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UNIT DISPLACEMENT OF SHEEP PRODUCTION IN MEXICO BY EFFECT OF IMPORTS

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ABSTRACT

The aim of this study was to evaluate the displacement of Mexican sheep production units as a result of imports. The country as a whole was taken as the unit of analysis, the information is mainly obtained from SAGARPA (for its acronym in Spanish) and sectorial agencies, FAO, Ministry of Economy and the Bank of Mexico, the study was conducted from 1970 to 2011. Data was deflated with National Consumer Price Index for the second half of December 2010. The increases/decreases, average growth rate, inventory, production and imports were determined. To calculate the units of sheep production displaced or not developed by the effect of imports and the blueprint details sheep products where the USP units stratified into four strata by the number of sheep. The average growth rate sheep inventory was 0.71% ending in 2011 with 8.2 million of heads, the production went from 20 800 t in 1970 and 2011 with 56,500 t, the sheep meat imports increased from 161 to 10613 t in the period from 1970 to 2011 with a 10.49 % average growth rate. The displaced units for 2011 as a result of imports were 579,000. The economic policy pursued by the Mexican state has no incentive to domestic production or consumption, but imports of sheep or meat to supply domestic demand.

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INTRODUCTION

Mexico is now one of the countries with the most extensive network of free trade agreements in the world, with more than 32 treaties with 32 countries on three continents, and a potential market of over 900 million people (Bobadilla-Soto *et al.*, 2012). The processes of regionalization of trade were led by the European Union since its inception in 1957, now consisting of 27 countries. Mexico in the 1960s, through the Treaty of Montevideo and the Central American Common Market, gained way to the Latin American Free Trade Association (LAFTA), with the entry of the General Agreement on Tariffs and Trade (GATT) in 1986 now the World Trade Organization (WTO) and the signing of various trade agreements, noted for its great impact on the Free Trade Agreement's (NAFTA) in 1994, the Treaty with the European Union in 2000. With NAFTA becoming effective, it has generated considerable discussion. The agricultural chapter has meant one of the most contentious issues in negotiations, differences in capitalization levels, technology and structure, remains unresolved and factors that decrease the

competitiveness of the sector. One of the notable changes in trade openness has been a brake on wages from trade liberalization and rising on the profitability of the capital (Puyana and Romero, 2004) as well as the dismantling of the national production as a result of found economic policies (Calva, 1994). In Mexico highlights a change in the configuration of foreign trade increased participation of Asian countries in the volume of imports, strengthening trade relations with the United States of America (USA) and the reduced presence of Mexican products in the European Union. Different were the political and economic events that have affected the food industry and trade in general. There are obvious changes in the marketing of products and the increase in Mexican exports as a whole, but the trade balance remains in most cases negative (Bobadilla-Soto *et al.*, 2012). Sheep farming in Mexico is done across the country, which gives a clear idea of the importance of this activity. Basically sheep production could be divided into two predominant production systems, extensive and intensive, although lately a combination of both has been successful (Artega, 2008). The problems afflicting sheep production is complex, it's hard to understand why if there is good price for all derivatives of sheep, there is an unmet demand and potential markets, it's a noble activity, generating jobs.

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It may be noted that the problems facing the national sheep breeding for many years, poor production efficiency herd stands; a brief analysis of the figures shows that if the population is 6.4 million of animals and 2.1 are killed, this would indicate that only 32.8 percent of the population are sacrificed, while other countries exceed 50 percent (Lucas and Arbiza, 2006). In the extensive system, which is the predominant system in Mexico, nourishment is basically by grazing animals in natural rangelands; capital investment in food, health and infrastructure is low and labor is generally done by the family. Meanwhile, in the intensive system, an intense use of the production medium is given, with a significant capital investment in infrastructure and equipment; the value of land is high and labor is employed. Nourishment is defined by taking place through full or partial enclosure, using inputs of high nutritional value (grains and oilseeds), which significantly raises the costs of production (Arteaga, 2008). There are marked differences between the data reported among national and international official institutions, producer associations and individuals, making it difficult to compare and interpret. Statistics and data production exports and imports suggest and give evidence of the behavior of the variables involved in it, however, from the above; the aim of this study was to evaluate the displacement of Mexican sheep production units by the effect of imports.

MATERIALS AND METHODS

In making the national analysis, it was considered as the unit of analysis the country as a whole. Statistical information contained in this study, belongs to the official publications of the Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food (SAGARPA for its acronym in Spanish) and its line agencies, the user imports information was obtained from the United Nations Food and Agriculture Organization (FAO) and the Ministry of Economy. The data analyzed was inventory, meat production, imports of meat and sheep standing between the years of 1970-2011. Data are deflated using the National Consumer Price Index (NCPI) in the second half of December 2010. Mexican pesos became American dollar (1 dollar USA = 13.4866 Mexican pesos). Increases / decreases, the Average Annual Growth Rate (AAGR) was determined. The data was fitted by the method of least squares to obtain the inventory (Martínez, 1982), production and imports trend, Microsoft Office Excel 2007 was used ©. To calculate the units of sheep production (USP) displaced or not developed by the effect of imports and with data from the product blue print sheep system where the USP stratified into four strata by the number of sheep: Stratum I 1-20 (36.6%); Stratum II 21-100 (55.3%); Stratum III 101-500 (7.3%); Stratum IV of 500 (0.8%) sheep; the following formula was used:

$$USP_d = (no_i + tc_i) * E$$

Where:

USP_d = displaced sheep production units

no_i = number of sheep imported

tc_i = tones of imported sheep meat. Tons became sheep numbers by dividing tons by the average weight that yields a channel (19 kg) in Mexico according to SAGARPA.

E = percentage of stratum which each one provides.

RESULTS AND DISCUSSION

The sheep population went from 6.1 million in 1970 to 8,200,000 in 2011 with a AAGR of 0.71%, the increase over 40 years was 2.1 million head, in Figure 1 the behavior of the population is shown, being 1985 the year with the lowest population of 5.7 million (Figure 1). The production of sheep meat went from 20780 t to 56546 t in the period from 1970 to 2011 with a AAGR of 2.41 %, the increase was 35766 t (Figure 2). A study from 1980 to 2010 the production AAGR foot channel was positive, the production was covered on average 50 % of the national demand, for the three analyzed decades the growth rate was higher for meat production than on foot, due to the increased weight of animals and was reflected in increased channel performance, this was due to genetic improvement and the management of technologies in sheep production (Nuncio *et al.*, 2012), this is reflected in Figure 2 where there is more growth from 2000 to 2011 with a 4.5 % AAGR.

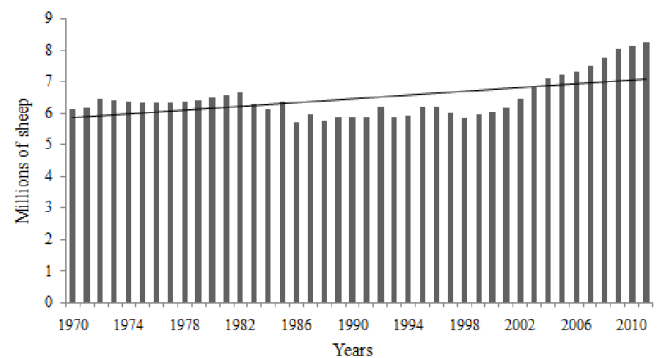


Figure 1. Sheep population in Mexico 1970-2011

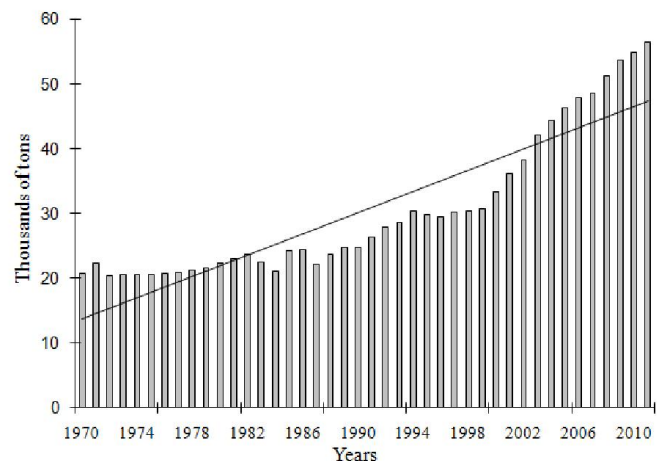


Figure 2. Sheep meat production in Mexico, 1970-2011

The sheep standing was better paid relative to other species such as goats, cattle, pigs and chickens in constant weights (Figure 3). There is great variation in prices as a result of inflation where in that decade was 697 % cumulative (Bobadilla -Soto *et al.*, 2010), in 1980 the sheep's price was 52.43 pesos / kg (3.89 dollar/kg) and in 2012 was \$ 23.88 kg (1.77 dollar/kg). The sheep carcasses were also the highest paid compared to the goats, cattle, pigs and chickens, in 2012 the prices were 47.20, 42.78, 34.87, 31.08 and 25.91 Mexican pesos/kg, respectively and in comparison with the price in

USA dollars /kg was 3.50, 3.17, 2.59, 2.30 and 1.92 (Figure 4). The current orientation of Mexican sheep production is primarily towards the production of meat, gaining high prices in foot and channel compared to other livestock species (the value of sheep meat production in 2003 was USA \$ 127,977,285) (Cuellar, 2003), which matches the results of this study. With FAO data, imports of sheep standing from 1970-2011 show no trend since it has shown fluctuation (Figure 5), being 1992 the year where there are more imports with 958,000 animals imported (Figure 6). The strongest inter annual variations occurred in the years 1974, 1979, 1982, 1988, 1991 and 2006 with an increase of 254, 2057, 179, 590, 101 and 73 % according to its preceding year, the years with the highest decrease were 1976, 1978, 1987, 1995, 2003 and 2011, with a percentage of 89, 88, 73, 68, 75 and 67 according to its previous year.

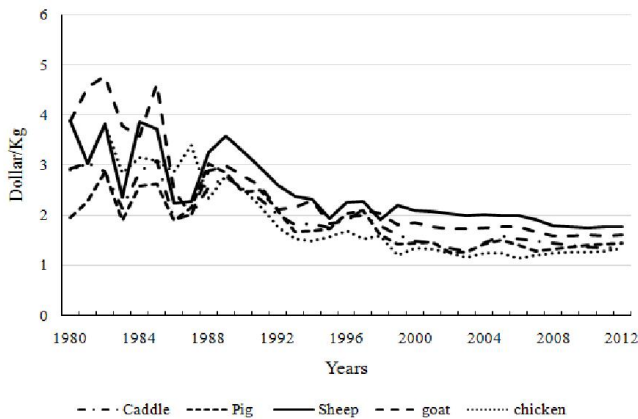


Figure 3. Sheep and other animal species pricing to constant weights

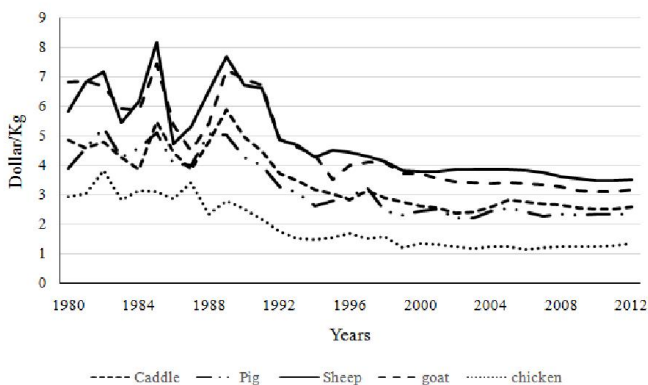


Figure 4. Prices of meat carcass to constant weights

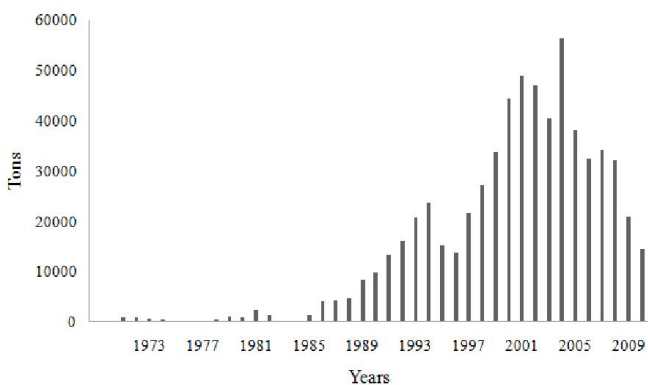


Figure 5. Imports of sheep meat

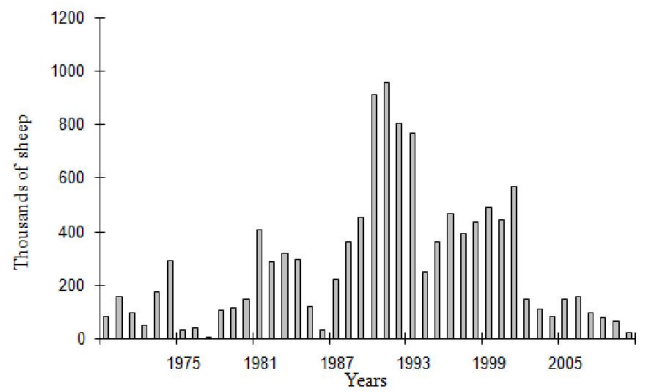


Figure 6. Imports of sheep standing

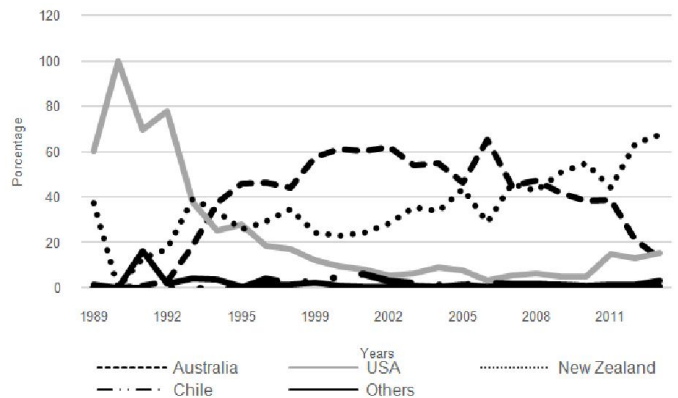


Figure 7. Participation of countries where sheep for breeding stock are imported

The sheep meat imports increased from 161 to 10,613 t in the period from 1970 to 2011 with an average annual growth rate of 10.49 %, being 2004 when most meat was introduced to the country with 56367 tons (Figure 5). Imports of sheep standing at the beginning were more important than beef in 1970, 80 thousand heads and 161 tons of meat were introduced, being 1992 when more animals were imported with a total of 958,000 and in 2004 the sheep meat peaked with 56 thousand tons, this indicates that first sheep was imported in foot, changing the trend toward foreign purchases of sheep meat at the end of this study is more important. Sheep scrap from USA, they are also used in preparing barbecue, with its market value almost half the price of meat of domestic sheep, however, is becoming less used that type of animal or mixed with the Mexican cattle, arguing the toughness of the meat of the sheep, and the type of fat you have (harder and yellow), which hinder the marketing of barbecue (Cuellar, 2003), with the introduction of sheep waste brings that domestic prices collapse. Using data from the Ministry of Economy where we have data from 2003 to 2012 will have the following tariff:

Table 1. Import tariff items

Tarriff	Description
02042101	Carcasses and half-carcasses (meat of sheep, fresh or frozen).
02042299	Other cuts (pieces) bone (mutton, fresh or chilled).
02042301	Boneless (mutton, fresh or chilled).
02043001	Carcasses and half-carcasses of lamb frozen.
02044101	Carcasses and half-carcasses (sheep meat frozen)
02044301	Boneless (frozen sheep meat).

Table 2. Import tariff items sheep meat (tons)

Years old	Tariff items						Total	
	02041001	02042101	02042299	02042301	02043001	02044101		02044301
2003	0	0.5	15.2	7.6	324.5	9895.8	47.2	10290.8
2004	0.0	0.0	166.9	7.1	2004.2	5395.2	49.0	7622.3
2005	64.9	0.0	54.5	3.4	2797.9	5408.1	203.5	8532.4
2006	0.5	0.0	49.4	2.0	1331.5	6288.0	568.5	8239.9
2007	49.5	56.6	136.2	23.3	568.1	5406.3	639.7	6879.7
2008	50.3	0.0	65.2	13.7	2318.8	4679.1	871.1	7998.3
2009	29.8	705.8	23.4	16.8	496.5	2264.2	724.7	4261.2
2010	0	314.7	8.0	9.3	0.1	687.7	1024.6	2044.3
2011	0	342.7	18.7	12.3	17.1	293.3	720.8	1404.9
2012	0	0	29.8	19.3	65.3	623.1	929.6	1667.1

In Table 2, the amount of sheep meat are listed in the above tariff, highlighting the 2003, with an import of 10 thousand tons, with an increasing trend, the fraction being the most important 02044101 in 2003 through their participation 2009 which was more than 50% of the 2010 to 2012, the fraction contributed 02044301 over 50%. The figures FAO does not agree with the Ministry of Economy, in 2003 the FAO reported 40 000 t and the Ministry of Economy 10 000 t, this is a difference of 30 000 t in 2011 reported 10,000 FAO 1404 t Economy with a difference of about 9000 t. The volume of domestic production is in deficit as imports of sheep meat have remained high in recent years and currently range from 43.5 to 50 % of national consumption, which means less than 50 thousand tons of which 100 thousand currently consumed in our country are imported (Arteaga, 2008), which are brought mainly from Australia and New Zealand, which have more than 90 % of world sheep production, as well as Canada, USA and lately Uruguay (Mondragón *et al.*, 2010), in Figure 7 is shown to have greater participation Chile and Uruguay.

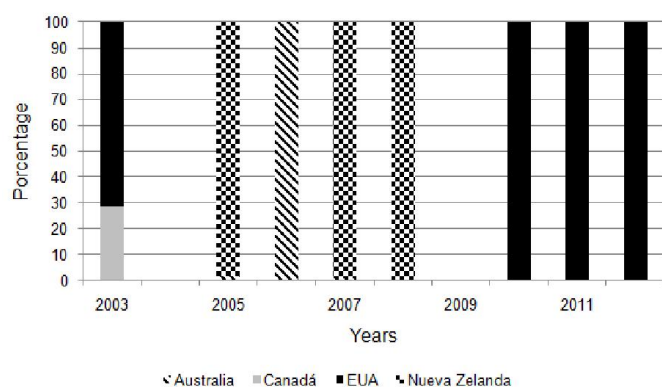


Figure 8. Countries participation where they import sheep for breeding

New Zealand was the fourth largest producer of sheep meat, with just 6% of the total sheep population and was the leading exporter with 40% of the total. Like Australia, have developed programs to increase productivity of the herd, which have been reduced but at the same time increasing both the volume and value of exports. Australia has the second largest inventory of sheep in the world with 10 % of the total and was the second largest producer with 8% of total sheep meat and it is the second largest exporter with nearly 30% of exports. In this country, thanks to the implementation of Lambplan program have succeeded in reducing the herd but at the same time increased its productivity, allowing them to maintain the same levels of production and export (Carrera, 2008), which shows

that these two countries have emerged as the main introducers of sheep meat to Mexico. The consumption of meat from sheep 95% is in the form of barbecue (Mondragon *et al.*, 2010), meanwhile Molina (2005) reports that 98 % of sheep meat produced in Mexico or imported is intended for the barbecue market. The barbecue is native to central Mexico (State of Mexico, Tlaxcala and Hidalgo), although this spread throughout the country. Mainly consumed in tacos, but this type of food is carried on holidays, celebrations or weekends and is accompanied with broth. The preference of domestic livestock is the freshness of the meat and the presence of visors, to which attribute performance and taste of the product (Molina 2005). There are three tariff items for imports of sheep standing with the 01041001 or certificate of high pedigree registered, 01041002 and 01041099 to supply others (livestock of sheep). The number of sheep for slaughter is the fraction more animal matter in comparison with the other two being 2003 the year recording the highest number of sheep (143,000 heads) and the fraction of high record was in 2007 when it imported 35 thousand livestock for breeding (Table 3).

Table 3. Tariff items sheep standing

Years old	Tarrif items (number of sheep)			Total
	01041001	01041002	01041099	
2003	693	143442	821	144956
2004	0	108740	0	108740
2005	4826	79004	172	84002
2006	18747	126569	86	145402
2007	35159	119983	87	155229
2008	12	97952	150	98114
2009	0	78733	92	78825
2010	20	64003	99	64122
2011	293	20634	125	21052
2012	6	253	49	308

In Figure 8 the main countries where sheep are imported for breeding highlighting New Zealand and in 2007 was the greater number of sheep imported high registration and participation of this country was shown 98.3%, second Australia introduced in 2006 to 100% of animals with a greater amount to 18 thousand livestock, USA in some year has placed 100% purebred breeding animals to the Mexican market remains small amounts (Table 2). Table 4 units displaced sheep production shown were calculated from 2000 to 2011, Stratum II was that turned most affected this is because it contributes 55.3% of the population of sheep in 2004 coincides with the increased meat imports in that year moved to Stratum II over 1.7 million, Stratum I 1.2 million; Stratum III 224,000 and Stratum IV 25, 000 units of sheep production.

Table 4. Sheep production units displaced by stratum

Years old	Stratum (number of sheep)			
	1 a 20	21 a 100	101 a 500	Over 500
2000	1082265	1635226	215862	23656
2001	1103940	1667974	220185	24130
2002	1112744	1681277	221941	24322
2003	828858	1252346	165319	18117
2004	1125605	1700710	224506	24603
2005	762475	1152046	152078	16666
2006	677864	1024204	135202	14817
2007	713976	1078768	142405	15606
2008	654450	988827	130532	14305
2009	430814	650930	85927	9417
2010	305385	461415	60910	6675
2011	212145	320536	42313	4637

The trend from 2004 to 2011 is down ward, as imports of sheep meat and its tendency was to diminish. This unfavorable environment for the agricultural sector, has resulted in the abandonment of millions of rural producers, the power does not cross the border, given the recession in the United States are forced to augment the reserve army jobber and/or part of the growing unemployment in large and medium cities (Carrera, 2008). Applied the formula for the number of sheep imported to tariff item with high pedigree or certified registered for the years of greatest import (Table 5) in theory should support for 2007 to 12868 Stratum I and Stratum II 19443 units of sheep production as shown in Table 4 for each of the strata and the three years of highest import of this fraction. Study conducted in the State of Mexico in 2007, seventeen months after the subsidies for the purchase of sheep for breeding stock at the time of the survey 16% of family units no longer had a single head of cattle have been delivered, 36 % were declining and only 48% of producers were supported stable or growing.

Table 5. Sheep production units supported in theory

Years old	Stratum (number of sheep)			
	1 a 20	21 a 100	101 a 500	Over 500
2005	1766	2669	352	39
2006	6861	10367	1369	150
2007	12868	19443	2567	281

In the latter group, the estimated growth rate was only 0.6 bellies per year, while those that did were decreasing at a rate of at least ten sows per year, so that globally the growth rate of the herds was bellies least four year. Since in general, the amount of subsidies can purchase a herd of fifteen bellies on average, this means that at this rate of loss of livestock assets in just four years public investment (subsidy) and private investment is lost (contribution producer with own resources) (Martínez-González *et al.*, 2011). This is that policies to agricultural sector have not been appropriate for the above more than 50 % of the units are closed or decreasing; González and Sánchez (2008), reporting inefficiencies in resource allocation to the agricultural sector and is in need of structural changes in national policy. Statistical evidence of the amounts targeted promotion and productivity, it has not been reflected or productivity, competitiveness and social well-being of the Mexican population.

Conclusions

The sheep population in forty years (1970-2011) had an average annual growth rate of 0.71%, the production was

amarginal increase in annual average 2.41%, which did not cover the demand of the domestic market first have to import cattle sheep up and after having a AAGR meat of 10.49%. Best price have both feet as sheep carcass compared to cattle, pigs and chickens. With the importation of sheep and beef have been lost have not been developed for 2011 about 579 thousand units of sheep production and imports of sheep for breeding in theory in 2007 were due to support 35,000 units production. The economic policy developed in the last forty years in the Mexican state has no incentive to domestic production, but imports of sheep or meat to supply domestic demand.

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