	Family
Herd size	300-400	100-200	40-80	5-10
Milky days	305	208-300	210-260	120-180
Performance (L/cow/year)	20-27	14-18		6-12
% of national herd	17	11	62	10
% of national production 1980	24	15	40	21
% of national production 2000	51	21	18	10

Table 2. Characteristics of milk production systems in Mexico
Source: Modified from Álvarez (2009)

Specialized systems, as a result of stationary prices, had to increase the size of their herds to maintain their incomes but each time with more serious problems. Since as mentioned they are highly resource-demanding as good and irrigated soils, as well as many imported

inputs, especially agrichemicals that regularly end up contaminating groundwater and air; plus they are highly demanding of water increasingly scarce.

In contrast family, double purpose and some semi-intensive systems work with modest parameters and efficiency levels (Figure 2). They mostly perform traditional practices such as manual milking, feeding with grazing and agricultural wastes, and having partial preventive medicine practices. Also, they remain to biological cycles and seasonal production of forage and pasture; and therefore, production tends to be seasonal, which makes difficult the supply to industry, and hence the vertical integration.

In the past the highest milk production were sustained by the double purpose and specialized (Table 2). This change to the intensive system was explained by the limits of productivity that double-purpose herds have, unable to produce large amounts of milk, although they have the huge advantage of low production costs.

3.2 Milk consumption

Milk consumption in Mexico is given after the arrival of the Spaniards due to the Indians had no domesticated animals for milk producers (mainly cattle). The merger of the two civilizations, as result of conquest, triggered new consumer habits and the development of particular industries; that results in the gradual development of derivatives such as cream, butter and cheese, which were taken peculiarities in each region. Slowly, milk consumption was widespread, as technology associated with dairy production has been innovated and the changing markets that a globalized society requires (Martínez & Salas, 2002); despite of milk is not part of the traditional Mexican diet.

3.2.1 Consumption trends

The Apparent Domestic Consumption (ADC) reported in 2008 was 12,140.2 millions of milk litres, and it has grown rate from 1995 to 2008 of 1.35%. The estimation of per capita availability of milk based on the ADC notes an increase in per capita consumption from 94.03 to 113.8 liters in 1995-2008; this also has been reflected in the daily consumption is seen as increased availability per person which step of 258 to 312 ml in the same period. Consumption of milk and dairy products is growing, primarily, as a result of the recovery of purchasing power of some sectors of the population, the decline in inflation and the increasing variety of milk products on the market.

Within the consumer trend, it has been observed that gradually they prefer industrialized products that facilitate their use, providing security in terms of safety and allowing them to meet their expectations of social status and caloric intake (Álvarez, 2009). For example UHT milk represented the 28% of the consumed milk in 1996, this proportion changed to 45% in 2005, which are mainly supplied by large and technologically advanced companies with large distribution channels. Nevertheless, some estimated references show that between 30% and 35% of milk is consumed as raw milk without any processing, which is provided by family systems, with the disadvantages of health and quality that it implies.

Some reports mention that big commercial enterprises such as Wal Mart, Comercial Mexicana, Soriana and others, which participate mainly in the urban centres of the country, develop 48% of milk products sales, while 34% are made in a small scale through gatherers and traditional markets, and the rest of the sales are developed within small businesses. This shows the diversity of marketing channels but with a marked tendency to channel more moderns, although still shows that there is an important focus of traditional marketing.

Milk consumption in Mexico is still modest, given that neither milk nor dairy products are part of the traditional diet. Fluid milk consumption has grown for their known nutritional intake and the development already undertaken by public authorities; instead, cheese consumption has been consolidated from fresh varieties that are incorporated as part of prepared products. In fact, in the last ten years, with the spread of the Western diet consumption of other products such as flavoured milks, yogurts, desserts, semi- aged cheeses and breast milk have been taken with greater force in the diet deeply of the Mexican population, mostly urban.

Despite these changes in per capita consumption of milk and dairy products, Mexico records lower consumption compared to developed countries; for example, it is consumed only 30% of the milk acquired by Dutch and less than half that Americans do. That consumption of milk is explained, in part, because for most Mexicans is a relatively expensive product, in fact, in recent years the price of milk (pasteurized) has increased faster than the minimum wage population (Álvarez, 2009).

4. Family dairy production in rural areas

Preceding pages has emphasized in describing the process of globalization in Mexico, also they point out some predicted effects in agriculture and dairy food system that would be triggered with structural reforms. This part point out how dairy sector has been affected by globalization, and how its effects have favoured, especially, to transnational corporations which have assisted to the productive growth of intensive systems, and therefore the increase of production and consumption of domestic milk. However, we do not yet review the effect on the less supported systems. For this reason, we conduct a review of family dairy production and how it has weathered the globalization process.

4.1 Rural areas in Mexico

Rural areas in Mexico have extensive coverage from 2,454 Mexican municipalities half are rural municipalities, and from 199,000 Mexican localities, 196,000 are rural (less 2,500 inhabitants), which involve 24% of national population. If we consider even more populated settlements, up to 15,000, where people have more rural than urban features and where the basic dynamic is agriculture and forestry, the estimated rural population would increase to 38.4 million people, 37% of national population.

Features that constitute rural areas are framed by polarized aspects. One hand rural population has the highest rates of poverty; in contrast, the wealth of natural resources is concentrated in these areas. Statistics of the National Council of Assessment of Social Develop Policy (CONEVAL, 2006), showed in 2004 that 10.9 million people who lived in rural areas, had food poverty and population increased to 12.5 million people in 2005, the same trend was observed for asset and capability poverties where the numbers have risen from 22.1 to 23.8 million of people, and from 13.9 to 15.4 million people, respectively.

Poverty dates are reflect of scarcity of formal jobs in rural areas. Nearly 9 million people receive a minimum salary, and more than 10 million do not receive any income. Therefore, international migration has increased to 40%. The rural household income from remittances of emigrants to the U.S. in the period 1995 to 2006 increased more than 600%; between 1992 and 2005 the annual income of rural households increased from just \$1,332 to \$1,539 dollars,

which represent 47% of the urban income (Instituto Nacional de Estadística, Geografía e Informática, INEGI, 2005).

In contrast, natural resources are huge in rural areas. They have 28 million hectares of farmland, 100 million hectares dedicated to livestock and 61 million hectares of forest land. Crop areas provide 34% jobs in farming activities, where 20% of producers are depend exclusively on agricultural and forestry activities. Currently, around the world 60% of population is rural people, 85% of them are dependent on agricultural production.

4.2 Socioeconomic of family dairy production

Family dairy develops diversely around the country, and their characteristics are linked to geographic and socioeconomic variables from each region, which determine the production process and the characteristics of different products offered. However, the socio-economic function is very similar in each region where the system area developed.

Family dairy fulfils a major socio-economic work. It generates income and jobs for women, children, adults and seniors that support for commodities and employment in rural areas. In some studies (Jiménez et al., 2009) has been shown that family dairy contributes to food sovereignty with total supply of milk to local markets, where covers the milk consumption recommended and provides a nutritional food at low prices (even \$0.50 dollars below the processed milk). These features are present in most family farms that develop this system, which allows to the activity has an important social and economic role within the national territory.

Despite this, the families who developed this system have suffered marginalization and exclusion of the policies and actions of current globalization and from this paradigm the family dairy is deemed ineffective for do not take advantage from economies of scale (Cesín et al., 2009). Thus, the low volumes of production, poor yield per cow, and small farms where herds are developed, are consider limits to make efficient use of resources, leading to high production costs and low competitiveness.

In addition, producers have been subjected to prices fixed by the intermediation due to low volumes of production and lack of organization. The poor integration to production chains does not allow them to enjoy the benefits of added value of their milk, where agent gets a higher profit margin than producer sales on final price (Espinosa et al., 2008).

Another element of exclusion is given for the quality of raw milk. Globalization has brought new rules on milk market where is required high standards in safety and components in milk which is difficult to reach for small producers due to need technology to reduce contamination by human contact. The incorporation of technology is a limiting issue due to high investment; and therefore, family dairy is relegated to the local trade where usually operates the business and finds a market.

In addition, the population who work in dairy production is generally mature and elder which show a limited generational change. It has seen that this happen because dairy production is not an attractive economic activity for young people who have better opportunities in other jobs that are not so demanding of time and offer better remuneration.

4.3 Production process and market of family dairy products

The family dairy farms have Holstein-phenotype animals, creoles and their crosses. Establishments are adapted to small areas close or at homes. Management expenses may be

stabled livestock, or during the day grazing on common land or along roadsides and rivers, which the cattle are stocked at night. Management that is given to cattle depends on the availability of food resources and family labour.

Family dairy, as part of the peasant logic, is intimately associated with agriculture; rural families combine resources of temporary and irrigation surface such as corn, alfalfa and crop residues for animal feed. Regularly farmers complement feeding with some products outside their farm as local concentrates and balanced feed (Martínez & Salas, 2002).

Activities are often focused on milking, feeding, cleaning stables, and sale and processing of milk, all of them are made with family labour. It is not odd to see that some farms employ foreign labour as a support when the activities are increased, as in the harvest season.

This system is typified by a low technology level because the producers do not apply modern practices for breeding and genetic improving, such as artificial insemination or embryo transfer, mechanical milking and economical and productive records. In addition, animal health is scarce because producers usually do not carry schedules for preventive medicine, brucella and tuberculosis control, and hygienic handling of milk during milking and processing.

The family dairy market is also heterogeneous. Milk is mainly sold locally in different sale channels such as: direct to consumers, intermediary and/or rural or commercial industry, but it is not free to sell in big urban areas where the sale of pasteurized milk prevails. The sale direct to consumer is sold per litre, at this channel producers reaches a higher prices because they rescind the action of agent.

Intermediaries collect milk to supply either fluid milk market in urban areas or to manufacture of traditional cheese that has a remarkable market in cities or suburban areas. Commercialization to industry can be made in two ways: a) sale to local rural agro-industry which produces traditional cheeses and has an acceptance and cultural identification on local areas; and b) sale to commercial industry that is responsible of pasteurization and milk transformation.

4.4 Trends of family dairy production during globalization process

As it has been stated, one of the main effects that would bring globalization, specifically NAFTA, of national economy and dairy production was the trend to the market leave of millions of maize producers, the abandonment and disappearance of small-scale dairy production, and the migration of thousands of rural people, so we will describe the impact of some of these trends on family dairy production.

4.4.1 Productive reconversion maize-milk

At the beginning of NAFTA it was expected that domestic production of maize declined and agricultural employment reduced, however they did not. That is explained by self-sufficiency in maize production in the third of small farmers, and because farmers were able to adapt and face the risks of market fluctuations and to maximize the family income with combination of maize and livestock production, which resulted in a productive reconversion.

The productive reconversion has been a trend in agriculture and has stated an alternative to the low prices of maize as a consequence of trade liberalization. This trend has been observed at regional level in states such as Jalisco, Michoacan, Mexico State, Veracruz, Morelos and Colima which the maize price did not compensate the costs of production; for

that reason peasant opted for conversion to livestock (Keilbach et al., 2001). This conversion has not been distinctive to Mexico, according to Delgado et al. (1999) it has also been noted in a global way, but in developing countries livestock has increased as a result of the global crisis of grains. Studies carried out in regions where maize production is the main activity, have showed that the contribution of dairy production to household economy was increased while the maize crisis was deepened (Wiggins et al., 2001). Economic evaluations showed that milk provided more economic returns than maize, and equal or better than those received in other non-agricultural activities. So those evaluations illustrate how the conversion maize-milk production is a local response to global policy.

4.4.2 Did family dairy production disappear?

In the global arena has been observed different productive structural trends as a result of globalization, one of them have been the decrease in the number of small farms (García et al., 2005). This trend has been observed either U.S. or Canada. the number of farms in U.S. decreased during 1992-2000 at 48,510 farms, which means a loss of 36.9%; and in Canada there are currently only about 7% from those in 1970 (Schwarzweiler et al., 2000). Each country has different reasons to explain it, such as problems in land tenure, support policies toward the great producer, insecurity, and others.

In Mexico the trend to reduce of small-scale dairy production has been little studied. Studies at the beginning of globalization established that family dairy would be on disadvantage face intensive systems which were more competitive. The main weakness to compete were focus on the low profitability to collect small volume of milk, the poor milk quality, and the high cost to produce, which would keep out from competitive markets

The poor competitiveness is given because it is unthinkable to collect small volumes of milk produced at scattered small farms, which implies to add a higher cost than a large farm that produce a big volume of milk does. In this sense, the low production volumes and poor yields per cow in family dairy do not allow take advantage of economies of scale, and make an efficient use of resources, therefore that cause a high production costs and an uncompetitive at the end.

Furthermore, milk quality has been a complex element to handle by small-scale dairy production. Requirement levels on safety milk (low bacterial counts) and physicochemical composition (a minimum of fat) are an indicator of small producer marginalization because milk quality also limit to access to competitive markets where industries need to have an input of the highest quality with minimal cost. To maintain a high quality is not possible to think in a manual milking, it requires technology and automation to reduce human contact, same situation for cooling, storage and transport (Garcia et al., 2005). The incorporation of technology is a limiting factor for family dairy due to it needs high investments which are not covered by the income it earn, thus family dairy loss competitiveness.

However, although data in Mexico show a decline on family dairy participation to domestic supply (Table 2), it is also known that the number of small farms has not decreased. In the 90's there were 127,000 units of milk production which 77% of them corresponding to the small-scale dairy farms. (Martinez & Salas, 2002); those data are remained, in the last livestock census conducted in 2007 (INEGI, 2011) was found that around 73% of units correspond to the small farms. Therefore, statistics help to point out that the tendency to disappear and abandon family dairy production has not been established in Mexico, and in contrast family dairy has been an option for rural families.

However, it is fundamental to know how has family dairy persisted against the expected effects from globalization?

4.4.3 Persistence strategies in family dairy

Family dairy has persisted due to a range of adaptations and modifications made either their production model or their marketing scheme, some of them are intra-farm and other are attracted by external agents of market, so in the next paragraphs these strategies will be described based on arguments that point out disappearance of family dairy.

4.4.3.1 Local products and markets

First, it was said that the quality of milk would be a constraint to family dairy in market. Although, several producers could not face quality standards set by industry, those standards did not stop all producers went out of commercial market. Producers who kept on market under this scheme have had to adapt and change their patterns of production process. In the most dairy regions of Mexico, industries such as Nestle, Sello Rojo, Alimentos la Concordia, Alpura, LaLa, and others changed to a new strategy to collect milk that was defined in a system to obtain raw milk at best quality (cold milk), to achieve stability and security of supply, and to reduce collection costs.

The enterprises gave credits to producers to purchase of equipment for milking hygiene and infrastructure in the cooled milk, in order to decrease the bacterial counts. These measures forced producers to organize themselves in groups concentrated around a cooling tank, and implicit contractual relationships without previous negotiation. Thus, enterprises have bought the milk using reward and punishment rules where quality standards were increasingly more rigorous² than the previous (Cervantes & Cesín, 2008). This new industry strategy deepened the relationship with family dairy, redistributing profit margins and risks, where producers receive a payment for their milk but they would assume the risks and costs of collecting, cooling, and deliver milk with quality and safety standards required on industrial process; in the same way, they would be eliminated producers who are not efficient in terms of profitability and quality. Under this market scheme, farmers were subjected to industry needs to continue in market.

Producers who left from industrial market had to turn up to local markets which use raw milk to sell unpasteurized milk and to make traditional cheese. The market for unpasteurized fluid milk is still quite large, about 35% of fluid milk is commercialized in this way. This milk is appreciated not only by price but also by intrinsic features such as flavour and cultural identity; but with that the consumer ignore safety because during milk boiling that families do, it can reduce the health risks. Therefore, through from this kind of market many small farms still remain.

Regarding the raw milk sale for cheese, studies say that the traditional cheese market has increased on national and international markets, internationally in the market called “nostalgia”, which is demanded in Mexican migrants. In Sonora production of “cheese tortillitas” are sold with high demand in the region. Today, they are so demanded that buyers go to “quesadilleros” homes to buy them. The Mexican population, particularly from

² Industry has reacquired increasingly lower bacterial count through the reductase, which is an indirect measure of the bacteriological quality. Reductase in the case of Altos de Jalisco step of 178 minutes (very contaminated milk) in 1992 to 574 minutes (safe milk) en el 2000.

Sonora, has increased in U.S., which has favoured the informal export of “cheese tortillitas” (Andablo et al., 2009).

Another case that has made a choice of alternative market has been the producer of “Cotija” cheese. This traditional cheese has been produced for many years in mountain chain region of Jalisco and Michoacan, and it is the third Mexican cheese in Mexican production (Villegas, 1993). In the last decade producers through an organizational process have sought in the Protected Denomination of Origin (PDO)³, an instrument to create value so that compete in an unconventional markets in order to face globalized markets. Experiences in the process have point out that producers, in addition to using surplus of milk during the rainy season, have been able to enter in markets that offer better prices, 40% higher than they were paid (Chombo, 2007). These examples exemplify how rural areas have the possibility of alternative development to face stipulated forms without pass over the history and local culture.

However, raw milk is also a public health problem because it does not meet quality standards, so the consumption of some cheeses is a constant risk to human health. Despite this, traditional cheeses are widely consumed, the total consumed cheese in Mexico 80% are made from raw milk produced in family systems. Therefore, if safety quality of milk is improved, the opportunities will be promised.

4.4.3.2 Prevalence in use of family sources

High production costs in family dairy were a factor regularly point out as a limit to compete with intensive systems. Some studies suggest that high costs in dairy production are caused by high costs of feed inputs, especially by the price of balanced feed (Cervantes et al., 2001). The balanced feed is a resource, in many cases necessary, to obtain good yields of milk per cow; so many producers have to buy no matter prices. The strategies to reduce feed costs or use of balanced feed, was based in introduce ingredients produced own farms. Family dairy shift resources from agriculture to sustain a part of cow feed for instance corn and agricultural wastes (straw) mainly; in other cases, for example in Hidalgo, the incorporation of alfalfa to dairy production has been a resource to give value to crops, reducing its sale in the local market (Vargas et al., 2009). By incorporating own food ingredients, the family resources such as land, family labour, seeds, and others producers do not have to pay cash to buy these inputs, hence they reduce costs and add value to their resources.

Likewise there are other inputs such as facilities, cows, and especially, labour. The last input is a basic factor in every production process; hence the family labour has been for years the cornerstone to the subsistence of family dairy production. The use of family labour in the production process depends not only on the head of household, but also on the years of experience of elders, good management of resources for women, and the willingness of children to join to milk production process.

Resulting from the use of family labour is seen that farms keep a cost of production below to milk price, despite the fact that it allows them to have a profit margin; in many cases it does not reward their own labour. However, many labour of elder people, women and children who hardly have access to employment options in formal economy (Jiménez et al., 2008; Cesín et al., 2009), found on a family dairy a labour option.

³ Protected Denomination of Origin (PDO) is a process of commercial legal protection of an agro food, whose quality are associated to natural and humans factors that territory provides

4.4.3.3 Pluriactivity and diversification of productive activities

Emigration of rural population in recent years has placed in doubt the permanence of rural dairy production. Mexico is first exporter of migrants in the world and the third receiver of remittances, while its migrants make up the largest foreign contingent in the U.S., where there are 21 million Mexicans. It is estimated that from 2000 to 2005 the number of migrants toward U.S. increased in 22% (De Luna, 2005), and that the main origin of emigrant people are rural.

Pluriactivity in family systems is an essential part of supplementing of family incomes; it means an increase of economic activities which could be inside or outside of farms. These circumstances, consistently are observed in family system; Espinoza et al (2005) indicates that the diversification of activities is part of the strategies used by producers to solve their difficulties, in certain regions such as Sonora, Zebu crossbreed are used in order to diversify their production, thus, producers can sell calves fattening and keep animals resistant to bad weather conditions (Andablo et al., 2009). Therefore, partial agriculture, diversification of activities on farm such as calves sell as an inside activity, and the emigration as activity outside, clearly reflect the pluractivity in households. The possibility to diversify production activities either inside or outside of farm makes possible to sustain the family with enough economical resources.

5. Global actions and their local effects: the globalization in family dairy production from Maravatío, Michoacan

The following case study aims to show local effects arising as a result of the actions applied in globalizations process and regional integration. We chose the main milk-producers communities of the town such as Santa Elena, Campo Hermoso, Dolores, Casa Blanca, and Tejero, all located in the valley of Maravatío. The choice of these took place mainly because despite having a low participation in state milk supply, they have a long history as producer, so with this we tried to not exaggerate the globalization effects at local level.

The information presented below is part of the results obtained in different research projects related to family dairy on Economics, Administration and Rural Development Department of Faculty of Veterinary Medicine and Animal Husbandry (FMVZ) of the National Autonomous University of Mexico (UNAM), conducted from 2002 to date.

The methodological framework is based on participation-action research. The fundamental idea of this method is to optimize the relationship between researchers and researched. For this reason we have made stays of 6 months to a year in different communities in order to create a trust link with communities. Information was obtained through semi-structured interviews and participant observation carried out in dairy farms which participated in the different studies; structurally observation and interview guide included three main elements: 1) access to natural resources, 2) organizational and family productive structure, and 3) production process and economics of dairy production.

5.1 Maravatío localization

Maravatío municipality is part of the state of Michoacán in central western Mexico. It is located northeast of the state an altitude of 2,020 meters above sea level. The distance to the capital of Michoacan (Morelia) is 91 km, and represents 1.17% of the state total size. Its climate is mild with summer rains, an annual rainfall of 897.7 mm, and temperatures ranging from 14.1 to 29.9 °C.

It is considered a high poverty county, agriculture is the main activity in the primary sector, being maize the main crop, it is cultivated in 17,683 hectares which 6,250 are irrigated and 11,433 are rain dependent. Livestock is the second most important activity in the primary sector, both agriculture and livestock account for 65% of economic activity in Maravatío (H. Ayuntamiento de Maravatío, 2007).

5.2 A brief history of Maravatio as milk producer

Milk production in the municipality begins in the early nineteenth century (Pérez, 1990). From 1900 to 1935 the activity was taking place mainly on three haciendas Santa Elena, Huerta and Casa Blanca. Rustic cattle were used for temporary milk production and cheese making; besides the accumulated manure in stables was used as fertilizer for irrigated plots (Léonard, 1988).

The arrival of the train in late nineteenth century bring out the expansion of marketing toward Maravatío and later to Mexico and Morelia, letting the development of dairy farming and cheese, mainly from Haciendas (Pérez, 1990). In contrast, it also was a motive for sons of small owners to immigrate to the United States.

In 1935, the characteristics of land tenure and agricultural production changed with the creation of ejidos; however, milk production remained monopolized by large landowners, which outlined a differentiation of activities. Little properties were beginning to split into even smaller production farms. Also, in the late fifties the use of chemical fertilizers became widespread, causing the abandonment of manure as fertilizer.

Since 1970 started the peak of dairy production in Maravatio, this occurs by the differentiation and accumulation of land in certain regions such as Campo Hermoso, for these reason Campo Hermoso was the first to purchase Holstein cows in 1971 (Leonard, 1988). The decline in wheat prices between 1970 and 1980, and the fragmentation of rangeland in 1978, provided the impulsion for dairy development, and gave guidelines to dedicate those plots of abandoned irrigation for growing grass and oats for cattle feeding.

In 1982 state government directed and developed those conditions in the Maravatio's valley with a project of family dairy development, although it was not the one project launched on Maravatio due to a project of big cowsheds (4 stables of 250 cows) also was promoted by Ministry of Rural Promotion; nevertheless they were closed because they had a poor management, bad organization and resource misuse.

The relevance in dairy development in Maravatio is originated by economic potential that geographical position represents, it is located near to urban areas such as Mexico City, Toluca, Queretaro and Morelia, besides it is a centre of many roads from these cities and others, for these reason it has opportunity to supply and sell dairy products to urban areas.

Currently dairy production is conducted by family farms mainly. In the last livestock census (INEGI, 2011a) was recorded 392 farms over five cows which had 2,692 cows, in average each farm had 7 cows. Dairy production showed stability during 2002-2009, in that period production had a growth rate of 0.65% where step from 4,794.05 to 4,923.96 thousands of litres which represented to Michoacan supply between 1 to 2%.

5.3 Maravatio's family dairy

5.3.1 Characteristics of natural resources

Study communities have access to water from the Fresno lagoon that irrigate crop land from Campo Hermoso, Santa Elena and Dolores; besides they have the Casa Blanca marsh and

other swamp places which increase their extension on rainy season so they are used to graze cattle. Casa Blanca, Campo Hermoso, Dolores and Santa Elena contain many springs that are used to feed community populations.

Farms own in between 1 to 15 ha of agricultural areas, some of them are taking to crop in temporary and irrigate lands where maize, oat, beans, strawberry, and grass are cultivated. Lands have different kind of soils such as sandy, clay and silt. In all communities is seen many inactive lands. Producers commented that they are left by owners due to there are not people who want to work it, and also many of them have diminished their yield. Problems related to access to natural resources are diverse, many of them concur in low efficiency of irrigate channels, pest in crops and frost that happen in winter, all of them are restriction to increase productivity in crops, not forget the high prices of inputs for instance fertilizers and agrochemicals.

5.3.2 Organization and social characteristics

Communities from valley of Maravatio do not exceed 1,000 inhabitants, except Santa Elena that have 1,700 inhabitants (IINEGI, 2011b). In average each family has 5 people; the most inhabitants are grouping in elder and fully adults, and at least 50% of farms visited have a family member in the U.S.

Migration is common in Michoacan that is considered a state with traditional migration, for these reason communities and many farms are not exceptional to this social phenomenon.

Population in town has been waved in number of inhabitants from 1995 to 2010 with rate growth lower to 2% as is seen in Table.; nonetheless, population in Dolores has a clear tendency to decrease, so rate growth is negative. These trends could be consequence that in most of the rural communities people tend to emigrates, especially, young people. They emigrate when finish the elementary school, and their destination is to Chicago in the United States. Information indicates that population have constant migratory flows which reveals that many communities raise, besides it provokes a lack of labour to work in agriculture and dairy farms.

Communities	1995	2000	2005	2010	% ARAG*
Maravatío	65,694	68,849	70,170	80,258	1.34
Dolores	678	648	550	536	-1.55
Tejero	726	719	500	606	-1.20
Campo Hermoso	753	748	724	759	0.05
Casa Blanca	617	649	656	780	1.58
Santa Elena	1401	1544	1,701	1,893	2.03

Table 3. Numbers of people from communities of study from 1995 to 2010
Source: Made from National Population Census 1995, 2000, 2005 y 2010 (INEGI, 2011b)
*ARAG: average rate of annual growth

Communities have basic services such as potable water, electricity, only Casa Blanca and Campo Hermoso have sewerage and drainage; in education, communities have up to elementary school; as sport services they have fields of soccer, basketball and baseball; and to buy household goods they can buy them in little shops inside the communities and in the municipality market central that is located 10 to 25 from each community. There are roads to access to communities, where occasionally public transport is a way to move for purchasing basic goods and going to school but it is very limited because it takes 40 minutes or an hour to go. Beside they have telephone, television and radio as a commutation media.

As a form of community organization, communities have an Ejidal president and an order manager which are in charge of convening meetings for different purposes for instance notice of support programs and security problems. In productive organization, the Maravatío have two livestock associations, one of them is independent and the Local Livestock Association has register in the National Livestock Association. In addition, from the year 2000 the municipality has managed to form 6 livestock groups to validation and transfer technology (GGAVATT).

The livestock associations have up to 800 partners; the Local Livestock Association has 60% of producers. It has been leading role on keeping the livestock activities in Maravatio; in recent years it has helped to get more than 70% of support from “Activos Productivos,” as its producers have said, the Association facilitate bureaucratic paperwork in order to get support, also sometimes it funds to producers to acquire the assets from programs. This help is due to, among others, producers have complications in requirements that producers by themselves could accomplish, at first because they have low scholar levels (in average they get up to 3 scholar years), and at second because they could not afford their economic part in such support programs. Therefore, Local Livestock Association has an essential utility to producers either to promote or make possible the access to support programs.

1. Numeric Identification	10. Artificial Insemination
2. Productive Records	11. Mineral Supplementation
3. Economic Records	12. Concentrates Supplementation
4. Milk Weighing	13. Silage and hay
5. California Mastitis Test	14. Artificial breeding
6. Drenching	15. Soil Sampling
7. Vaccination	16. Seeding of Cut Forage
8. Pregnant Diagnosis	17. Fertilization
9. Brucellosis and Tuberculosis Diagnosis	18. Manufacture of Compost

Table 4. Basic technologies to GGAVATTs

On the side of GGAVATT, it is important to point out that the program consist in giving technical assistance during 3 years, where government subsidy the salary of technical

assessor. The 6 groups that there were in Maravatio so far, just one is keeping as a legal figure (Society of Rural Production); other two groups are working with GGAVATT methodology since they have still a support year; and the others have disappeared after the support have finished. It is important to mention that the one GGAVATT kept since program beginning has been thanks to the advantages that have a legal figure and the financial compromises as group has obtained with the only reason to have assets. This transfer of technology model has acceded to producers that have been in a GGAVATT (100 producers), to know a packed of technologies consider as basics for all country (Table 4); however, few producers has implemented it ordinarily. That has been a sign of weaknesses that the model has when is used a generic method to improve farms. such weaknesses are focus on a lack of knowledge from local culture, a lack of a real participation of producers on transfer technology, a mismanagement and resource misuse, and a lack of extension service that play a important role to transfer technology and group consolidation.

5.3.3 Productive and economical characteristics

Communities have dairy production as first economical activity that it is intimately join to agriculture, besides they could be complemented with other incomes for instance sheep and poultry production, land rent to crops, non-agricultural jobs (drivers, masonry, and others), and also, remittances from relatives who lives in the U.S. (Table 5). Milk sell represent almost 50% of average total incomes (\$1,363.63 dollars per month) whereas remittance incomes 4% from totals (Jiménez et al., 2008), which denotes the economic importance from dairy farms to rural families.

Sources of Incomes	%
Dairy production	51
Migration to U.S.	33
Crafts trade (pottery, masonry, etc)	7
Little business	4.5
Formal employment	4.5

Table 5. Main economic activities in dairy farms

Most producers held have developed dairy production for at least 40 years; only 13% of farmers have less than 5 experience years. Their herds are compounded by Holstein, Jersey, Montpellier, Swiss Brown and their cross as breed animals. Their cowshed are located on an area where producers live for these reason they are consider as backyard units, facilities are made from concrete floors, sheet roofing and linear feeders, this place is used either milking or feeding, also it is used as stay and handle of cows; even though some producer in this place have adapted little milking parlour. Their cowshed have space and slope problems which originate humidity excess on rainy season, at the same time they have manure accumulated in excess that predisposes animal diseases and increase the possibility to milk contamination.

Dairy farms as technological practices execute preventive medicine such as drenching and vaccination but they are not scheduled and recorded; and artificial insemination which has increases its acceptance on dairy farms of Maravatio, it is used on 24% of census cows that was more than the national use (11.6%) (INEGI, 20011a). This acceptance has been derived by some producers that has received training and has been able to acquire quality semen from international enterprises such as SEMEX and ABS; as a consequence, the experiences about milk-yield increase has been transmitted among them.

The milking, animal feeding and milk selling are the main activities during productive process. Milking is made two times during the day, morning and evening, it is making manually, and only 20% used milking machine, during this activity, few producers do practice that safe milk hygiene and reduce mastitis such as sealing and dipping teat and California mastitis test.

Cow feeding vary depends on season and management system. In rainy season (May – September) feeding is based on grazing, commercial balanced feed, maize, bran, and maize or sorghum straw complemented with native grass, forage such as alfalfa, rye-grass and clover. In dry season (October – April) animals are confined on facilities where they feed with maize or sorghum straw, oat and commercial balanced feed, if producers have irrigate crops they could provide forage such as alfalfa, clover or rye-grass.

Balanced feed and chemical fertilizer⁴ rising prices are the most significant costs in dairy production. Balanced feed prices have increase 20% just from 2006 to 2007, and fertilizers from 40% to 60% in the same period. Strategies to reduce the use of those inputs are related to use own inputs; balanced feed are reduce but it is offset by other ingredients for instance maize and oat which through trial and error, have gone balance to not shrink milk production, also in recent years some producers have been incorporated maize silage as an alternative to improve and have a better use of all maize plant due to it has a low cost to elaborate and has a better quality than straw; the incorporation of ingredients produced in own farms to cow diets allow that cost of feed is reduced up to 21% (Jiménez et al., 2008). To reduce the use of chemical fertilizers on grassland producers have come back to a traditional practice, to use manure as a natural fertilizer which was used before green revolution in Mexico.

All the activities are done by family where men are focus on forage production and animal management, children look after animals during grazing, and women are in charge to elaborate cheeses. Family labour tend to be masculine, however, with migration increase is quite evident that women participation has increased in productive process, between 20 or 30% are producer women. Two family members participate in production process who invests approximately 9 hours per day. Additionally, some farms paid for labour, it happens between 30 and 50% on dairy farms, and it is linked with season and number of activities in farm, so it regularly happens during harvest season.

Jiménez et al. (2009) report that dairy production would be guarantee 63% of jobs in people who are labour age. Nonetheless, because of economic retribution that people receive from dairy activities is lower than they expect at international migration, many elder, children and women use dairy as an economical labour option (Jiménez et al., 2008). Thus, dairy production gives the opportunity to any family member with the purpose they complement family incomes and productive occupation in rural areas.

⁴ Broadly used to fertilize maize and grassland

Milk production is quite heterogeneous, volume in farms is from 10 to 400 litres per day, and each cow in average produce 14 litres per day (INEGI, 2011a). Cost of production, also are very inconsistent throughout the year, it is due to feed available in each season and herd size. Months where producers have the highest costs are June, July and August where they reach up to 130% of sell price, while September, October and November are the lowest costs because represent 53% of sell price (Gil, 2010). Size herd also is determinant on costs of production, more milking cows less costs of production; it is consider that farms should have more than 7 cows in production to get profits, while they do not take account the family labour cost (Jiménez et al., 2007).

As in other country regions, the use of own resources in order to lessen production costs are prevailing in Maravatio farms. Additional to family labour and ingredients incorporated to feeding, many producers in Maravatio have their own breeding, with this they save money to buy cows, reduce safety risks and have animals adapted to feeding and weather local conditions. For some famers to have a own breeding have permitted, on one hand, to renew frequently their herd, up to 25% yearly, and in less time to sum better genetic in their herd; and on the other hand to sell cows-residue at higher or equal price than heifers-in-calf. The use of all resources getting in the own farm can reduce up to 70% of total of production costs, making dairy production economical feasible (Jiménez et al., 2008).

The commercialization is made locally to cheese manufacturers, the dairying of Maravatio, sell direct to consumers, sell to agents on farms and own manufacture for selling cheeses. It is important to state that most farms used drink milk produced by themselves, this consumption represent from 10 to 20% of total production, and it is used either familiar or calf consumption. The sell point depends on each community, for example in Campo Hermoso milk is sold, in the most cases, within it, where is used to elaborate fresh cheeses; in Dolores and Casa Blanca is commercialized mainly to cheese manufactures and the dairying of Maravatio. Prices are also varied and depend on the sell point, they are between \$0.35 and \$0.45 per litre-milk, and the direct sell to consumer offers a better price.

Those ways to sell have perpetuated for years in each community. The transnational enterprises have not historically had influence on milk commercialization; some producers commented that Nestle some years ago could be an alternative to commercialize their milk but for quality requirements never was established any business; for these reasons safety quality has not been a limiting to access to local market, the only inconvenient that cheeses manufactures could punish is when producers add water to the delivered milk because water addition reduce cheese production, the punishment is not receive the milk of producers who have added water, in this way they loss incomes from a day. In contrary to other country regions, milk quality has not been a competitiveness element on family dairy of Maravatio which focus historically its market in local level.

Barajas (2007) in a market study on Maravatio points out that the rural communities are the main consumers of raw milk. Jiménez et al. (2009) in a study made in Dolores indicate that 63% of Dolores population consumes local raw milk; its consumption is more than national in 17% and consumers of raw milk exceed with 60 ml FAO recommendation (500 ml). The main factors related with a high consumption are flavour, accessibility, and low price of raw milk. In those cases dairy satisfy completely local consumption, which represent 20% of local production, and the surplus go to rural agro-industry that manufacture chesses, yogurt, milk candies and other products.

Despite of above, it has found that urban areas of Maravatio are a potential market to milk produced in family farm due to 25% of consumers of pasteurized milk would be disposed to buy raw milk if they had available it (Barajas, 2007), in the same way urban places are broadly consumers of dairy products such as cheese that is consumed each week in 500 gr. (Espinosa et al., 2003). Similar to border regions in Mexico, Maravatio has the opportunity to take advantage from “nostalgia” market because in season after Christmas’s holydays (January-March), migrants used take local cheeses when they return to U.S.

5.4 Effects of globalization polices in dairy production

The policies taking to globalize the Mexican economy were based on market liberalization with country allies, the importation of basic goods with competitive prices, and the arriving of transnational enterprises that in national dairy system has brought the introduction of Holstein system of intensive production. At the same time, policies were guided to reduce either direct subsidies to producers or support budgets to get equipment and technical assistance and extension programs. These policies definitely had repercussion and effects in diverse manner on family dairy of Maravatio.

5.4.1 Liberalization trade of maize and milk

The importation of basic goods such as Maize and Powered milk brought a low domestic price on internal consumption level, which to producers of Maravatio meant a drop of maize price paid to them, this provokes as in other regions of Mexico that producers were including maize to cow diets every time in more proportion which was tend to a productive reconversion maize-milk.

During the globalization and trade integration years, producers have been able to overcome maize prices with economical, for instances if there are prices on market that cover production costs producers sell a major proportion to commercial maize enterprises, but if prices is lower than production costs they integrate maize in more amount to milk production. These strategies are not new to them since they have experienced similar challenging with weather uncertainties, so they have learned to overcome either natural risks or market uncertainties.

In the case of milk prices, it was feared that many producers left of market and disappeared many farms due to they have poor competitiveness face international prices; furthermore, quality on products imposed new rules of market where small farms would not overcome. To dairy of Maravatio the low milk prices do not have effect on dairy disappearance because the number of farms is almost the same that even they have increased the volume of milk production from municipality.

International milk prices did not affected directly to dairy production, and they would hardly do it, due to dairy farms never was integrated to commercial productive chain, so they did not compete with international prices of commercial milk, and beside due to international prices of milk were higher than raw milk. Family dairy of Maravatio only have local competitiveness when there are a surplus provoked by the seasonal production which makes that prices get down or production be rejected in that season.

The safety and composition quality on milk have not restricted that dairy farms continue selling raw milk in Maravatio because producers do not have relationship with the commercial industry; even, for some features that raw milk have, many chesses

manufacturer prefer that milk to elaborate traditional cheeses which have a good acceptance in regional and local market. Solely, as we have mentioned, water added to milk is an element often questioned by cheese manufacturers due to cheese productivity are reduced by water added.

In an indirect way the globalization effects are reflected on the increase of prices of commercial balanced feeds. The increase of oil prices between 2007 and 2008 has increased chemical fertilizers on almost 200%, and as a consequence the inputs used to manufacture balanced feeds. That effects have been manifested in Maravatio where the increase of fertilizers have reflected on prices of balanced feed that is required imperiously every day to milk production. Despite of producers have introduced other ingredients, they have done very few to avoid being immerse on the dynamic of market prices.

The globalization among other objectives has pretended to homogenize the way to produce and consumption around the world which benefits to big transnational enterprises and industrial mass production. At this stage Mexican traditional cheeses are threatened by imported cheeses produced industrially, imitation cheeses⁵ and analogues cheeses⁶, and market cheeses of Maravatio is not immunity. Currently, it is introduced those king of cheeses which could be a hard hit to local market of traditional cheeses due to this cannot compete on markets where prices are an important aspect that consumers consider to buy cheeses which is reflected in the price paid to producers.

5.4.2 Liberalization trade and the arrival of Holstein system

The liberalization trade and free markets allowed the arrival of transnational enterprises on the different levels of the milk chain. Particularly in production level resulted in the introduction of the Holstein system of intensive production. This model was established as a competitive option to domestic dairy systems, even family dairy, it is because the model offers specialization and intensification necessary to get competitiveness. However, Cervantes et al. (2001) states that in the country is impossible for family dairy to adopt this model for the different geographic and socioeconomic characteristics, but it is common that some producer partially follow the model according to their resources.

This has been notorious in some producers of Maravatio, especially who have participated in GGAVATT, where techniques and technological practices are aimed to intensification and specialization of family dairy. An example of what globalization with the Holstein model has represented in family dairy is the use of artificial insemination, where globalization has brought benefits to purchase quality semen and genetic from U.S. and Canada which needs better space, feeding and health conditions. These aspects hardly producers in the past had, but recently thanks to the experiences for using artificial insemination some of them were able to overcome these effects of Holstein model.

5.4.3 Reduction of subsidies and support programs

In past decades dairy production in Maravatio was highly promoted through different projects such as the 4 big stables in 80's or the introduce Holstein cows in 70's. those

⁵ Imitation cheeses are manufactured using cow milk in part and other with vegetable fat.

⁶ Cheeses manufactured with raw materials processed of dairy or non-dairy origin (dry milk, casein and vegetable fat) but not fresh milk.

supports were obtained with few costs and inversion to producers, maybe for this reason such projects were missing out and leaving up to their disappearance.

Many producers with decentralization and state-level control programs and their contribution on investment have been forced to a new stage of competitiveness for getting support, since programs are not massive for requirements and budget reduction; therefore, they reach to very few producers. This has led to organize through the Local Livestock Association and the GGAVATT, to make investments financed by remittances, and to value the resources obtained. According to the above, it is beginning to generate a structural and productive transformation of agriculture and family dairy in Maravatio, despite it is made in a way imposed and enforced.

To sum up, we could assumed that globalization effects in family dairy of Maravatio have been contrasting. We could perceive that the globalization has been breaking producers' paradigms such as in the use of new productive techniques, the management of economic resources to face and adjust market trends, and the organization to get productive and economic advantages, even though they are not part of expected, they are a collateral effect that globalization means to local level. Family farms of Maravatio with that transformation and their natural, cultural and traditional local resources have been able to persist in a globalized economy.

6. Conclusion and future perspectives

Globalization in Mexico has encouraged the import of raw materials and food to low prices, intensifying competition in domestic markets, while the government supports and production subsidies has fallen; which for the agricultural sector and dairy subsector would initially mean the exit of millions of peasants and the disappearance of family dairy farms, and hence the search for new employment options in the migration.

In literature reviews about family dairy, and particularly in the case study of Maravatio, it is clear to notice that the expected impacts over 16 years of globalization in Mexico, migration to the United States is only the effects have appeared and worsened in that period, without this meaning that the family dairy production has disappeared. In this context is evident that family dairy is an activity that has been key to support rural families economically in the regions where they perform, for this reason dairy farming in rural areas has not disappeared.

Family dairy has persisted to a highly globalized environment through small changes in the paradigms of production and market that it have been subjected and forced by globalization, but mainly due to it reminds local features either in production or in market, which has helped generate persistence strategies.

In each territory where milk production is developed there are special features that allow build up specific local strategies; however, in general family dairy base their persistence in:

- a) the productive reconversion maize-milk where milk production has been a solution to the crisis in the prices of maize and it is a way of added value to agriculture;
- b) the prevalence of family resources mainly family labour and land, essential factors in production process for the development of any economic activity;
- c) the pluractivity and diversification of activities inside and outside of farms which gives ability to keep an adequate supply economic resources to family;
- d) the dominance of traditional markets where prevail the preference for products originated from family dairy.

Then, it is the heterogeneity, too

questioned in family dairy, which offers the strengths and opportunities in each region which can generate local strategies to work against global actions.

Despite these strategies, the future prospects of family dairy seem to be contrasting, in the manner that producers in the short and the medium term still have elements which could endure and persist at the local level regardless of distortions and uncertainties in the global economy; nevertheless in the long term future is uncertain, and perhaps a very unpromising to some producers.

Farmers-market dairy industry are from the perspective of their relations with the market industry the less privileged, since they have unbalanced contractual relations and there is not favourable ways nor the intention to regulate markets by the state. These facts over time could be wearing away to producers which do not want and do not have the intention to transmit the family dairy activity to future generations as an economic resource.

In the case of producers who have been maintained thanks to local markets, the immediate future can be tilted to a situation that may be eroding its market. With the massive promotion of uniformity in the consumption of dairy products and the increasing incursion of products with lower prices than traditional, trends in consumption may change as the consumer will always tend to find lower prices. Therefore, it is thought that this scenario would put at risk the family dairy production for future generations, and also traditional products which will lose some of the gastronomic heritage which identifies the territories and cultural diversity of Mexico.

The future of family dairy in the long term tends to have limitations in the order of increasing migration that occurs in rural areas. Without doubt, the remittances are an income resource for families, it is also a fact that with the exodus of rural, migration contributes to the deterioration of family dairy given that the moving away from primary production and rural life cause culture changes that in the medium and long term decrease the generational replacement in family dairy.

Economic globalization is a phenomenon that is here to stay, whether in Mexico began with NAFTA, it will follow with other countries around the world; thereupon, each day will impose new challenges to local production.

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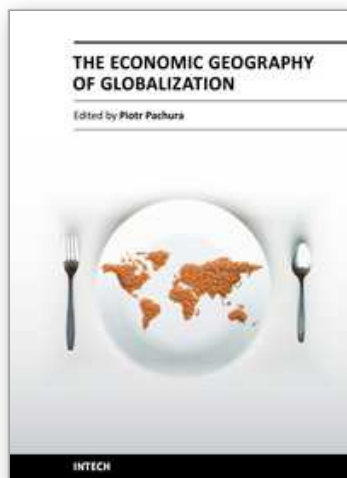
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