MINISTRY OF ECONOMY

DEPARTMENT OF BASIC INDUSTRIES

SE

ANALYSIS OF THE CORN-TORTILLA VALUE CHAIN: CURRENT SITUATION AND LOCAL COMPETITION FACTORS

ABRIL , 2012

Contents

I. International Context

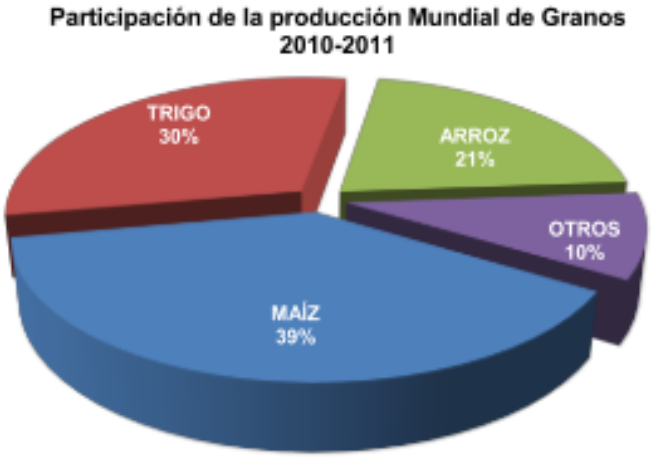
Until recent decades, corn was traditionally primarily intended as human and animal food. However, in recent years, with advancements in science and technology applied to the study of corn, a variety of products can be obtained from it, including non-food products. Among the primary products that can be obtained from corn are the following:

- Protein and fiber: for the production of balanced food;
- Dextrose: for snacks, bakery use, beverages, serums, lysine, citric acid and antibiotics;
- Ethanol: industrial alcohols, alcoholic drinks and fuel;
- High fructose corn syrup: as a sweetener for making soft drinks, juices, jams, sweets, desserts, wines and low-calorie sweeteners;
- Oils: edible for domestic use and baby food;
- Starch: for making bread, atoll, baby food, beer, corrugated cardboard and paper;
- Glucose: for manufacturing sweets, candies and gum;
- Coloring: in processes for the production of soft drinks, beer, liquor, sausages and bread;
- Maltodextrins: powdered milk, sausages, chocolate powder, powdered foods;
- Sorbitol: for toothpaste and confectionery.

This range of products currently made from corn caused, until a few years ago, no significant problems to the world corn supply dynamics. With the entry of biofuels onto the scene less than a decade ago, it appears that although the global supply reacts to price increases, it has not reacted at the same speed at which demand has changed. Added to the adverse effects of climate change on agricultural production in recent years, we can explain much of the increase in prices of agricultural products and their impact on the global food industry.

I.1 Relevant aspects of the international corn market

The main grains produced in the world are corn, wheat, rice, barley, sorghum and oats. Of these, the largest share is corn, with 39% of world production, followed in importance by wheat with 30% and then rice with 21%. These three grains accounted for 90% of world production between 2010 and 2011.

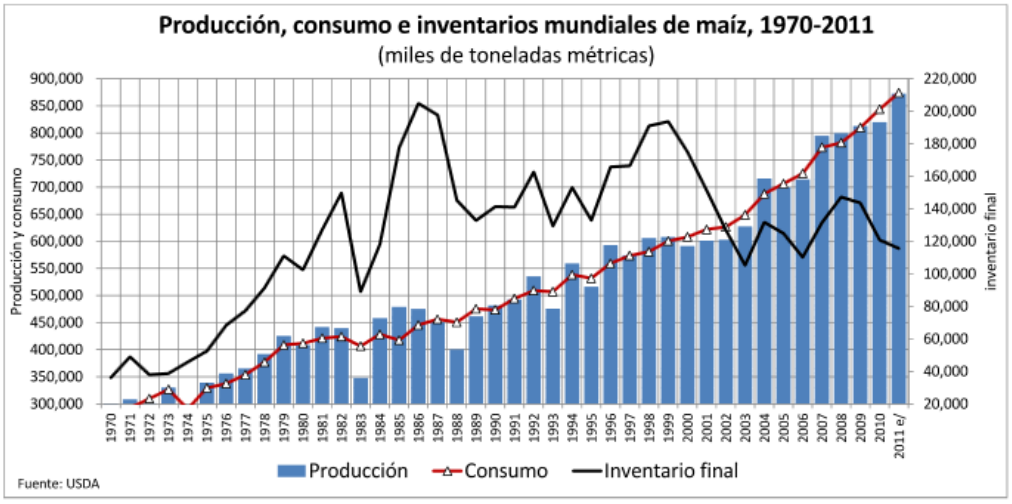


Source: USDA, Offer-Demand Report for May 11, 2011.

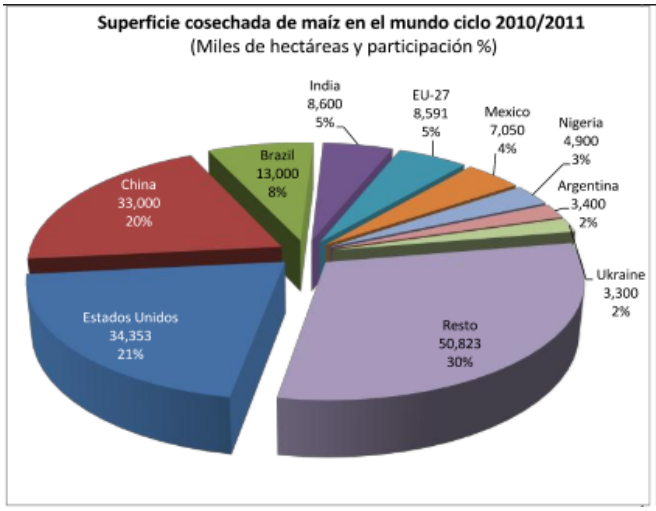
According to the latest report of the World Supply and Demand Estimates (WASDE), global grain production will recede by 1.9% in the 2010/11 cycle compared to the 2009/2010 cycle, although it is expected to recover around 4.6% for the 2011/12 period. The fall in the estimated production for 2010/11 is due to a 5.0% recession in wheat and a 1.4% recession in corn and sorghum, while a 1.7% growth in global rice production is estimated.

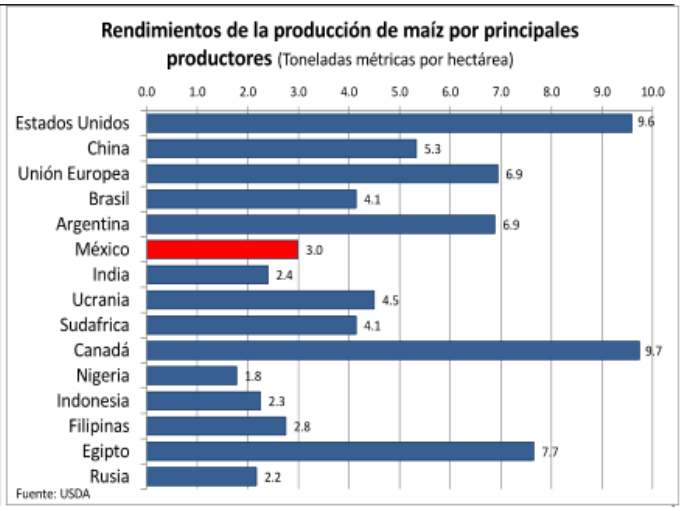
I.2 Worldwide corn production, consumption and inventories

The historical evolution of global corn consumption shows two major periods, the first from 1984 to 2003 in which the indicator shows an average annual growth rate (AAGR) of 2.2%, and the second being the period from 2003-2010 when growth was at 3.8%. This shows that 2003 marked the beginning of a new era in global corn demand.



Meanwhile, although global production has reacted significantly to new demand levels in recent years, it shows increased instability, which is causing an increase in inventory levels during certain periods and a reduction in others. This causes instability in markets and puts pressures on world corn prices.





Nearly 160 million hectares of corn are harvested in the world, with the United States being the largest participant (21%), followed by China (20%), Brazil (8%), India and the European Union (5% each) and Mexico (4%).

Corn production levels depend both on the total surface area used for the crop as well as its yield. The United States is the country with the most surface area used for corn and it has one of highest yield rates in the world (9.6 tons per hectare). This is why it is the number one producer of this grain. It is followed by China, which uses nearly the same surface area for corn production, but has a lower yield rate (5.3 tons per hectare). Therefore, China's production is nearly 50% lower than that of the United States.

CORN: MAIN PRODUCER COUNTRIES [a/]
(MILLIONS OF TONS)

PAIS	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12 (Proyectado Abril 12)	PART. % 2010/11	TMAC 06/07 - 11/12
EE.UU.	267.5	331.2	307.1	332.6	316.2	313.9	*40.6*	*3.3*
CHINA	151.6	152.3	165.9	164.0	177.2	191.8	*20.0*	*4.8*
UNION EUROPEA	53.8	47.6	62.3	56.9	55.8	64.5	*7.0*	*3.7*
BRASIL	51.0	58.6	51.0	56.1	57.5	61.0	*6.8*	*3.6*
UCRANIA	6.4	7.4	11.4	10.5	11.9	22.5	*1.3*	*28.5*
ARGENTINA	22.5	22.0	15.5	23.3	23.8	22.0	*2.8*	*(0.4)*
INDIA	15.1	19.0	19.7	16.7	21.7	21.5	*2.0*	*7.3*
MEXICO	22.4	23.6	24.2	20.4	21.0	20.5	*2.5*	*(1.7)*
SUDAFRICA	7.3	13.2	12.6	13.4	10.9	12.0	*1.6*	*10.5*
CANADÁ	9.0	11.6	10.6	9.6	11.7	10.7	*1.2*	*3.5*
SUBTOTAL	**606.6**	**686.4**	**680.4**	**703.4**	**707.9**	**740.4**	**85.9**	***4.1***
OTROS PAISES	107.4	108.3	118.7	115.8	121.4	124.6	*14.1*	*3.0*
TOTAL MUNDIAL	**714.0**	**794.7**	**799.2**	**819.2**	**829.0**	**865.0**	***100.0***	***3.9***

a/ Each period ranges from October of one year to September of the following year.
SOURCE: Grain: World Markets and Trade, USDA April 10, 2012

According to the United States Department of Agriculture (USDA) in the 2010/2011 period, world corn production reached 829 million tons, with ten countries producing 85.3% of the total: the United States, China, the European Union, Brazil, Argentina, Mexico, India, Ukraine, South Africa and Canada.

CORN: MAIN CONSUMER COUNTRIES a/
(MILLIONS OF TONS)

PAIS	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12 (Proyectado Abril 12)	VAR. % 11/12 v.s. 10/11	PART. % 2010/11	TMAC 06/07 - 11/12
EE.UU.	230.7	261.6	259.3	281.6	285.0	279.5	*(1.9)*	*33.8*	*3.9*
CHINA	145.0	150.0	153.0	165.0	176.0	191.0	*8.5*	*20.8*	*5.7*
UNION EUROPEA	62.4	64.0	61.6	59.3	62.5	65.9	*5.4*	*7.4*	*1.1*
BRASIL	41.0	42.5	45.5	47.0	49.5	52.0	*5.1*	*5.9*	*4.9*
MEXICO	30.7	32.0	32.4	30.2	29.0	30.3	*4.5*	*3.4*	*(0.3)*
INDIA	13.9	14.2	17.0	15.1	18.3	19.2	*4.9*	*2.2*	*6.7*
JAPON	16.5	16.6	16.7	16.3	15.6	16.1	*3.2*	*1.8*	*(0.5)*
CANADA	11.4	13.8	11.7	11.6	11.4	11.1	*(2.9)*	*1.4*	*(0.6)*
SUDAFRICA	8.6	9.6	9.9	10.3	10.5	10.6	*1.0*	*1.2*	*4.3*
EGIPTO	10.7	10.4	11.1	12.0	12.5	10.4	*(16.8)*	*1.5*	*(0.6)*
SUBTOTAL	**570.9**	**614.7**	**618.2**	**648.4**	**670.3**	**686.1**	***2.4***	***79.4***	***3.7***
OTROS PAISES	157.8	158.6	165.1	174.2	174.0	183.4	*5.4*	*20.6*	*3.1*
TOTAL MUNDIAL	**728.7**	**773.3**	**783.2**	**822.6**	**844.4**	**869.5**	***3.0***	***100.0***	***3.6***

a/ Each period ranges from October of one year to September of the following year.
SOURCE: Grain: World Markets and Trade, USDA April 10, 2012

Global consumption of corn, meanwhile, amounted to 844.4 million tons in the 2010/2011 period and was concentrated in seven countries, the United States, China, the European Union, Brazil, Mexico, India, Japan and Canada. These countries consume 76.7% of world production.

In the 2007/08 to 2009/10 cycles, final stock levels were relatively high. However, a significant decrease in stock levels of corn in the world was seen in the 2010/2011 cycle and another decline is expected for the 2011/12 cycle.

CORN: FINAL STOCK [a/]
(MILLIONS OF TONS)

PAIS	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12 (Proyectado Abril 12)	VAR. % 11/12 v.s. 10/11	PART. % 2010/11	TMAC 06/07 - 11/12
CHINA	36.6	38.4	51.2	51.3	53.4	58.0	*8.5*	*41.7*	*9.6*
EE.UU.	33.1	41.3	42.5	43.4	28.6	20.3	*(29.0)*	*22.4*	*(9.3)*
BRASIL	3.6	12.6	12.1	10.0	9.8	10.3	*5.1*	*7.6*	*23.4*
UNIÓN EUROPEA	7.4	4.4	6.1	5.2	4.8	5.4	*13.0*	*3.7*	*(6.2)*
MÉXICO	1.7	4.1	3.6	1.4	1.7	1.6	*(5.9)*	*1.3*	*(0.9)*
SUDAFRICA	1.7	3.1	4.1	5.2	3.5	2.9	*(16.5)*	*2.7*	*11.9*
UCRANIA	0.8	0.8	0.9	0.7	2.3	3.6	*53.7*	*1.8*	*33.9*
SUBTOTAL	**84.9**	**104.7**	**120.5**	**117.1**	**104.1**	**102.1**	***(2.0)***	***81.3***	***3.8***
OTROS PAISES	25.2	26.9	26.8	27.0	23.9	22.5	*(6.2)*	*18.7*	*(2.3)*
TOTAL MUNDIAL	**110.1**	**131.6**	**147.3**	**144.1**	**128.1**	**124.5**	***(2.8)***	***100.0***	***2.5***

a/ Each period ranges from October of one year to September of the following year.
SOURCE: Grain: World Markets and Trade, USDA April 10, 2012

It is worth noting that China maintains high levels of corn stocks due to the implementation of its food safety policy. For the 2011/12 cycle it expects a reserve volume of about 58 million tons (46.5% of the global total). Finally, it is notable that the United States projects a 29% drop in its stock for the 2011/2012 cycle, compared to the previous cycle.

A simple comparison between production and consumption of the major supplier countries allows for an examination, in a very general way, of countries and the surplus corn destined to foreign markets.

Production, consumption and exportable surplus by country
1000 MT

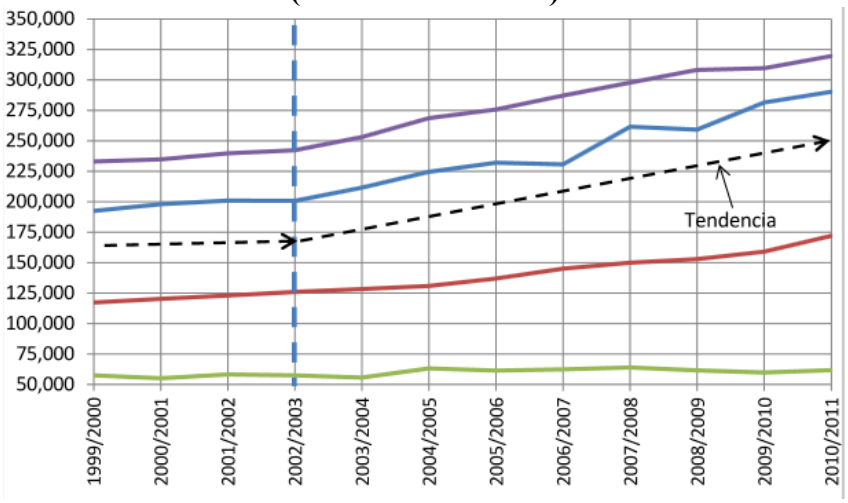
País	2008/2009			2009/2010			2010/2011			2011/2012*		
	Producción	Consumo	Excedente Exportable	Producción	Consumo	Excedente Exportable	Producción	Consumo	Excedente Exportable	Producción	Consumo	Excedente Exportable
United States	307,142	259,272	47,870	332,549	281,590	50,959	316,165	285,005	31,160	313,918	279,540	34,378
China	165,900	153,000	12,900	158,000	165,000	-7,000	177,245	176,000	1,245	191,750	191,000	750
EU-27	62,321	61,600	721	57,281	59,300	-2,019	55,725	62,500	-6,775	64,524	65,900	-1,376
Brazil	51,000	45,500	5,500	56,100	47,000	9,100	57,500	49,500	8,000	62,000	52,000	10,000
Argentina	15,500	6,400	9,100	22,800	6,900	15,900	23,750	7,300	16,450	22,000	7,700	14,300
Mexico	**24,226**	**32,400**	**-8,174**	**20,374**	**30,200**	**-9,826**	**21,130**	**29,000**	**-7,870**	**20,500**	**30,300**	**-9,800**
India	19,730	17,000	2,730	16,720	15,100	1,620	21,730	18,300	3,430	21,500	19,200	2,300
Ukraine	11,447	5,850	5,597	10,486	5,700	4,786	11,919	6,550	5,369	22,500	8,250	14,250
South Africa	12,567	9,900	2,667	13,420	10,300	3,120	11,924	10,500	1,424	12,000	10,600	1,400
Canada	10,592	11,687	-1,095	9,561	11,606	-2,045	11,714	11,434	280	10,700	11,100	-400
Nigeria	7,970	7,900	70	8,759	8,800	-41	9,340	9,200	140	8,700	8,900	-200
Indonesia	8,700	8,900	-200	6,900	8,800	-1,900	6,800	9,200	-2,400	8,100	9,500	-1,400
Philippines	6,853	7,300	-447	6,231	6,500	-269	7,271	7,200	71	7,140	7,200	-60
Serbia	6,130	0	6,130	6,400	0	6,400	6,800	0	6,800	6,267	4,800	1,467
Egypt	6,645	11,100	-4,455	6,280	12,000	-5,720	6,500	12,500	-6,000	3,800	10,400	-6,600
Other	82,611	126,917	-44,306	81,115	128,975	-47,860	85,332	134,545	-49,213	83,511	122,836	-39,325

Source: Foreign Agricultural Service, Official USDA

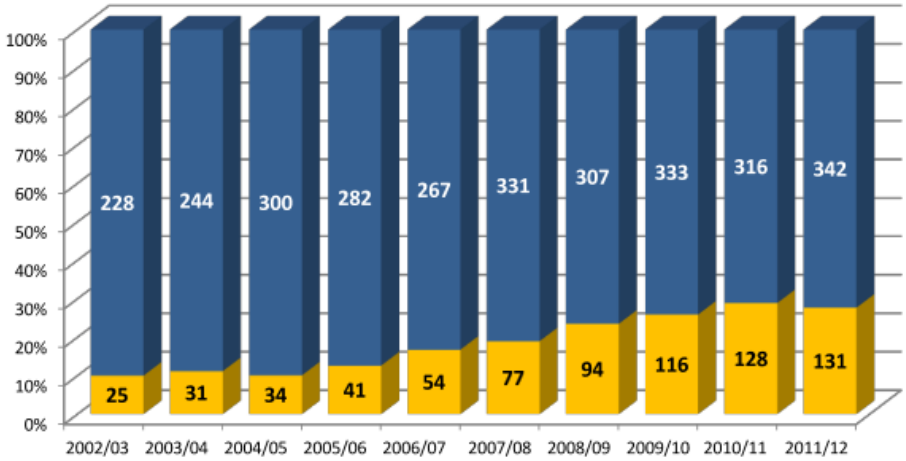
According to the above information, in the 2011/12 cycle the exportable surplus will be mainly generated by four countries, the United States, Argentina, Ukraine, Brazil and, to a lesser extent, India and South Africa.

Worldwide corn consumption increased significantly since 2003, mainly due to increased demand from the United States since that year, but especially since 2008 when the plan was initiated to replace gasoline with corn-produced ethanol in a 20-year period. This marked the beginning of an era in which various food products began to be used for non-food use, putting pressure on the availability of corn for human and animal consumption.

Historic evolution of global corn consumption, 99/00-10/11e
(Thousands of tons)



Corn destined for ethanol production in the US
(Millions of tons and percentages)



Additionally, some countries with rising income levels, such as China and India, have recently begun to demand a greater amount of corn in response to an increase in their consumption of meat products.

I.3 Worldwide corn exportation and importation

Corn is the primary grain produced in the world, yet its international trade flow is limited to only a few exporting and importing countries.

CORN: MAIN EXPORTER COUNTRIES [a/]
(MILLIONS OF TONS)

PAIS	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12 (Proyectado Abril 12)	VAR. % 11/12 v.s. 10/11	PART. % 2010/11	TMAC 06/07 - 11/12
EE.UU.	54.2	60.7	47.8	49.7	45.3	43.5	(3.9)	49.2	(4.3)
ARGENTINA	15.7	15.7	8.5	17.0	15.2	14.0	(7.6)	16.5	(2.3)
UCRANIA	1.0	2.1	5.5	5.1	5.0	14.0	179.6	5.4	68.6
BRASIL	8.1	7.9	7.2	8.6	11.6	9.5	(18.0)	12.6	3.3
INDIA	0.6	5.1	2.6	1.9	3.4	2.4	(29.4)	3.7	32.8
SUDAFRICA	0.4	1.1	2.1	1.6	2.8	2.0	(29.6)	3.1	35.9
PARAGUAY	2.0	1.5	1.9	1.4	1.2	1.8	49.6	1.3	(1.9)
SUBTOTAL	**82.0**	**94.0**	**75.4**	**85.3**	**84.4**	**87.2**	**3.3**	**91.9**	**1.2**
OTROS PAISES	9.5	4.3	8.5	7.7	7.5	9.0	20.7	8.1	(1.0)
TOTAL MUNDIAL	**91.5**	**98.3**	**84.0**	**93.0**	**91.9**	**96.2**	**4.7**	**100.0**	**1.0**

a/ Each period ranges from October of one year to September of the following year.
SOURCE: Grain: World Markets and Trade, USDA April 10, 2012

The United States has a surplus that allows it to export. It exports an average of 15% of its production. Argentina uses most of its production for exports (77%); the rest is used for domestic consumption for animal use. Brazil exports 15% of its production; the rest is for the domestic market and is used for human and animal food, primarily the poultry industry. The Ukraine exports on average about 42% of its production; the rest is used for domestic consumption for human and animal food.

As for importations, Japan is the largest importer of corn with a projected import volume of 16.1 million tons for 2011/12, followed by Mexico, whose import volume will amount to 10.5 million tons. Next in importance are Korea, the European Union, Egypt and Taiwan.

CORN: MAIN IMPORTER COUNTRIES a/
(MILLIONS OF TONS)

PAIS	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12 (Proyectado Abril 12)	VAR. % 11/12 v.s. 10/11	PART. % 2010/11	TMAC 06/07 - 11/12
JAPON	16.7	16.6	16.5	16.0	15.7	16.1	2.8	17.0	(0.7)
MÉXICO	8.9	9.6	7.8	8.3	8.3	10.5	27.2	9.0	3.3
COREA	8.7	9.3	7.2	8.5	8.1	8.0	(1.3)	8.8	(1.7)
EGIPTO	4.8	4.2	5.0	5.8	5.8	5.0	(13.8)	6.3	0.7
UNION EUROPEA	7.2	14.0	2.8	2.9	7.4	4.5	(38.9)	8.0	(8.9)
TAIWAN	4.3	4.5	4.5	4.5	4.2	4.3	3.3	4.5	0.1
CHINA	0.0	0.0	0.0	1.3	1.0	4.0	308.6	1.1	n.a.
COLOMBIA	3.4	3.3	3.1	3.7	3.5	3.7	5.6	3.8	1.8
IRÁN	3.3	2.9	3.6	4.3	3.5	3.5	0.0	3.8	1.2
SUBTOTAL	**54.1**	**61.5**	**46.9**	**51.0**	**53.8**	**56.1**	**4.2**	**58.6**	**(0.1)**
OTROS PAISES	37.4	36.8	37.0	42.0	38.1	40.1	(9.2)	41.4	0.4
TOTAL MUNDIAL	**91.5**	**98.3**	**84.0**	**93.0**	**91.9**	**96.2**	**4.7**	**100.0**	**0.1**

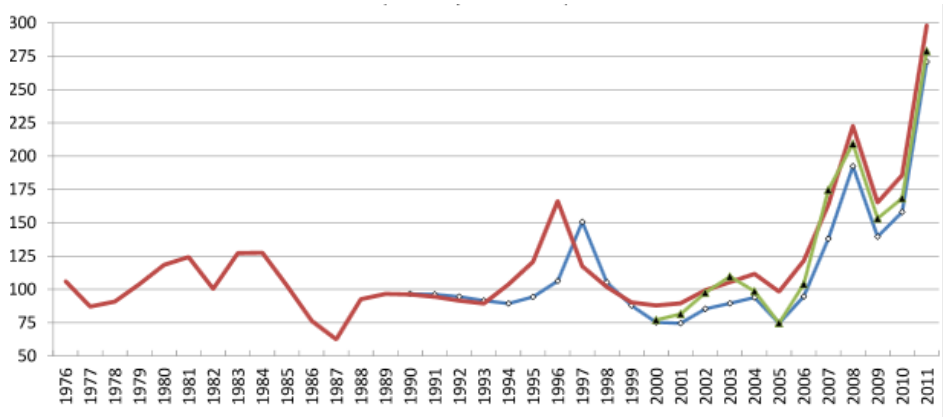
a/ Each period ranges from October of one year to September of the following year.
SOURCE: Grain: World Markets and Trade, USDA April 10, 2012

I.4 International price evolution

The United States cash markets are referenced to the international prices of corn because its market moves large volumes of the grain.

The main market for US corn is in Chicago Illinois, which is located in the heart of the Corn Belt. This is where the cash price called Central Illinois Yellow Corn, which is the reference price in the producing area, is located. Another corn quote is in the port of New Orleans. In this area it is called American Gulf Yellow Corn. The St. Joseph White Corn in Missouri is the third cash price in the US market. However, the volume produced and sold is very low compared to yellow corn.

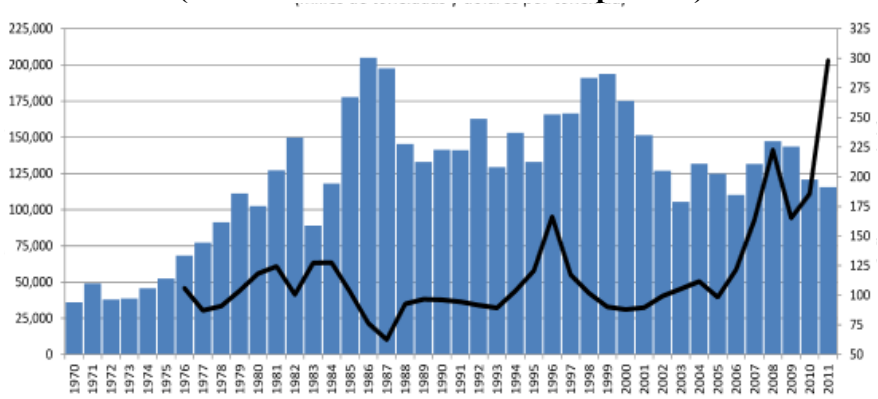
Evolution of corn cash prices in the US
(Dollars per ton)



Since 2006, international corn prices have shown an upward trend that has led to the highest historical price of this grain being registered in July 2011.

This increase could be because of various factors. Among the most important are low inventory levels due to climate change in some producing regions, the non-food use of corn (ethanol), energy prices, raw materials (fertilizers) and transportation, increased demand in medium income countries, international commerce restrictions and speculation.

Evolution of global corn prices and inventories
(thousands of tons and dollars per ton)



In the global environment, at the beginning of the second decade of the twenty-first century, the importance of grains and especially corn as a base material has been hampered by the number and intensity of weather events that occur as a result of global warming: floods, droughts, frosts, fires and hurricanes in grain and oilseed producing countries such as Argentina, Australia, Brazil, China, India, Mexico, Russia and the United States. This is in addition to a reduction in yield per hectare and inventories in the United States, which is the main producer of yellow corn in the world.

The decrease in production and inventories of commodities like wheat, soybeans and corn generates a domino effect on the prices of grains and oilseeds. This in turn causes volatility in food prices due to decreased supply and a growing increase in demand for use in human consumption, livestock and bioenergy.

I.5 Worldwide use of biotechnology and genetic modification of corn

In his study "Global Status of Commercialized Biotech/GM crops in 2011" Clive James says that between 1996 and 2010, due to the contribution of biotech crops, an increase can be seen in agriculture production valued at 78 billion dollars. The environment has benefited from savings of 443 million kg of active pesticide ingredients. Just in 2010, carbon emissions were reduced by 19 billion kg, the equivalent of removing approximately 9 million vehicles from the road. Biodiversity has benefited due to the conservation of 91 million hectares of land. Poverty has been fought against by helping 15 million small farmers who are among the poorest people on the planet (Brookes and Barfoot, 2012, in preparation).
This same study shows that, of a total of 29 countries that now have Genetically Modified (GM) crops, 16 have commercial GM corn. This crop is, after soybeans, the main biotech crop in 2011, with 51 million hectares (equivalent to 32% of the crops in the world).

According to the article "Transgenic Corn: risks and benefits," by MC Refugio Ortega Ramirez, published in "Universidad de Sonora" magazine, corn yields have tripled, helping to fight hunger in high population growth areas which usually suffer from shortages and drought. The use of chemical pesticides has also diminished and consequently the toxicity of foods treated with them has decreased. The application of biotechnology enables sustainable agricultural

practices and production of materials using renewable resources. Furthermore, the economic viability of production is increased and losses during distribution and sale are reduced by up to 30%, allowing the postharvest life of the products to be extended. It also permits the quick implementation of soil conservation programs, improves the quality of life of farmers and allows for obtaining useful products that improve human health.

II. National Context

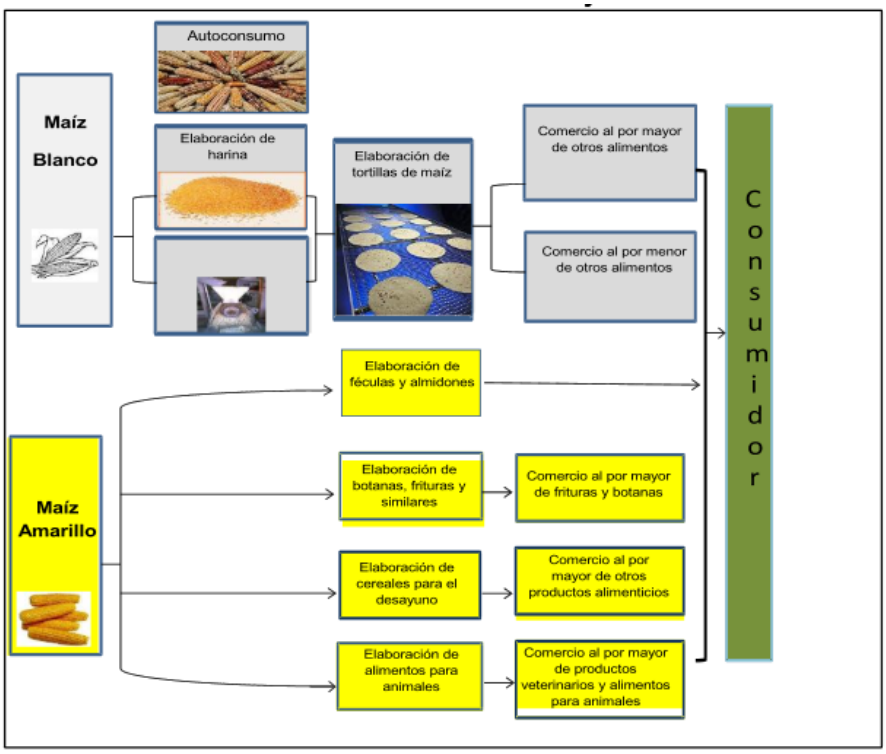
II.1 Primary production link

II.1.1 Relevant aspects of the Mexican corn market

The national corn market consists of several varieties, mainly white and yellow corns. While there are other varieties such as pozolero and color corn, the first two varieties take a major share of production and sales in the domestic market.
White corn is used primarily for human consumption in various traditional foods, such as: atoll, bread, tamales and others. It is also used for tortillas from nixtamalized and dehydrated corn flour. Additionally, it is used as nixtamalized and ground corn for dough.

Meanwhile, yellow corn has applications for human and animal consumption as well as industrial uses, among which are the production of starches (raw material used in the chemical, textile, food and other industries), snacks, chips and similar products, breakfast cereals and animal feed production (raw material used for balanced pet food and the livestock sector).

Value Chain of White and Yellow Corn



The seasons for planting and production of corn in Mexico are split between the fall-winter and spring-summer cycles. For the fall-winter cycle, planting occurs during the months of October to March. November to February are the months that are used with the greatest intensity. Meanwhile, the fall-winter harvest starts in February and ends in August, with May and June being the months where 50% of the crop is harvested.

SEASONS FOR CORN PRODUCTION

	OCT	NOV	DIC	ENE	FEB	MAR	ABR	MAY	JUN	JUL	AGO	SEP	OCT	NOV	DIC	ENE	FEB	MAR	% anual
OTOÑO-INVIERNO																			
SIEMBRA	5%	20%	25%	25%	20%	5%													29.30% (6,631,191 ton)
COSECHA					5%	10%	15%	25%	30%	10%	5%								
PRIMAVERA-VERANO																			
SIEMBRA							5%	10%	25%	40%	15%	5%							70.70% (16,375,400 ton)
COSECHA											5%	10%	10%	20%	25%	15%	10%	5%	

For the spring-summer cycle, planting begins in April and ends in September. July is the month in which 40% of the crop is planted. The harvest season begins in August and ends in March the following year. November to February are the months that 70% of the harvest is taken.

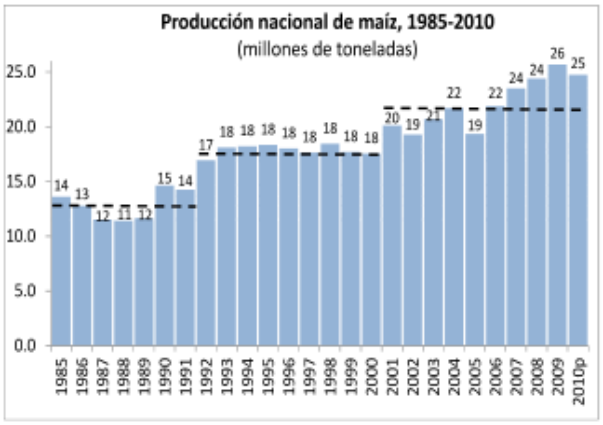
The type of corn being produced leans considerably toward white corn with 91% of total production. The remaining 9% is yellow corn production.

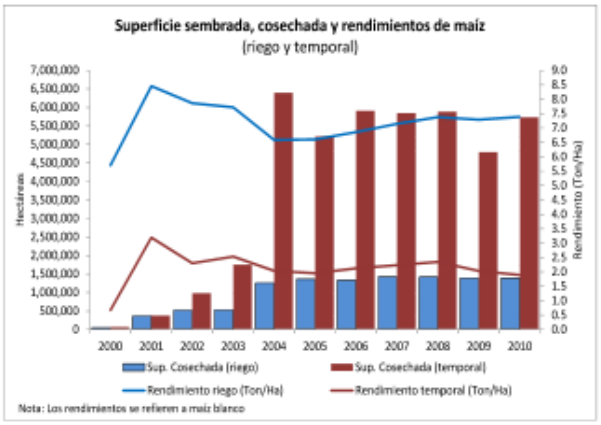
Since the demise of CONASUPO, the makeup of the storage and marketing distribution of corn in Mexico can be identified in five areas:

1. Two large flour companies (MINSA and MASECA) acquire the volume of corn planned for processing at its plants at harvest prices.
2. Marketers buy corn in producing areas at harvest price and move it to urban areas for deferred sale primarily to the nixtamal industry.
3. Several regional collective companies similarly store grain acquired at harvest time for deferred sale to different consumers, including the nixtamal industry.
4. Livestock producer associations with credit support store the raw material in harvest areas.
5. After a comparative analysis of domestic and import prices large starch industries define their corn purchase volume in the producing areas in Mexico.

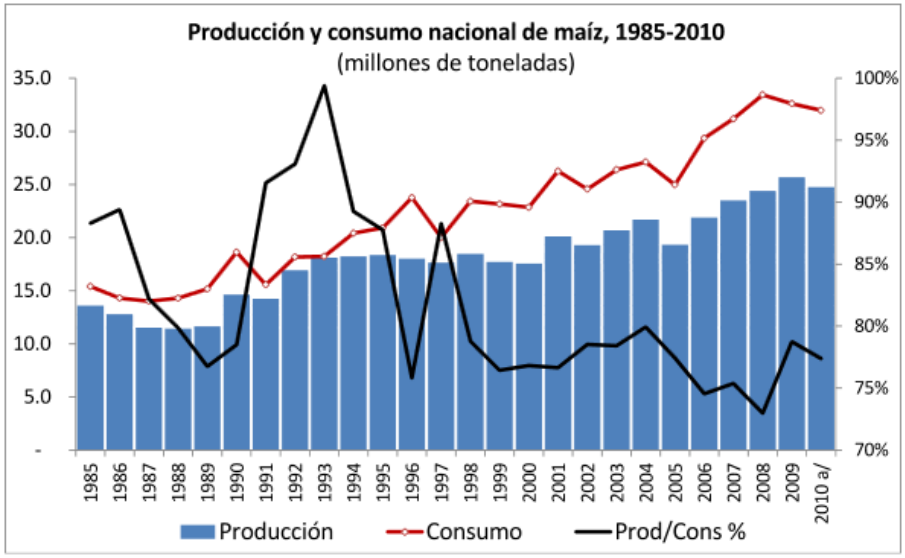
II.1.2 Production and consumption of corn in Mexico

Since the mid-eighties, corn production in Mexico has shown a relatively increasing trend in three well-defined periods: 1985-1991, 1991-2000 and 2000-2010. In these periods, the AAGR of corn production was 0.8, 2.3 and 3.5%, respectively.





The difference between production growth in the 2000-2010 period compared to the two previous periods is primarily a result of an increase in planted land area and, to a lesser degree, yields. In 2003, irrigated crop area was 550 thousand hectares (Mha). Starting in 2004 and to date, this has increased to 1,400 Mha. Seasonal crop area increased from 2 to 6.5 MhA in those same periods, respectively. Yields, however, show very similar levels from before 2004 and from that time up to now, both in irrigated and seasonal areas.



Preliminary data from SIAP-SAGARPA shows that in 2010 7.8 Mha were planted, of which 7.1 Mha were harvested. These areas had an average yield of 3.1 tons per hectare (Tonha), 7.3 and 1.9 Tonha for irrigated and seasonal, respectively. Taking the above into consideration, total production in that year was 24.7 million tons, which represented a fall of 3.7% compared to 2009.

National corn production has shown different behavior during certain periods. In 1985-1991, it averaged 12.8 million tons. Later, in 1991-2000, this indicator increased to 17.5 million tons,

and finally the 2000-2010 period shows a significant increase in this variable, reaching 21.7 million tons on average.

Cultivo	Modalidad	Superficie Sembrada		Superficie Cosechada		Producción		Rendimiento
		Ha.	Part.%	Ha.	Part.%	Tons.	Part.%	Ton/Ha
Maíz Blanco	Riego	1,229,996.22	17%	1,211,872.36	18%	8,946,693.52	44%	7.3865
	Temporal	6,223,137.63	83%	5,537,389.74	82%	11,533,661.62	56%	1.8925
	Total	**7,453,133.85**	**100%**	**6,749,262.10**	**100%**	**20,480,355.14**	**100%**	
Maíz Amarillo	Riego	192,244.24	49%	182,579.44	48%	1,432,630.04	75%	7.645
	Temporal	201,683.40	51%	198,195.90	52%	473,985.86	25%	1.8215
	Total	**393,927.64**	**100%**	**380,775.34**	**100%**	**1,906,615.90**	**100%**	

Despite this, in Mexico for several decades, even before the entry into force of NAFTA, domestic production has been insufficient to meet domestic consumption needs. Particularly in the last five years, national corn consumption has shown significant growth, reaching a peak of 33.4 million tons in 2008. The latest available data (2010) shows 32 million tons for this variable. The average annual growth rates of consumption for the 1985-1991, 1991-2000 and 2000-2010 periods were 0.2%, 4.4% and 3.4%, respectively.

As seen by these numbers, Mexico has a corn deficit of about 7.9 million tons per year on average in the last five years. This deficit has been filled with yellow corn imports, mainly from the United States. The imports are directed primarily to balanced feed for the livestock industry and the starch, chips and snacks and breakfast cereal sectors.

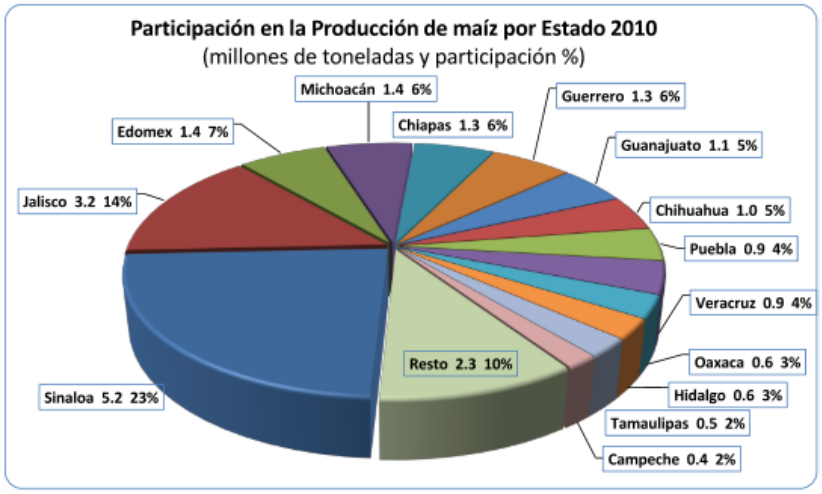
It is worth noting that, historically, the proportion of domestic consumption that is covered by the country's production has been declining. In the 1985-1997 period, about 86% of consumption was supplied by domestic production. For the 1998-2010 period this indicator was reduced to 77% on average. The difference has always been covered by imports, mainly from the United States.

One of the main problems with the cultivation of corn in Mexico is duality in production. On one hand, one-sixth of the land surface concentrated in the north of the country that is used to produce this product is irrigated and produces yields close to those of the United States. However, most production is seasonal and scattered all over the country with very low yields. This latter indicator even worsened in the last two years (2009-2010) compared to the three previous years.

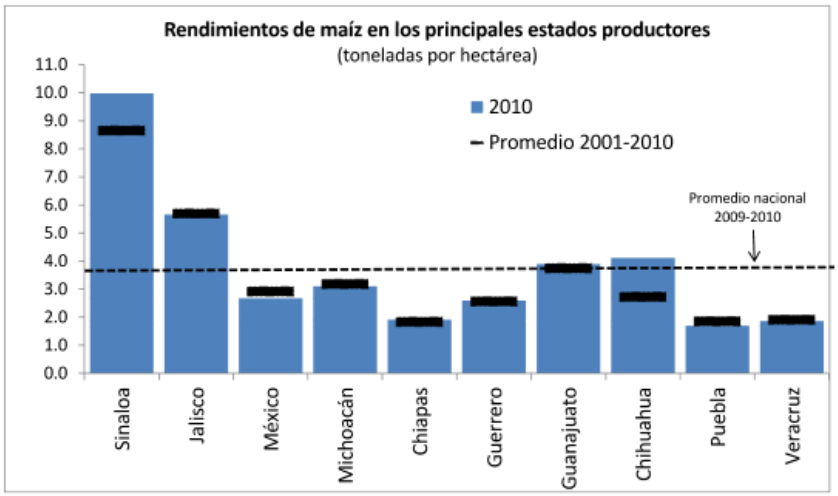
In general there is a marked dualism and low productivity. This dualism implies the coexistence of a large universe of small landowners with parcels less than five hectares and of landless laborers engaged in seasonal cultivation. On the other hand, there is a small number of producers owning a high proportion of lands using irrigation technology.

While corn production is reported in all of the country's states, 14 of them account for 90% of national production. SAGARPA data indicates that in 2010 the major corn producing states

were: Sinaloa, with a production of 5.2 million tons and a share of 23%; Jalisco with 3.2 million tons and a 14% share; and Mexico State with 1.4 million tons and 7% of the share. These are followed by the states of Michoacán, Chiapas, Guerrero, Guanajuato, Chihuahua, Puebla, Veracruz, Oaxaca, Hidalgo, Tamaulipas and Campeche.



Most corn production in Mexico (95%) is of the white variety, while yellow corn production is reported mainly in the states of Chihuahua, Jalisco, Tamaulipas, Sinaloa, Chiapas and Zacatecas.



While national corn yields have increased very little, there are notable statewide data concerning the national average. Upon analyzing the top ten corn producers in Mexico, Sinaloa stands out from the rest. It is the largest producer with 23% of total production and an average yield of 8.6 Tonha in the last 10 years, particularly 2010, during which 10 Tonha was reached. This latter indicator was well above the national average and even 1.5 Tonha higher than the historical average from 2001-2009. The state of Sinaloa stands out from the rest of the country because it has shown increasing yields in the last ten years which has allowed it to maintain a high level of production despite using less surface area for this crop in recent years.

Meanwhile, production in the state of Jalisco, the second largest producer in the country, is entirely dependent on its yield since it has shown stagnation in the area used for this crop at close to 600 thousand hectares. It is notable that this state not been able to increase its yields in the past 10 years.

Of the remaining eight major producing states in the country, Guanajuato stands out and has shown an upward trend in yields for the last 7 years.

II.1.3 Exportation and importation of corn in Mexico

The North American Free Trade Agreement (NAFTA) stipulated that tariffs and quotas on some sensitive products such as corn and beans be kept until 2008. In practice, due to the increasing demand of the industry, corn imports in amounts exceeding the quotas agreed in the Agreement were allowed, either duty-free or with very low tariffs. As a result, corn imports in some years reached double the quota stipulated in the Agreement.

The main reasons to extend the quotas were to ensure the supply of raw materials to industries that use grains and to resolve tariff inconsistencies in agro industrial chains and the livestock sector which were generated by the way in which the Agreement was negotiated, where protection of raw material (corn) lasted until 2008, while products made from these raw materials (starch, meat, flour, chips, etc.) were free from duty payments since 2003, along with corn substitutes.

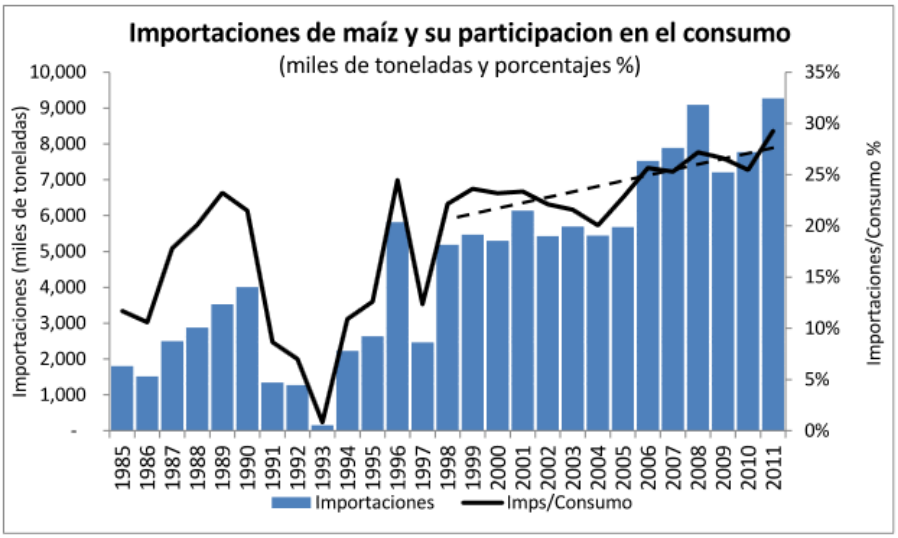
This access to quotas and over-quotas was given to stimulate growth in the Mexican livestock and industrial sectors and to stay competitive against imports of finished products. As a result of these measures, livestock and industrial producers that benefited from the quotas and over-quotas were able to buy part or all of their corn requirements under conditions similar to those of their US competitors.

Although trade policy on importation quotas and over-quotas in Mexico managed, to a greater or lesser extent, to cover the country's grain deficit without paying tariffs or by paying very low tariffs, and thereby avoided the erosion of international competitiveness in the grain consuming sectors, it accelerated the convergence of domestic grain prices with international grain prices. This had adverse effects on corn producers in countries that were less protected. Commercial producers are compensated with support programs for marketing, but semi-commercial and self-consuming producers in general have not had enough government support.

CORN: MINIMUM QUOTA NEGOTIATED IN NAFTA 1994-2008

Arancel %	Año	Negociado (Toneladas)			Cupo Adicional
		E.U.A.	Canadá	Total	
206.40	1994	2,500,000.00	1,000.00	**2,501,000.00**	99,510.00
197.80	1995	2,575,000.00	1,030.00	**2,576,030.00**	872,813.26
189.20	1996	2,652,250.00	1,060.90	**2,653,310.90**	6,908,813.10
180.60	1997	2,731,817.50	1,092.73	**2,732,910.23**	378,852.77
172.00	1998	2,813,772.03	1,125.51	**2,814,897.53**	3,966,151.07
163.40	1999	2,898,185.19	1,159.27	**2,899,344.46**	4,615,767.85
145.20	2000	2,985,130.74	1,194.05	**2,986,324.79**	3,136,296.98
127.10	2001	3,074,684.66	1,229.87	**3,075,914.54**	3,490,047.39
108.90	2002	3,166,925.20	1,266.77	**3,168,191.97**	2,788,783.73
90.80	2003	3,261,932.96	1,304.77	**3,263,237.73**	3,817,704.46
72.60	2004	3,359,790.95	1,343.92	**3,361,134.86**	3,696,863.97
54.50	2005	3,460,584.68	1,384.23	**3,461,968.91**	3,994,814.24
36.30	2006	3,564,402.22	1,425.76	**3,565,827.98**	6,957,940.85
18.20	2007	3,671,334.28	1,468.53	**3,672,802.82**	6,504,436.81
-	2008	LIBRE			

Since Mexico is a corn deficit country, export records are in very small amounts compared to total production, so that foreign trade is basically concentrated in imports.



In order to supply its domestic market for the livestock, starch, cereal and chips and snacks industries, Mexico imported an annual average of 7 million tons of yellow corn during the 2006-2010 period. Its main supplier of yellow corn is the United States.

DEFINITIVE CORN IMPORTS, 2004-2010
(THOUSANDS OF TONS)

Variedad	2004	2005	2006	2007	2008	2009	2010
1005.90.03 (Amarillo)	5,095.6	5,614.8	7,278.3	7,561.7	8,611.8	7,044.7	7,276.1
1005.90.04 (Blanco)	346.3	66.2	253.5	328.3	479.0	162.9	505.8
1005.90.99 (Los demás)	0	0	0	0	0	0	0
Total Maíz Entero	5,441.9	5,681.0	7,531.8	7,890.0	9,090.8	7,207.7	7,781.9
1104.23.01 (Tabajado)	2,300.4	2,705.1	3,203.2	2,823.4	167.9	152.5	192.3

a/ Since August 2001 corn has been classified into two tariff sections: 1005.90.03 for yellow corn and 1005.90.04 for white corn.

Source: From 2004 to 2008, SHCP and for 2009 and 2010 data obtained from the SIAP/SAGARPA website.

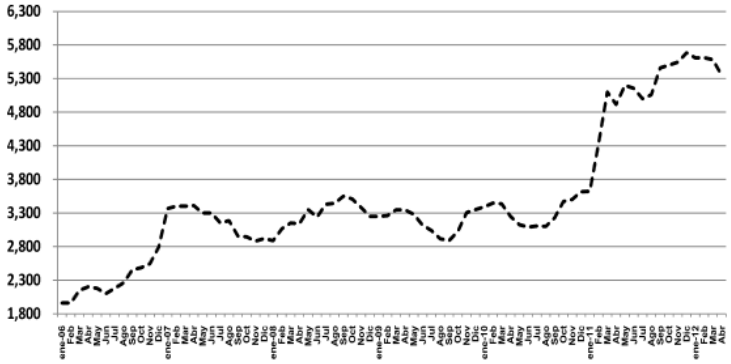
This increase in imports in the last five years is mainly due to an increase in the domestic consumption of corn during that period, without domestic supply having reacted sufficiently to cover the increased demand. Since the early 90s and up to 2010, the share of imports in domestic corn consumption had remained at an average of 23%. However, in 2011 this indicator reached almost 30%.

II.1.4 Evolution of corn prices in Mexico

Due to low inventory levels resulting from the effect of climate change on production in some regions of the world, the non-food use of corn (ethanol), energy prices, raw materials (fertilizers) and transportation, growing demand in middle income countries, restrictions on international trade and speculation, the global increase in grain prices affected the domestic prices of corn in Mexico.

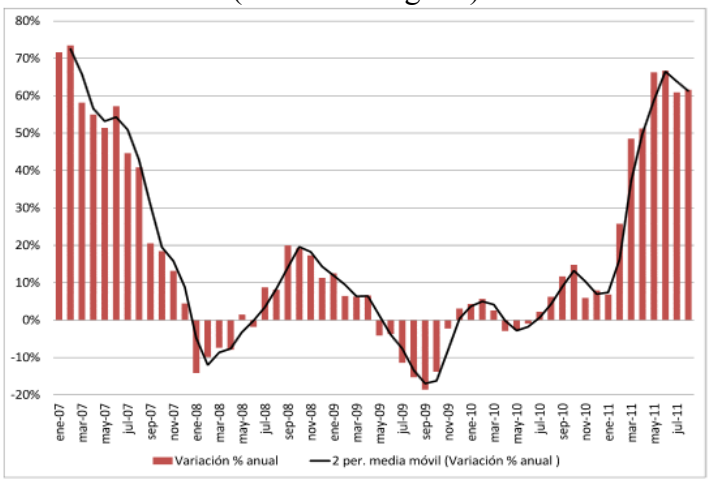
Therefore, the prices of white corn in the domestic market increased from less than $2,500 per ton in the first quarter of 2006 to settle at $3,400 per ton in the second half of 2006 and through 2010. From February 2006 up to the same month of 2007, prices had increased up to 73% from the same period the year before. The effects of the global food crisis in 2008 reverberated in the domestic price of corn. By September 2008, the increase in corn prices had reached an annual rate of 20%, to bring its price to $3,550 per ton.

Milled White Corn Price in Mexico City and the metropolitan area
January 2006 – April 2012 ($/ton).



Source: Grupo Consultor de Mercados Agrícolas, S.A. de C.V.

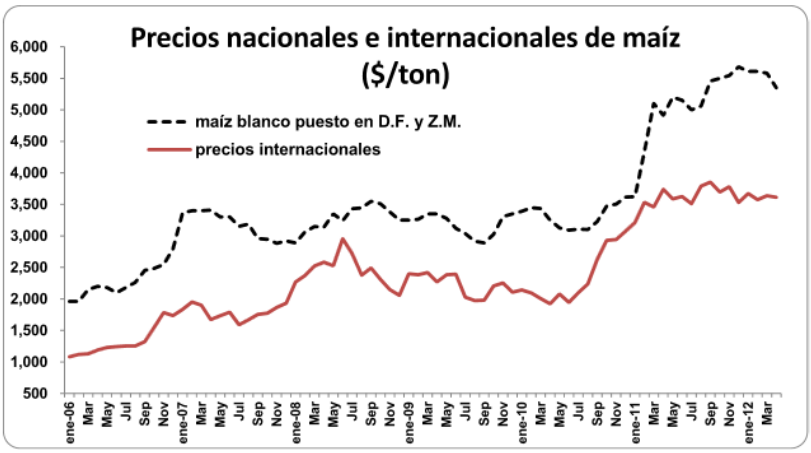
Milled White Corn Price in Mexico City and the metropolitan area
(Annual change %)



Source: Grupo Consultor de Mercados Agrícolas, S.A. de C.V. Data to August 5, 2011

In terms of the most recent trends in the price of corn, it is determined by two factors, one of national origin and the other with a national component. The first is that a large percentage of corn planting in Sinaloa (the primary corn producing state in Mexico), was affected by atypical frost recorded in February 2011. The second factor is the escalation of international food prices which began in mid-2010, prompting volatility in international corn prices due to the increased use of corn for ethanol, reduced inventories, increased global demand for the grain, along with weather reasons.

This has caused corn prices in 2011 to increase at an average monthly rate of 4.7%. The months with the highest increase were February and March which showed a monthly rise of 19.7% and 17.7%, respectively. However, in June and July of 2011, the annual change in the price of corn was 66.7% and 60.9%, respectively, placing them at $5,155 and $5,000 for the months mentioned. Currently, although price levels remain high, they have not shown more volatility.



II.1.5 Use of biotechnology and genetic modification of corn in Mexico

As for our country, it should be noted that, to date, GM corn crops are only in the experimental and pilot phases, and it has not been possible to make the move to the final stage which is its commercial release.

This is largely due to the fact that our country is a Center of Origin and Genetic Diversity of Corn. It should be noted that LBOGM mandates the determination of the species of which Mexico is the Center of Origin and Genetic Diversity (two different concepts), along with the location of the geographic areas in which the two concepts converge. Here, the entities that LBOGM mandates as those responsible for carrying out this work have been working for years to resolve the needs for corn.

The slowness of this process is, to date, a liability for producers, especially considering that they are the ones who have seen the results obtained by producers in other countries from GM corn.

Along this line, as long as the location of the geographic areas of the Centers of Origin and Genetic Diversity of Corn are not available, domestic producers will continue to be at a disadvantage, lacking the opportunity to see for themselves the effectiveness and benefits which are enjoyed elsewhere. Furthermore, as a way to move forward to food self-sufficiency, it would be right to especially promote the production of this crop as it is the main food supply for Mexicans.

II.2 Processed products link

Mexico consumes about 30 million tons of corn, 74% of which account for the total domestic production of white corn (21.8 million tons). The remaining 26% is imported yellow corn, mainly from the United States.

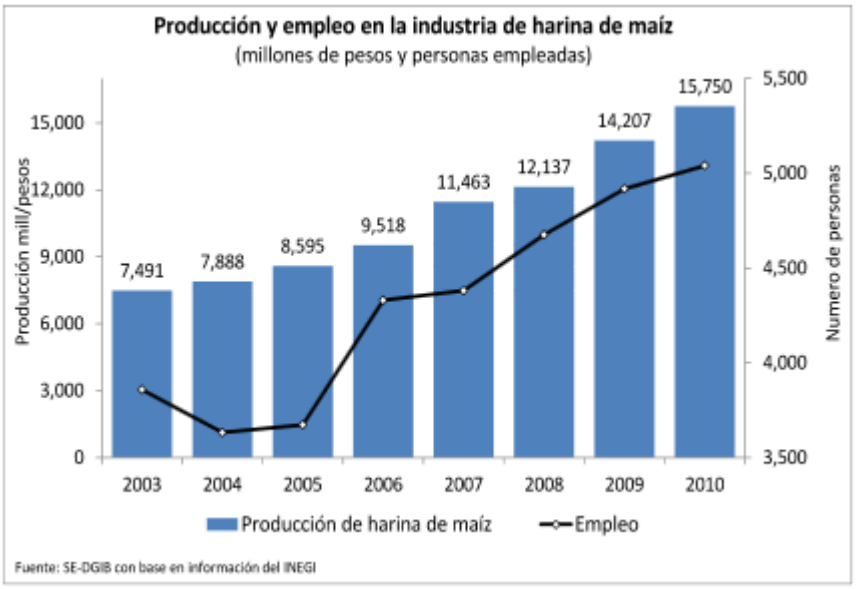
White corn is produced and consumed in its entirety in the country. Of the nearly 22 million tons produced, about 12 million are intended for commercial human consumption (flour and

nixtamal dough industries, mainly). About 6 million tons are non-marketable production (self-consumption), 2 million tons are consumed by the livestock sector, and the rest is divided into seeds, shortage supplies, inventories and exports.

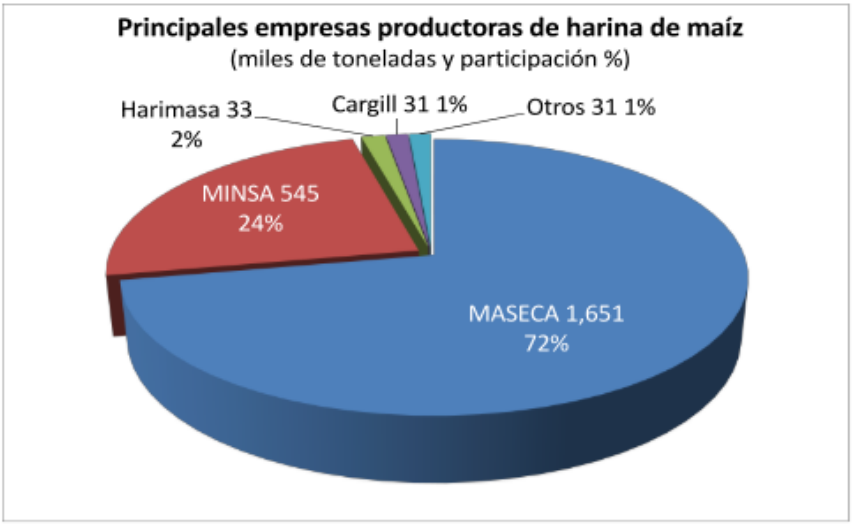
Yellow corn (7.8 million tons, imported mainly from the US) is consumed by the balanced livestock feed producing industry, along with the grain, chips and snacks and starches industries.

II.2.1 Flour and nixtamalized corn dough industry

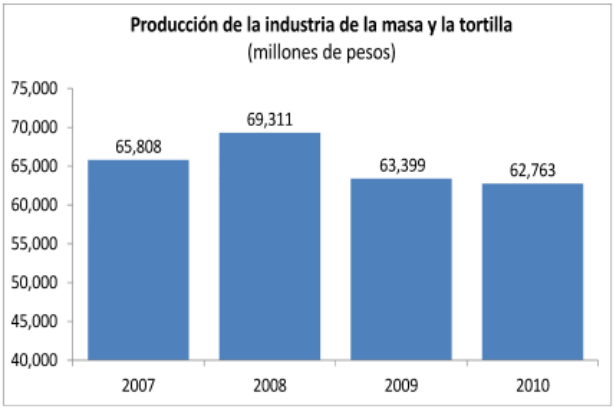
Information from INEGI shows increased production in the corn flour industry in Mexico. In the 2003-2010 period, production showed an AAGR of 11.2%, reaching a value of 15.750 billion pesos in 2010 and the generation of nearly 5,000 jobs in the same year. Information from the Monthly Industrial Survey shows that in 2010 corn flour production reached 2.28 million tons, after reaching a peak of 2.31 million tons in 2009, or a 1.1% contraction. Despite this, in 2011 the production of corn flour showed a recovery of 5.3% in the January-May period compared to the same period in 2010.



The corn flour industry in Mexico is concentrated to just a few companies. In order of importance, these include the following: Grupo Industrial MASECA which holds a 71.2% market share, MINSA (23.54%), Harimasa (1.4%), Cargill Mexico (1.3%), Molinos Anahuac (1.1%) and Productos Manuel José (0.2%).

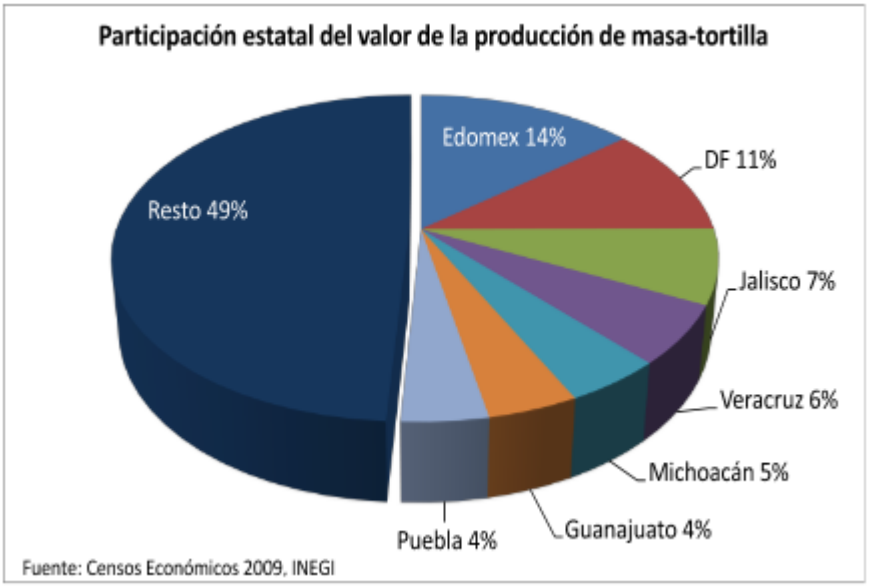


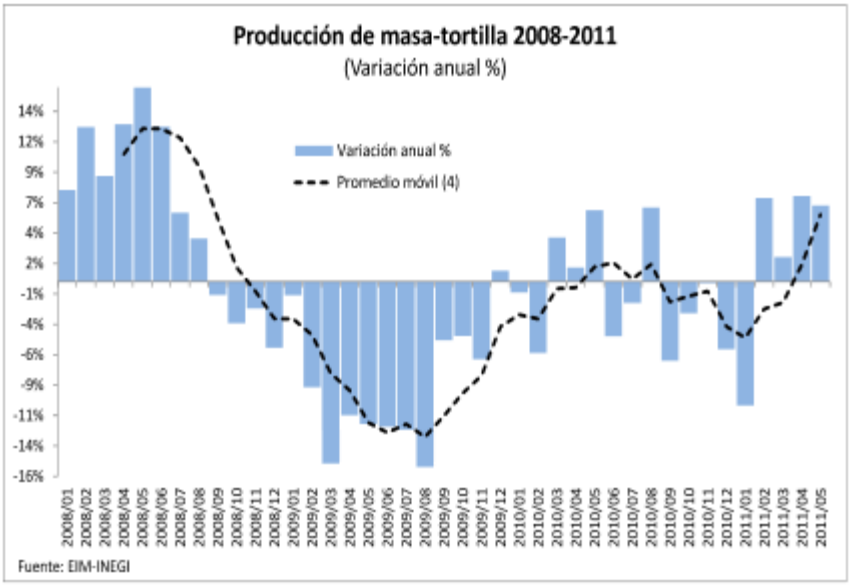
As for the corn dough and tortilla industry, according to data from the INEGI Economic Census, by 2008 the industry's value reached 28.460 billion Pesos, with an 11.1% AAGR in the 2003-2008 period and generation of 214,728 jobs in that same year. However, according to INEGI's Monthly Industrial Survey, in 2010 the value of corn dough and tortilla production reached 62.763 billion Pesos, decreasing 1% from 2009 but in 2011 already showing a recovery of 2.1% in the January-May period compared to the same period in 2010.



The corn dough and tortilla industry is scattered across the country with 78,852 establishments nationwide, counting mills, tortilla makers and businesses offering both. 94% of the establishments employ between 1 and 5 employees.

Seven states hold 53% of all the businesses in the country and 51% of production and jobs: the State of Mexico, Mexico City, Jalisco, Veracruz, Michoacán, Guanajuato and Puebla.





Due to its infrastructure and production capacity, the cost structure of tortilla production shows that it is more efficient if it is produced with flour than if it is produced with nixtamalized corn dough. However, the retail price is, on average, one peso more expensive per kilogram of tortillas produced with flour compared to those produced with nixtamalized corn dough. Additionally, production from flour has higher yields, quality, brand recognition, technology, customer service and nationwide coverage. While the nixtamal milling industry continues to use traditional corn dough methods, its production costs are higher.

Cost structure to produce tortilla from corn flour

Concepto	Part. (%)
PROCESO HARINA - MASA	
Costo de harina puesta en la tortillería	47.0%
Número de empleados	0.2%
Costo del kw / hr	0.2%
Costo del m3 de agua	0.2%
Valor de la amasadora	0.1%
Renta local mensual	1.3%
Gasto de mantenimiento mensual	0.3%
Subtotal	49.3%
PROCESO MASA - TORTILLA	
Número de empleados	30.3%
Costo del kw / hr	1.5%
Costo del lt de gas	6.9%
Valor de la máquina	2.4%
Renta local mensual	6.6%
Gasto de mantenimiento mensual de la máquina	0.9%
Gastos administrativos mensuales	2.1%
Subtotal	50.7%

Source: Minsa.

Cost structure to produce tortilla from nixtamal dough

Concepto	%
Maíz	68.7%
Luz	4.9%
Agua	2.4%
Gas	5.0%
Renta	2.8%
Salarios	8.4%
Otros	7.8%
Total	**100.0%**

Source: SPYMES with industry data.

As shown in the table below, the corn to flour chain is more efficient than the corn to tortilla chain, in which for every kilogram of corn 1.560 kg of tortillas are produced, while the nixtamalized corn to dough to tortilla process produces 1.400 kg of tortillas for each kilogram of corn used.

Conversion Factors in the corn-tortilla chain

Insumo	Producto Elaborado	
Maíz	**Harina de maíz**	**Masa de Nixtamal**
1 kg	0.938 kg. de harina de maíz nixtamalizado	
1 kg	2.140 kg. de masa	1.8 de masa
1 kg	1.560 kg. de tortilla	1.400 kg. de tortilla

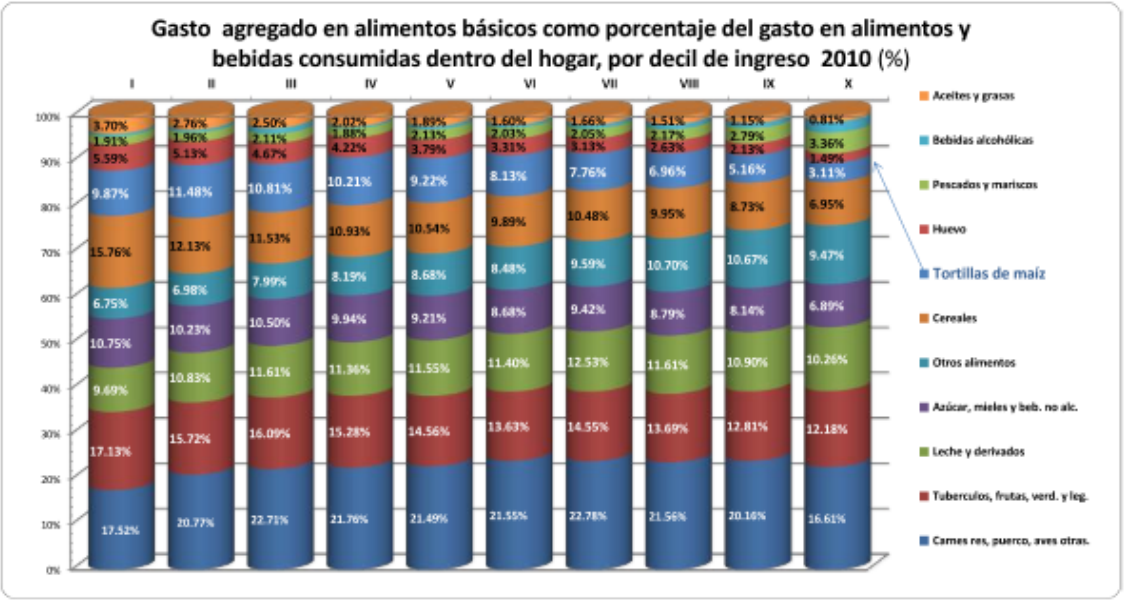
Source: Tesis de la Demanda de maíz-tortilla en México (Theses on the Demand for corn-tortilla in Mexico) 1996-2008, written by Regel Fernández Mantilla, using Minsa data

Additionally, because of its heavy use in food consumed by Mexicans, the tortilla is the second most important product in the basic consumer basket, only after beef.

Importance in the CPI and basic basket for top 10 food products in Mexico

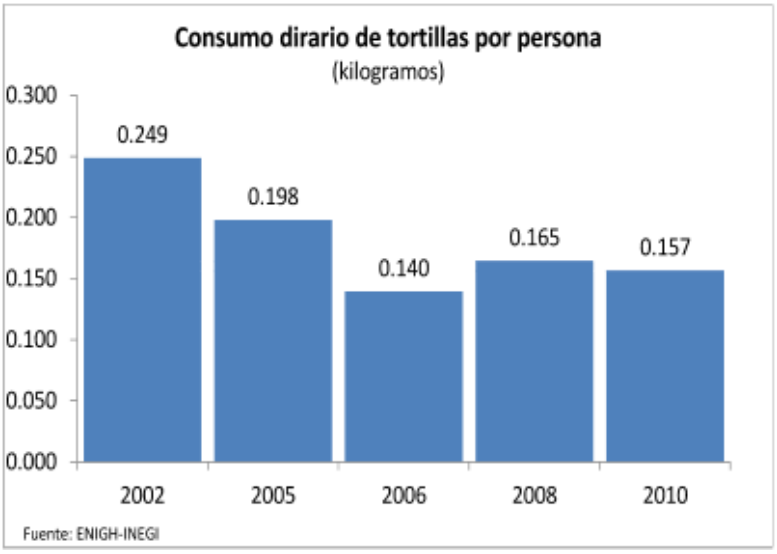
1	Carne de res	1.79145
2	**Tortilla de maíz**	**1.58664**
3	Cerveza	1.56979
4	Leche pasteurizada y fresca	1.44288
5	Pollo	1.31802
6	Refrescos envasados	1.14496
7	Otros alimentos cocinados	1.01825
8	Carne de cerdo	0.69147
9	Huevo	0.62302
10	Cigarrillos	0.60724

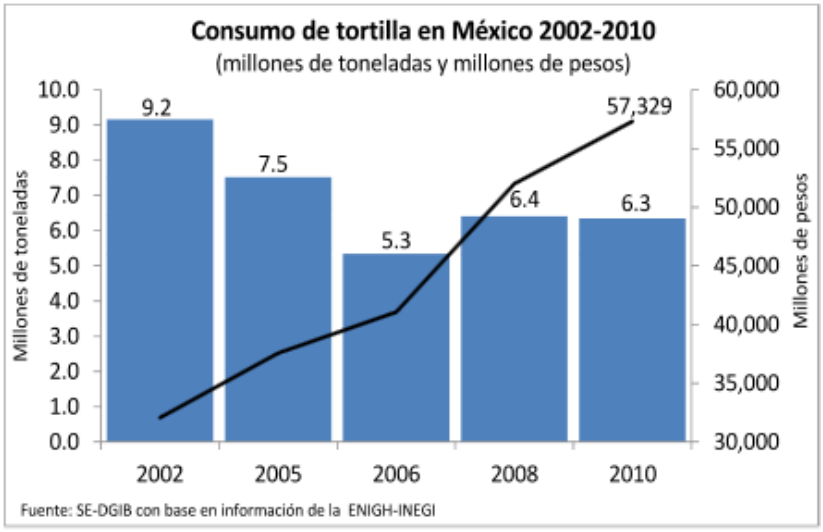
This reflects the importance of this product in the country's diet and the effect its price has on the demand and purchasing power of the Mexican population in general, particularly for those with low income.



In 2010 the lowest income decile in the country spent 9.9% of the income they used for food and beverage consumption on tortillas. In contrast, this indicator for the highest income decile was only 3.1%.

A comparison of data from the National Household Income Expenditure Survey (ENIGH as abbreviated in Spanish) for the years 2002, 2005, 2006, 2008 and 2010 shows that daily consumption of tortillas per person has declined in recent years. While in 2002 daily consumption of tortillas was an average of 249 grams per capita, by 2010 this indicator was reduced to 157 grams.





This is due to the introduction to the market of new fast food products and lifestyle changes. It is also the result of the increase in the price of corn and its movement towards raw materials and tortillas, which directly affects consumption and the consumer.

Recent results from CONEVAL (National Council for the Evaluation of Social Development Policy) show tortilla consumption in rural and urban areas. In rural areas, CONEVAL estimated that in 2010 the daily consumption of tortillas per person was 217.9 grams. In contrast, in urban areas this indicator is 155.4 grams. Using these data, it is estimated that tortilla consumption in the country in 2010 amounted to 6.9 million tons of tortillas with a value of 72.481 billion pesos.

Tortilla consumption in 2010

	Consumo diario de tortilla por persona (gramos)	**Precio Promedio 2010** ($/Kg)	**Población 2010**	**Consumo per cápita tortilla por año** (Kg)	**Consumo anual de tortilla** (Toneladas)	**Consumo anual de tortilla** (millones de pesos)
Zonas Rurales	217.9	10.3	24,938,711	79.5	1,983,463	20,430
Zonas Urbanas	155.4	10.5	87,397,827	56.7	4,957,292	52,052
TOTAL	**169.3**	**10.4**	**112,336,538**	**61.8**	**6,940,755**	**72,481**

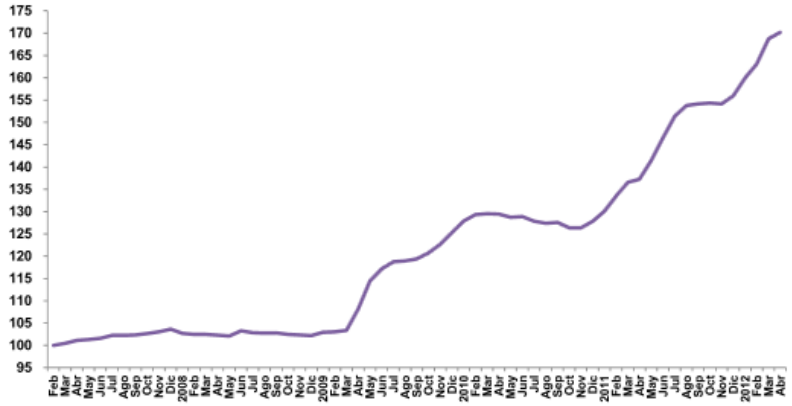
II.2.2 Flour and corn tortilla price evolution

The upward trend in the price of corn has been maintained in the last months of 2011. This has meant higher costs for the preparation of corn flour. The share of corn in the cost structure of

flour production is 67%. The increase in the price of corn flour is directly reflected in the price of tortillas sold in self-service stores because corn flour is used as a raw material.

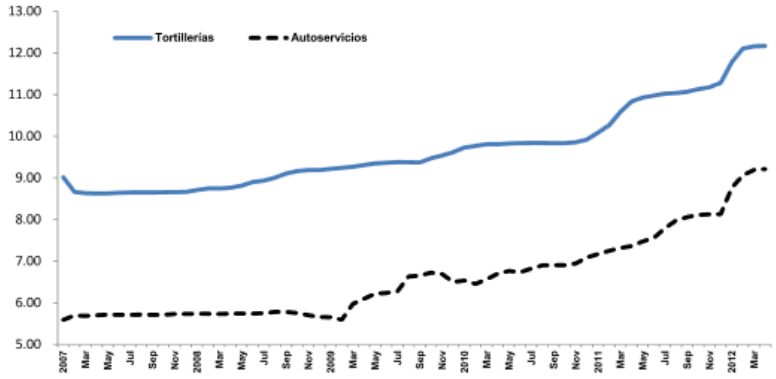
While the price of tortillas has shown some stability, there have been increases in the price of this commodity. In particular, an increase of 10.2% was seen between June 2010 and May 2011. As of April 2012, the price of tortillas has completely stabilized.

PRICE INDEX FOR CORN FLOUR
(February 2007=100)



***Note**: The price considered by SNIIM (National System of Information and Integration of Markets) includes several varieties of corn flour (basic, with additives, with preservatives, etc.).*

PRICE PER KILOGRAM OF TORTILLAS IN TORTILLA SHOPS AND SELF-SERVICE STORES



III. Local restrictions on competition and its effect on tortilla prices

In March 2010, the Federal Economic Competition Commission (COFECO as abbreviated in Spanish) presented a proposal called "Guidelines for Preventing Regulatory Constraints on the Efficient Functioning of Production markets, Marketing and distribution of corn dough and Corn Tortillas" to the Department of the Economy.

The purpose was to prevent municipal regulations regarding tortilla dough and tortilla shops which include restrictions to competitiveness. These regulations would incur higher tortilla prices for the consumer.

This analysis identified 98 municipal regulations located in 19 states containing elements that undermine competitiveness. The "anti-competition" elements that were found which are the most relevant and frequent are the following:

1. Imposing, explicitly or tacitly, minimum distances for the installation of new facilities.
2. Setting conditions for the entry of new establishments, subject to the amount of establishments already in place.
3. Requiring the permission for new establishments and their prices to be subject to the opinions of existing establishments.
4. Imposing undue requirements regarding opening and operating facilities.
5. Imposing minimum quotas of local raw materials.

Therefore, COFECO concludes that local ordinances being imposed by municipal regulations has negative effects on society because they create or may create undue advantages in favor of one or more producers, marketers and distributors. This advantage would be to the detriment of potential participants and competitors in this market. Consumers, meanwhile, are stuck paying high prices because of this lack of competition.

III.1 Procedure for the analysis of anti-competition

Regarding the analysis of the "Guidelines for Preventing Regulatory Constraints on the Efficient Functioning of Production markets, Marketing and distribution of corn dough and Corn Tortillas" by COFECO, the impact of these anti-competitive practices on the market price of corn tortillas will be quantified by an econometric model. To achieve this, the following methodology is used:

1) Collection and analysis of the 98 municipal regulations regarding this subject.
2) Creation of an information matrix regarding elements of anti-competition that have been identified and that have the most frequency.
   2.1) To build the matrix, first the five elements of anti-competition listed above were considered. A subdivision of some of these was proposed to indicate the frequency in which these regulations incur uncompetitive practices. The final classification is as follows:

Anti-competition Elements	
1. Impose, explicitly or tacitly, minimum distances for the installation of new establishments.	
2. Set conditions for new establishments, subject to the amount of establishments already existing.	
3. Submit the entrance of new establishments and their prices to the opinion of currently existing establishments.	3a) External opinion regarding requests from persons interested in entering the market and competing in production and corn dough and tortilla distribution. 3b) External opinion to set prices to which all participants are subject.
4. Impose undue requirements on the opening and operating of new establishments.	4a) Create legal uncertainty that discourages the entrance of new participants. 4b) Impose fixed hours for marketing and distributing corn dough and tortillas. 4c) Impose unequal treatment regarding similar activities.
5. Impose requirements for minimum quotas for local inputs.	

2.2) 98 municipal regulations were analyzed and it was determined to assign a unit value to the existence of each anti-competition element. Thus, for example, a score of 1 would be assigned for each anti-competition element, and zero for those containing no anti-competition element.

2.3) The total population of each municipality was weighed against the total population of the corresponding federal entity.

3) As a third step, the average monthly consumer prices of corn tortillas (January 2008-February 2012) were collected and calculated in the 56 cities that are reported by the National System for Market Information and Integration (SNIIM as abbreviated in Spanish). The average price of corn and corn flour was obtained from "Central de Abasto" (the primary Mexican market), located in the various states of the country, and with assistance from SNIIM.

4) Consumer prices for corn tortillas in the 56 cities are compared to the 98 municipalities with anticompetitive regulations (anti-competition matrix elements). This relationship was based on the fact that there was not absolute compatibility between the cities reporting corn tortilla prices and the municipalities subject to the study. For this reason, the price of corn tortillas for the 98 municipalities was set at the same price as at the nearest (neighboring) city that SNIIM reports on when not coinciding[1].

5) With respect to the price of white corn and corn flour, the monthly average at Central de Abasto (CEDA) was adopted, as calculated and published by SNIIM. 30 CEDA sites located in 23 states were considered. Where there were two or more CEDAs, a simple average was obtained and was adopted as the corn price for that particular municipality.

III.2 General Analysis of Anticompetitive Regulations and Guidelines

The 98 municipal regulations containing regulatory constraints to the efficient functioning of corn dough and corn tortilla markets are spread over a total of 19 states. The states with the greatest number of regulations having these characteristics are Morelos, Michoacán, Sinaloa, Veracruz, and Chiapas. These have a total of about 66 regulations, i.e. 67% of the total sample.

[1] The results show that only ten municipalities agreed on the same number of cities than the SNIIM.

Moreover, the total population of the municipalities with restrictive regulations on competitiveness totaled 15,778,459 people, i.e. 14% of the total population.

Number of Municipal Regulations and Population with Anticompetitive Guidelines

Entidades	Reglamentos Municipales		Población	
	Número	%	Total de Población Municipios	% de la Población Municipal/Entidad
Aguascalientes	1	1%	99,590.0	8%
Baja California	1	1%	1,559,683.0	49%
Campeche	1	1%	259,005.0	31%
Chiapas	10	10%	1,470,654.0	31%
Coahuila	3	3%	822,004.0	30%
Colima	4	4%	303,729.0	47%
Guanajuato	1	1%	68,795.0	1%
Guerrero	3	3%	303,683.0	9%
Jalisco	2	2%	508,786.0	7%
México	2	2%	1,683,770.0	11%
Michoacán	16	16%	1,139,740.0	26%
Morelos	17	17%	956,052.0	54%
Nayarit	1	1%	93,074.0	9%
Nuevo León	7	7%	2,288,019.0	49%
Puebla	3	3%	508,264.0	10%
Sinaloa	12	12%	2,188,065.0	79%
Tamaulipas	2	2%	705,986.0	22%
Veracruz	11	11%	779,643.0	10%
Zacatecas	1	1%	39,917.0	3%
Total	**98**	**100%**	**15,778,459.0**	**26%**

Source: Created based on data from COFECO and the Population and Housing Census of 2010.
1 / Has a state law for the Protection of the Nixtamal Mills Industry and its derivatives.
2/ Average.

On average, 26% of the population lives in the states that have regulations that inhibit competitive practices in the corn dough and tortilla market. Among the entities that stand out with the highest percentage of population are the following: Sinaloa with 79%, followed by Morelos with 54%, Nuevo Leon with 49%, Colima with 47%, Campeche and Chiapas with 31% each, Coahuila with 30%, Michoacán with 26% and Tamaulipas with 22%.

These municipal regulations mean that, of the guidelines that restrict competitive practices in the corn dough and corn tortilla market, the most frequently reported are: imposing unequal treatment of similar economic activities with a frequency of 77 out of 98, i.e. 78.6% of the sample. Secondly, imposing, explicitly or tacitly, minimum distances for the installation of new establishments, with 69 instances (70.4%), followed by legal uncertainty with a total of 59 instances (60.2%). Submitting the entry of new establishments and their prices to the opinion of establishments that already exist occurs in a total of 46 regulations (46.9%). On the other hand, that which appears least is imposing minimum quotas for locally supplied raw materials, found in two regulations out of the 98 analyzed.

Frequency of Anticompetitive Municipal Regulation Guidelines. III.3 Econometric modeling and estimation

Lineamientos	Frecuencia	%	% respecto a los 98 Reglamentos
1. Imponer, explicita o tácitamente distancias mínimas para la instalación de nuevos establecimientos	69	21.6%	70.4%
2. Condicionar la entrada de nuevos establecimientos, sujeto a la cantidad de los ya establecidos	36	11.3%	36.7%
3. Someter la entrada de nuevos establecimientos y los precios a la opinión de los ya existentes	46	14.4%	46.9%
3.1) Establecimientos	31	9.7%	31.6%
3.2) Precios	15	4.7%	15.3%
4. Imponer requisitos indebidos para la apertura y operación de los establecimientos	167	52.2%	-
4.1) Incertidumbre	59	18.4%	60.2%
4.2) Imponer Horarios	29	9.1%	29.6%
4.3) Trato desigual	77	24.1%	78.6%
5. Imponer requisitos de cuotas mínimas de insumos locales	2	0.6%	2.0%
Total	**320**	**100.00%**	-

Source: Created based on data from COFECO.

III.3 Econometric Modeling and Estimate

An econometric model is established according to the previous analysis using panel methodology to clarify the effects of anti-competitive practices in municipal regulations on the price of corn tortillas. The model is set as follows:

$$ptort_{i,t} = \alpha + \beta_1 pmaiz_{i,t} + \beta_2 phar_{i,t} + \beta_3 rpond_{i,t} + u_t$$

Where
$ptort_{i,t}$: corn tortilla consumer price in municipality i;
$pmaiz_{i,t}$: white corn wholesale price in municipality i;
$phar_{i,t}$: corn flour wholesale price in municipality i;
$rpond_{i,t}$: competitive restrictions weighed by population.

It is expected that the parameters $\beta_3 > 0$, i.e. under conditions where regulatory practices limit the competitive environment in the corn dough and tortilla market, consumer prices are higher.

The estimation done by this model, first of all, is performed using the Pooled Panel technique. The results are as follows:

Table 1: Pooled OLS Regression Results

```
Iteration 1: tolerance = .0859125
Iteration 2: tolerance = .00003786
Iteration 3: tolerance = 9.400e-09

GEE population-averaged model                   Number of obs      =      4900
Group variable:                        id       Number of groups   =        98
Link:                            identity       Obs per group: min =        50
Family:                          Gaussian                      avg =      50.0
Correlation:                 exchangeable                      max =        50
                                                Wald chi2(3)       =    563.44
Scale parameter:                 1.292616       Prob > chi2        =    0.0000

                                              (Std. Err. adjusted for clustering on id)
------------------------------------------------------------------------------
             |               Semirobust
       ptort |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       pmaiz |   .4795157   .0319604    15.00   0.000     .4168744    .542157
        phar |   .5145433   .0372902    13.80   0.000     .4414559   .5876307
       rpond |   .7897946   .1199412     6.58   0.000     .5547142   1.024875
       _cons |   3.943304   .3218634    12.25   0.000     3.312464   4.574145
------------------------------------------------------------------------------
```

* Estimation with standard robust error

The results obtained indicate that:

- For every Peso that corn prices rise, the price of tortillas is increased by $0.48 cents per kilogram, and for every peso that corn flour prices increase, tortilla prices increase by $0.51 cents per kilogram.
- Restrictions on competition put on the population directly affect consumer prices. This means that under an atmosphere that restricts the free entry and operation of new facilities, the result is a price higher than $0.79 cents per kilogram.

To achieve greater consistency in the above results, the same model was estimated using the Random Effects Panel methodology[2]. The results obtained are as follows:

Table 2: Results of Random Effects Regression

```
Random-effects GLS regression                   Number of obs      =      4900
Group variable: id                              Number of groups   =        98

R-sq:  within  = 0.7013                         Obs per group: min =        50
       between = 0.2767                                        avg =      50.0
       overall = 0.5074                                        max =        50

Random effects u_i ~ Gaussian                   Wald chi2(3)       =  11248.04
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000

------------------------------------------------------------------------------
       ptort |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       pmaiz |    .479124   .0143575    33.37   0.000      .450984    .5072641
        phar |    .514732   .0139801    36.82   0.000     .4873315    .5421324
       rpond |   .7898397   .0958689     8.24   0.000     .6019402    .9777392
       _cons |   3.943613   .1601175    24.63   0.000     3.629789    4.257438
-------------+----------------------------------------------------------------
     sigma_u |  .81714965
     sigma_e |  .66261877
         rho |  .60330254   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

[2] The Lagrange multiplier test for random effects was used to perform the estimation of the model. The result is presented in appendix I and indicates that it is feasible to proceed with the estimation of random effects. The random effects model is a panel model where the unobserved effects of data are uncorrelated with the explanatory variables in each time period.

The results reinforce the idea that the consumer price of corn tortillas is directly related to the price of corn and corn flour, two major raw materials for their manufacturing.

Furthermore, the results relating to restrictions on the entry and operation of facilities for the production and marketing of corn tortillas are statistically significant and in line with what is expected, i.e., it is estimated that the price paid by consumers for corn tortillas is $0.78 higher per kilogram on average. This is occurring in an environment that limits entry and free competition, causing a loss in the level of welfare of families living in these municipalities[3].

III.4 Conclusions

According to this analysis it is concluded that the restrictions that limit the free entry and participation of businesses that produce and sell in the corn dough and corn tortilla market cause consumer prices to be higher in comparison what prices would be with increased competition.

From the econometric results, it appears that the major constraints that adversely impact the consumer price of corn tortillas are those that aim to limit the free entry of new establishments, the imposition of minimum distances between establishments and price controls.

Keeping a structure that inhibits processes for free participation and the functioning of competitors in the market, along with the structural changes and/or shortages in the market for corn dough and tortillas, affects consumer prices and they will remain high compared to other states or regions that facilitate and promote free competition.

Furthermore, changing (rising or lowering) prices of the main raw materials for tortilla production, such as white corn and corn flour, are magnified and/or nullified in a structure devoid of competition. This, in turn, limits competitors in their ability to cushion possible friction arising from the raw material market. For example, a decrease of $1 in the price of corn and corn flour would not be directly translated to a reduction in the price of corn tortillas. This is because restrictions on free competition are specified at $0.78 pesos per kilogram.

Therefore, establishing and maintaining guidelines that inhibit the processes of competition for producers and marketers of corn dough and corn tortillas, as expected, significantly impacts consumer prices and reduces their ability to acquire an indispensable food product.

It is thereby essential to establish a program and a series of actions to dismantle all restrictions on competition identified by COFECO.

[3] The fixed effects model does not identify the competitive constraints because they remain invariant over time, so the results are seen and it is not possible to determine their application in relation to the RE model. The results of this regression are cointegrated and the tests are presented in Appendix I.

Appendix I

A. Lagrange Multiplier test for Random Effects (RE)

```
Breusch and Pagan Lagrangian multiplier test for random effects

        ptort[id,t] = Xb + u[id] + e[id,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                 --------+------------------------------
                   ptort |   2.618084        1.61805
                       e |   .4390636       .6626188
                       u |   .6677336       .8171497

        Test:   Var(u) = 0
                                 chi2(1) = 50980.65
                              Prob > chi2 =     0.0000
```

Based on the *p - value* we can reject the Ho. Therefore, the u_i random effects are significant and it is preferable to use random effects estimation rather than pooled.

B. Cointegration Test for Random Effects Panel Model

```
Levin-Lin-Chu unit-root test for residual
------------------------------------------------------------------------------
Ho: Panels contain unit roots                   Number of panels  =     98
Ha: Panels are stationary                       Number of periods =     50

AR parameter: Common                            Asymptotics: N/T -> 0
Panel means:  Included
Time trend:   Included

ADF regressions: 1 lag
LR variance:     Bartlett kernel, 11.00 lags average (chosen by LLC)
------------------------------------------------------------------------------
                     Statistic      p-value
------------------------------------------------------------------------------
 Unadjusted t       -23.7471
 Adjusted t*         -4.1729        0.0000
------------------------------------------------------------------------------

. xtunitroot breitung residual, trend

Breitung unit-root test for residual
------------------------------------------------------------------------------
Ho: Panels contain unit roots                   Number of panels  =     98
Ha: Panels are stationary                       Number of periods =     50

AR parameter: Common                            Asymptotics:  T,N -> Infinity
Panel means:  Included                                        sequentially
Time trend:   Included                          Prewhitening: Not performed
------------------------------------------------------------------------------
                     Statistic      p-value
------------------------------------------------------------------------------
 lambda              -1.5852        0.0565
------------------------------------------------------------------------------

. xtunitroot ips residual, trend

Im-Pesaran-Shin unit-root test for residual
------------------------------------------------------------------------------
Ho: All panels contain unit roots               Number of panels  =     98
Ha: Some panels are stationary                  Number of periods =     50

AR parameter: Panel-specific                    Asymptotics: T,N -> Infinity
Panel means:  Included                                       sequentially
Time trend:   Included

ADF regressions: No lags included
------------------------------------------------------------------------------
                                               Fixed-N exact critical values
                     Statistic      p-value        1%       5%       10%
------------------------------------------------------------------------------
 t-bar               -2.0655                     -2.360   -2.310   -2.280
 t-tilde-bar         -1.9800
 Z-t-tilde-bar       -6.1474        0.0000
------------------------------------------------------------------------------
```

Co-integration tests are performed on the residuals obtained from the random effects panel model.

According to *p – value* we can reject the Ho. Therefore, the panel is co-integrated. For the Breitug 10% test.

IV. Problems identified and policy recommendations

IV.1 Problems identified

1. Movements in international markets are directly inputted to the Mexican corn market.
2. Mexico is a country that is historically in a deficit. In other words, domestic production is not sufficient to supply the entire corn demand.
3. Duality in production. On one hand, one sixth of the surface area concentrated in the north that is dedicated to this product is irrigated and produces yields that are close to those of the US However, most production is seasonal and is scattered all over the country with very low yields.
4. There has been a significant lag for many years in yields per hectare in most of the country. This is contrasted sharply in the case of Sinaloa which has had increasing yields for at least the last 10 years.
5. Significant efforts are not being made to identify and use technology in order to increase the productivity of primary production, including planting this crop with improved seeds (genetically modified) as is done in many parts of the world to meet their productivity problems.
6. It has been seen that there is a concentrated market held by very few companies in the importation, storage and marketing of corn. These companies control the storage and distribution infrastructure, which presents a barrier to the entry of new competitors.
7. A very concentrated flour industry market is seen in the country.
8. The nixtamal milling industry located in urban areas cannot access direct corn purchases without making intermediary payments due to lack of organization, capitalization, lack of storage facilities, prevailing cash price set by traders depending on weekly supply and low volumes prevent traders from holding a better negotiating position.
9. A clear correlation between the lack of market competitiveness in the tortilla production market caused by states and the regional prices for this product is seen.
10. The policies implemented by ASERCA-SAGARPA regarding marketing generate market distortions and a high cost to the government.

IV.2 Policy Recommendations

1. Since international market movements directly affect the Mexican corn market, the best option for the Mexican market to minimize speculation and prices that differ from world averages is to continue the policy of opening our exterior markets and facilitate the commercial flow of this grain in order to cover our deficit in the most efficient manner.
2. Search for systems that stimulate the production of white and yellow corn via increases in yields.
3. Create incentives to stimulate corn cultivation in optimal seasonal areas and restructuring in areas that are not. Also, accelerate the implementation of irrigation technology where there is sufficient availability of water and create incentives to

increase the production of yellow corn in areas with high potential. Redesign SAGARPA support programs so that they contain incentives for soil compaction and the organization of producers based on viable and productive projects.

4. Replicate the Sinaloa production model which is oriented towards increasing yields. This could be done in other states with potential such as Jalisco and Guanajuato.
5. Provide more efficient support for research and technology transfer in order to generate more resistant varieties and accelerate the experimental release of GM corn.
6. Push the Federal Competition Commission to investigate and, where appropriate, resolve practices that go against competition in the corn import, storage and marketing sector.
7. Push the Federal Competition Commission to investigate and, where appropriate, resolve practices that go against competition in the corn flour production and marketing sector.
8. Generate an incentive scheme that provides an incentive to the nixtamal milling industry to be able to directly purchase of corn in order to reduce costs, including financing.
9. Replace the "Promasa" (Pro corn dough) grant program with a financing scheme for the nixtamal milling industry to help cover the costs of consolidated corn purchase storage, along with a financing plan and training for tortilla shops.
10. Determine, at the Federal Government level, the types and characteristics of targeted support for those involved in this sector. Gradually use part of the market coverage support resources for irrigation technology and technology transfer, or provide a direct, rather than marketing, subsidy plan.
11. Promote a standard for standardized tortilla production and push for a mix between nixtamal corn dough and corn flour in the central-south part of the country in order to reduce production costs.