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Article

Indicators of the competitiveness of Mexican beef in the world market

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Abstract:

The purpose of the present research is to assess the position and tendency of the competitiveness of Mexican beef carcasses versus the foreign supply, as well as the relationship between this commercial advantage, the domestic production and exportation that may allow proposing strategies to enhance livestock production in the medium term. In order to meet this goal, four indicators of competitiveness were estimated based on the procedure set forth by the Interamerican Institute of Cooperation for Agriculture, and the degree of association between variables was determined using Pearson's coefficient. The volume of the primary supply of beef positions Mexico in the seventh place worldwide, while as an exporter country it occupies the fifteenth place. The exportation of beef was found to have as its main destination the market of the United States of America, and the domestic production has a low level of competitiveness in the international market. The behavior of the production and exportation of Mexican beef is influenced by factors linked to the characteristics of the market and of the commercial process, as well as with natural

phenomena, which determine both the productivity and the generation of exportable surpluses of carcass meat and of value for the economy of the country.

Key words: Competitiveness, Exportation, Beef farming, Carcass meat.

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Introduction

From the agroeconomic perspective, competitiveness is the ability of a productive sector, such as livestock farming for the production of carcass meat in Mexico, to face worldwide competition[(1)]; this implies that its products can be sold in foreign markets, and that it must have the quality and efficiency for producing and for maintaining growing levels of gains of their resources, as well as to minimize the effect of imports. Thus, the inclusion and duration of a product in the world market depend on their level of competitiveness, which involves such factors as the productivity and characteristics of the product[(2)], movements of the exchange rate[(3)], availability of infrastructure for commercialization and the supply of production factors with low relative costs[(4)].

According to the FAO[(5)], in 2014, the world production of beef was 64.7 millions of tons, of which the United States contributed 17.7 %; Brazil, 15.0 %; China, 10.2 %; Argentina, 4.13 %, and Australia, 4 %. That same year, Mexico was the sixth producer of beef, participating in foreign trade with 2.8 %; in 2913, Mexico had the fifteenth place in exports. On the other hand, the main beef importers in 2013 were Italy, with 257.9 mil t, followed by the Netherlands (214.1 mil t), Germany (141 mil t), France (120.9 mil t), and China (104.2 mil t).

The evolution of the world beef market and the competitiveness of the countries that participate in it exert a positive or negative influence on the dynamics of bovine cattle farming in Mexico, depending on the level of competitiveness. This is relevant because livestock breeding is an economically important activity, of which meat production is the most productive activity, which is practiced across the country because it provides important raw materials, foreign currency, and jobs, which translate into greater social welfare in the population. This is evidenced by the corresponding statistics, which show that in general, from 1990 to 2000 the volume, the volume of production and exportation of this meat

exhibited the opposite behavior; the former grew by 26.5 %, while the latter decreased by 5.9 %. For the 2001-2013 period, the production grew (25.1 %), and the exportation increased very significantly (6,928.2 %)[5,6].

The situation described above brought beneficial consequences in the livestock subsector in the domestic economy. Prominent among these is its effect on the level of income generated in little more than a million of production units; the creation of 1.1 million direct jobs, and 3 million of indirect jobs[7] and, in beef production, of over 24 billions of dollars. This figure amounts to 23.70 % of the value of the domestic livestock production of the year 2013[6]. However, within the previous context, the competitiveness of Mexican beef in the world market is reflected in the exportable supply of merely 0.8 % of the production (2000-2013), while the volume of imports amounted to 0.7 % of the apparent domestic consumption. These participations evidence that the foreign market is small, but the surplus of the trade balance indicates the existence of favorable conditions for improving the position of Mexico. Therefore, and in order to contribute to the scarce information in relation to this topic, the present research proposes evaluating the position and the tendency of the competitiveness of Mexican carcass beef in the face of the foreign supply of the most important producer countries as the relationship established between this commercial advantage, production and exportation allowing to propose action strategies that may enhance livestock farming in the medium term.

Material and methods

The general method utilized was the deductive of the longitudinal section of the trend, based on estimated indirect information parameters; the main source was FAOSTAT[5], and the supplementary source was SIACON[6]. The parameters of interest, due to their scope and coverage, are the ones considered as indicators of results or *ex post*[8], as they allow the analysis of the behavior of a final product from the links of a production chain in relation to the respective products of the foreign competitors, in both the domestic and in the foreign market.

The competitiveness level was measured using four indices calculated based on the procedures proposed by the Interamerican Institute of Cooperation for Agriculture (IICA), while the supplementary parameters, which are descriptive or correlational between variables, were estimated according to Levin and Rubin[9]. The interest indices are described as follows:

1. Trade intensity index (TII). This measures the relationship between the net trade balance and the apparent domestic consumption (ADC); i.e. the participation of exports or imports in the consumption of a product. The formula utilized to estimate it was:

$Tij = (Xij - Mij) / (Qij+Mij-Xij)$

Where: Xij = exportations of product *i* by country *j*;

Mij = importations of product *i* from country *j*;

Qij = production of good *i* in country *j*.

This index has two auxiliary indicators: the degree of the exporting aperture and the degree of penetration of importations.

2. Relative Trade Balance Index (RTBI). Measures the commercial balance between countries in regard to the same good and allows to establish the degree of existing comparative advantage or disadvantage. It was proposed by Bela Balassa as a variant of the Grubell-Lloyd Index[10]. In terms of algebra, it is represented as:

$RTB= (Xij - Mij) / (Xij + Mij)$,

Where: Xij = Exportations of product *i* by country *j* to the world market;

Mij = Importations of product *i* by country *j* from the world market.

It reflects a competitive advantage when it is positive, and a disadvantage when it is negative.

3. Lafay index of International Specialization (IS). This measures the relationship between the net trade balance and the worldwide exportations of a product and allows evaluating the exporter vocation and the ability of a country to build permanent competitive advantages. It is estimated using the following expression:

$IE = (Xij - Mij) / Xim$

Where: Xim = Exportations of good *i* by the world.

When the value of this index is one or 100%, the country is the only exporter; but if it is negative, it has no degree of specialization and has competitive difficulties.

4. Comparative Revealed Advantage (CRA). This index compares the efficiency in the use of the resources in time both for the production and the consumption of all the goods of a country, revealed by its commercial flow, and where the one with the lowest opportunity cost is the most efficient[11]. It represents the result of the assignation of these in the economy and reflects its specialization position in the market. It is expressed as:

$CRA^i_a = CAE^i_a - CAI^i_a$

Where: CAE = revealed comparative advantage of the exports;

CAI = revealed comparative advantage of the exports.

These components of the CRA were calculated by:

$CRA^i_a = In [(X^i_a / X^i_n) / (X^r_a / X^r_n)]$

$CAI^i_a = In [(M^i_a / M^i_n) / (M^r_a / M^r_n)]$

The letters X and M express the value of the exports and imports; subscript (n) is the trade value of all the goods of all the sectors minus the product of interest (a); superscript (r) refers to the trade value of the world minus that of the reference country (i), and the expression (nl) indicates the natural logarithm. The potential results in the CRA depend on the combined value of the CAI and the CAE and are:

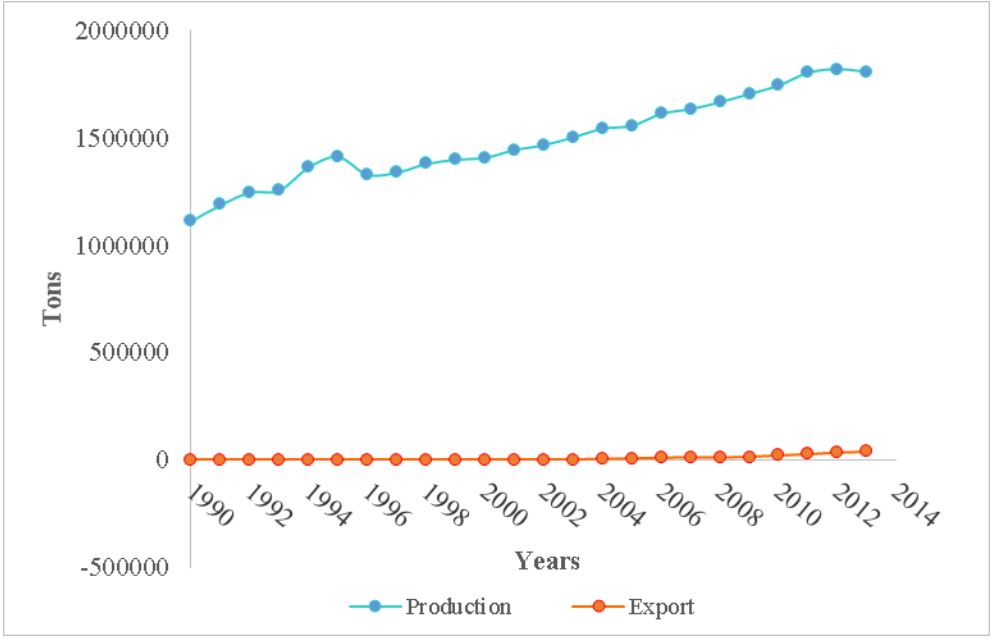
1. CAE>0, CAI<0; CRA>0. The country exhibits comparative advantage in the exports, which results in a positive CRA.
2. CAE>0, CAI>0; CRA> o <0. There are comparative advantages in the export and the import; the CRA will be above or below zero if the CAE is higher or lower than the CAI.
3. CAE<0, CAI>0; CRA<0. The country exhibits comparative disadvantage in exports and comparative advantage in imports, and the CRA is negative.
4. CAE<0, CAI<0; CRA<0. Evidences comparative disadvantages in the export as in the import of a product, and the CRA can be positive or negative. The meaning of the CRA is ambiguous and can lead to interpretation errors; for example, a positive value indicates that the country dos not intervene significantly in the world trade of exports or imports[12].

Results

Mexican beef production and trade balance

The volume of production of carcass beef in Mexico exhibits an upward trend from 1990 to 2013 (Figure 1), its growth was 62.2 %, going from 1,114 to 1,806.8 thousand tons, with a mean annual volume of 1,554.6 thousand tons[6]. However, the level of yield of carcass meat (204.7 kg in the 2004-2013 period) positioned the country in the 69th place in productivity.

Figure 1: Production and exportation of beef in Mexico



In the world market, the country was characterized by occupying the fifteenth place as exporter of beef during the abovementioned period; Poland is at the head of this list, while the American continent occupies the second place. The mean annual volume of Mexican exports was 17.9 thousand tons, which amount to 1.2 % of the domestic production. This figure represents a significant progress, because the production was virtually inexistent —of 0.004 %— in the first five years of the 1990s[5,6]. The average contribution of the exportable supply of Mexico to the world beef market in the 2004-2013 period was 1.1 %, i.e. 10 % of the contribution by the American continent. It is worth mentioning that this region contributes only 11.1 % of the world exportation of beef, which is led by Europe (80.1 %).

The main destinations of the exportable supply of carcass beef in Mexico in the year 2013[5] were the United States of America (95.5 %), Vietnam (2.7 %), and Japan (0.6 %). In 2004, the United States of America captured 87.5 % of this exportation; the Corean Republic (12 %) was another important destination. The United States of America is the first importer of this meat in the world, and, in average, 97 % of the total domestic exportations in the study period were channeled to that country.

As for the trade balance of beef in Mexico between 2004 and 2013, the volume of the exports showed an upward trend, increasing by 37.1 %. The imports also grew (58.9 %). However, since the volume of the exports exceeded that of the imports, the balance was favorable (annual average of 23.9 thousand tons). Nevertheless, the increase in imports evidences a loss of competitiveness of domestic beef farming due to the fact that the free trade agreement with the United States left Mexico at a disadvantage in terms of competitiveness, as the United States is the largest producer and exporter of beef in the world.

Competitiveness indicators

Trade intensity index

This index evidences that, among 139 beef producing countries, Poland occupies the first position in competitiveness (Table 1), as it exhibited the highest ratio between its net trade balance and the respective apparent consumption of this meat. This level of competitiveness agrees with its level of exporter aperture and its extremely low percentage of imports; Poland exports almost 40 % of its production, while the percentages for the United States, Brazil and Argentina were 0.5, 0.1 and 0.2 % respectively. This leads to the inference that the main producer countries maintain a low relationship between their exportation and their production

of beef, and that, regardless of the level of development of the country, exportation is relatively low compared with its domestic production.

Table 1: Trade intensity index of beef in the world market, 2004-2013

Country	Trade intensity index (%)	Competi-tive position	Character.	Export aperture (%)	Import penetration (%)
United States	0.20	19	Excess supply	0.54	0.34
Brazil	0.00	29	Excess demand	0.05	0.05
China	-0.31	39	Excess demand	0.03	0.34
Argentina	0.15	21	Excess supply	0.20	0.06
Australia	2.65	12	Excess supply	2.66	0.02
Russian Federation	-10.10	48	Excess demand	0.00	10.10
Mexico	0.79	17	Excess supply	1.07	0.28
France	3.54	11	Excess supply	12.19	8.65
Canada	1.54	15	Excess supply	2.44	0.90
Germany	10.19	5	Excess supply	18.94	8.75
Poland	64.22	1	Excess supply	65.22	1.00

Source: Prepared by the authors based on FAOSTAT data.

On the other hand, the availability of excess exports from Poland amounts to approximately 0.7 of the volume of its apparent domestic consumption of beef, far above the domestic consumption registered for the United States, Brazil, Argentina, and Australia. This contrasts with Italy, the eleventh beef producer country, but also a significant importer. The TII of Italy exhibits an excess demand of 18.6 % of its apparent domestic consumption (ADC), which is satisfied with volumes from various countries; its degree of import penetration (22.01 %) convers a low competitive position to its domestic production.

According to the TII, Mexico occupies the 17th place in competitiveness; its carcass beef exports amount to little more than 1 % of its ADC, while the imports represent less than one hundredth of this variable. Like most developing countries, these values evidence that, rather than exporting capacity, Mexico has the natural resources required for this productions (grasslands and natural vegetation), a low level of income per capita[13], and a limited preference for this meat[14], which together generate the exportable surpluses.

The situation of India in the world beef market should be highlighted, as it occupies the 16th place in competitiveness due to its trade intensity index (1.1 %). However, it differs from other exporter countries because, firstly, it does not import this meat, and its domestic product satisfies 101 % of its ADC; secondly, its cattle herd is surpassed only by that of the United States; thirdly, more than 800 million people practice Hinduism, which forbids the slaughtering of cows (a sacred animal); therefore , its meat processing industry is focused on exportation, and fourth, it offers a low-priced product that supplies markets with little demand for quality (almost 40 % inferior to that of Brazil); through these characteristics it has conquered markets of southeastern Asia and the Middle East[15]. Developing countries like Argentina and Mexico, do not have these traits.

Relative trade balance index

The countries that exhibited the greatest advantage in the international beef market through this index were India and Vietnam, whose values were 100 % (Table 2), followed by Colombia (99.9 %), Uruguay (99.8 5) and Paraguay (99.7 %).

Table 2: Relative trade balance (RTB) of Mexican beef

Country	RTB indicator (%)	Competitive position	Character.	Net trade balance
United States	22.24	25	Advantage	229,701
Brazil	-1.21	29	Disadvantage	-1,107
China	-85.02	37	Disadvantage	-184,151
Argentina	55.75	18	Advantage	43,050
Australia	98.85	7	Advantage	552,522
Russian Federation	-99.93	46	Disadvantage	-1940,720
Mexico	58.03	17	Advantage	131,702
France	16.97	26	Advantage	515,858
Canada	46.09	23	Advantage	194,312
Germany	36.78	24	Advantage	1092,780
Italy	-72.97	33	Disadvantage	-2383,357

Source: Prepared by the authors based on FAOSTAT data.

The competitive position of Mexico in the world, based on this indicator (58.03 %), remains the same as the position conferred by the TII: the seventeenth place. Mexican beef production is characterized by the fact that its foreign supply outweighs its demand, and therefore it has a surplus to export; however, it is surpassed by several countries of the American continent, such as Brazil and Argentina, which are at a better competitive advantage.

Among the main producer countries, only the United States had a favorable RTB during the analyzed period (22.2 %), which positions it in the 25th place. In contrast, Brazil, China, and the Russian Federation exhibit a clear disadvantage in the market as they have an RTB of -1.2, -85.0 and -99.9 %, respectively. Of these, only China increased its potential deficit, going from 7,409 t of beef in 2004 to 102,285 t in 2013 —an increase of 1,280.6 %. For its part, the Russian Federation reduced its commercial deficit, as its balance went from -184,363 t in 2004 to -92,807 t in 2013 —a 49.7 % decrease. And Brazil overcame its commercial deficit since 2012, with a balance that went from -743 t in 2004 to a surplus of 5,695 in 2013.

Lafay International Specialization Indicator

The information contained in Table 3 confirms that Poland and Germany have the highest commercial specialization and competitiveness in the world carcass beef market, having reached indices of 96.9 and 72.9 %, respectively, in the 2004-2013 period. This shows their capacity to build competitive advantages in this market.

Table 3: International specialization in the beef market, 2004-2013

Country	Specialization index (%)	Competi-tive position	Characteristic	Contribution to world exports
United States	1.53	13	Low	4.21
Brazil	-0.01	35	Low	0.30
China	-1.23	43	Low	0.11
Argentina	0.29	19	Low	0.40
Australia	3.69	5	Intermediate	3.71
Russian Federation	-12.95	49	Low	0.00
Mexico	0.88	16	Low	1.20
France	3.44	6	Low	11.87
Canada	1.30	14	Low	2.06
Germany	7.29	2	High	13.56
Italy	-15.91	50	Low	2.95

Source: Prepared by the authors based on FAOSTAT data.

Notably, according to the IS index, Australia is the only country with an intermediate competitiveness in the market, while the Russian Federation (-12.9 %) and Italy (-15.9 %), two of the main beef producing countries, did not exhibit any degree of specialization. Within this context, Mexico occupied the 16th place in the world, with a competitiveness considered as low (0.9 %). The two previous competitiveness indicators and this one confirm the competitive position of Mexico in the beef market, which is not ideal for a country with abundant natural resources and a livestock breeding activity generalized to its whole territory; this involves a limited productivity per surface area and per cow, as well as a low yield of carcass meat per finished animal(6).

Revealed comparative advantage index

The RCA index (Table 4) confirms that Australia is the country whose beef foreign supply has the highest level of competitiveness from the point of view of the opportunity cost of its production resources; its average index was 6.0 during the 2004-2013 period and, in general, it exhibited an upward trend; this value was higher than that of Mexico (1.7), which occupied the second place. Argentina occupied the third position (1.1), and the United States, the fourth (0.9). Brazil, China, and the Russian Federation, which have a relevant presence in the world market due to the value of their RCA and that of their trade intensity and international specialization indices, exhibited a lack of competitiveness in the said market.

Table 4: Revealed comparative advantage per beef producing country, 2004-2013

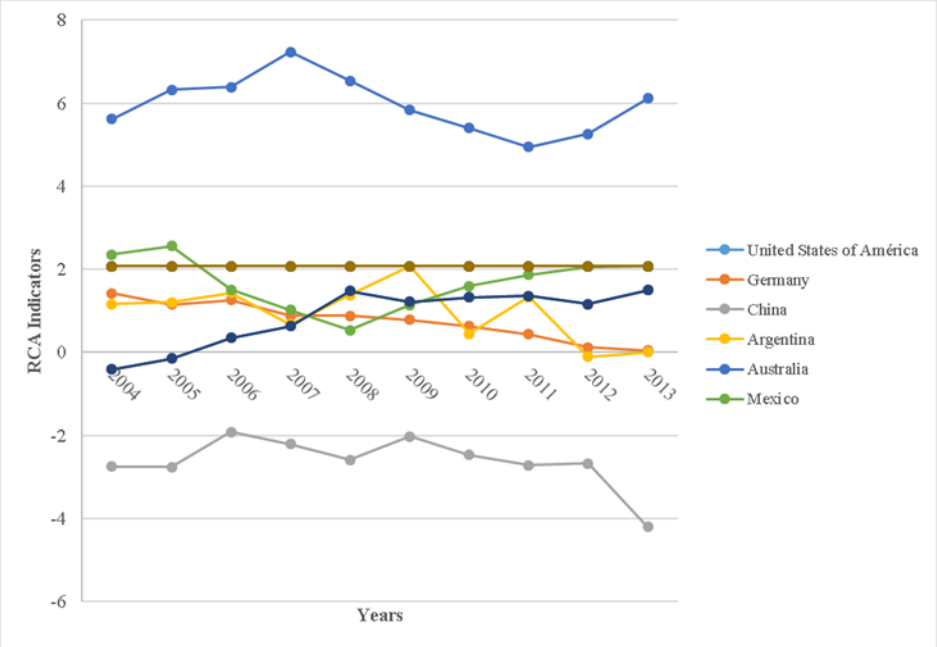
Country	Revealed comparative advantage index									
	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
U.S.A.	-0.40	-0.15	0.35	0.63	1.48	1.22	1.33	1.35	1.16	1.50
Brazil	-0.73	-1.12	-0.51	-0.66	-0.17	-0.68	-0.42	-0.67	-0.01	0.59
China	-2.75	-2.76	-1.91	-2.21	-2.58	-2.02	-2.47	-2.72	-2.67	-4.20
Argentina	1.16	1.21	1.44	0.68	1.38	2.08	0.45	1.34	-0.10	0
Australia	5.62	6.32	6.39	7.23	6.54	5.84	5.40	4.95	5.26	6.12
Russian Fed.	-8.85	-12.93	0	0	-10.84	0	-12.02	-8.99	-5.74	-6.03
Mexico	0.42	0.46	0.68	0.74	0.85	0.88	0.96	1.18	0.73	0.61
France	2.36	2.57	1.51	1.02	0.53	1.14	1.60	1.87	2.06	2.08
Canada	1.43	1.15	1.26	0.88	0.88	0.78	0.63	0.43	0.12	0.04
Germany	1.77	1.24	0.62	0.36	-0.03	0.22	0.68	0.18	-0.05	0.04
Italy	-3.04	-2.93	-2.76	-2.56	-2.48	-2.69	-2.50	-2.30	-2.45	-2.46

Source: Prepared by the authors based on FAOSTAT data.

According to the principle of comparative advantage[16], a country reaches the economic optimum when it produces and exports those goods for which it has an advantage and imports those that exhibit a disadvantage; this accounts for the allotment of resources in the three previously mentioned countries. Following this logic, in order to establish production companies at a lower opportunity cost, exporting less beef or importing it yields greater economic benefit; this, then, confirms the structure of the exchange relationship per producing country, as is the case in China, where the domestic industrial production has a greater economic importance than primary production.

Likewise, only two countries in Latin America —Mexico and Argentina— have been proven to have positive competitiveness levels; although in both cases the RCA exhibited a slight downward trend with marked ups and downs (Figure 2), but the rank of variation of Argentina turned out to be slightly broader than that of Mexico. The RCA for Argentina decreased by 2.1 points and its coefficient of variation (CV) was 71.6 %, while for Mexico, the RCA was approximately 2.0, and its CV was 38.1 %. In contrast, this index for the United States and Australia was characterized by its greater stability, as its variation was 1.6 points (CV= 82.5 %) and 1.4 (CV= 60.8 %), respectively.

Figure 2: Indicators of revealed comparative advantage indices



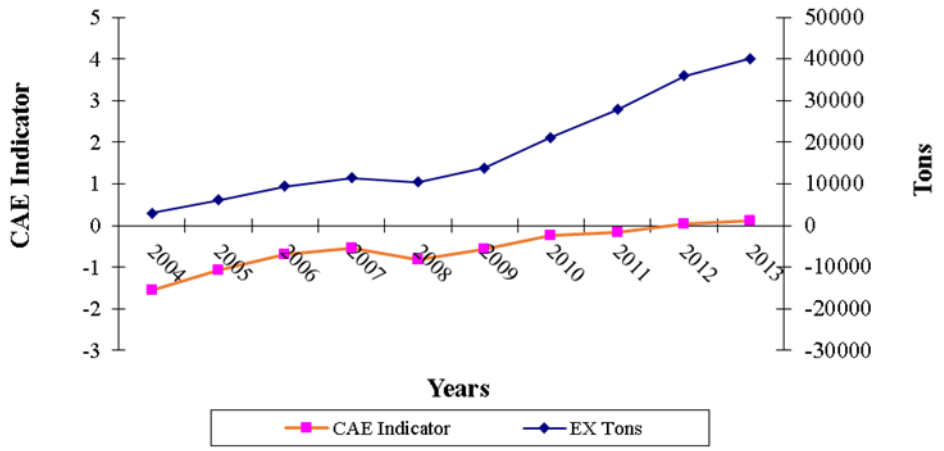
It is important to point out that most of the years between 2004 and 2013, the RCA coefficients of Argentina and Mexico registered a value above the unit, which evidenced a better performance of the beef producing livestock subsector. In fact, these turned out to be ambiguous because both their CAE and CAI indices were below zero in most years; thus, the

two countries are regarded as having a comparative disadvantage in both exports and imports and, therefore, they do not have a significant participation in the world beef market. This is not the case for Australia and Germany, which have a comparative advantage in exports and a disadvantage in imports, as indicated by the analysis criterion shown in the methodology section.

Based on the above, it is possible to infer that, due to its negative CAE during the 2004-2013 period, Mexico exhibits a comparative disadvantage in the production of beef, with a tendency to decrease; however, the trend becomes positive in 2012 and 2013. This behavior by RCA component implies that the country gradually increased its level of competitiveness. Beef imports from 2004 to 2008 followed the logic of the opportunity cost for the availability of a product; the domestic production was less efficient in terms of price or quality than that of other countries, and therefore importation became a better alternative for the economy.

Finally, as for the relationship established between the export volumes of Mexican beef and the value of the CAE index, as well as the relationship between the RCA index and the domestic supply of beef in 2004-2013, the former was consistent with the principles of the economic logic of international trade (Figure 3), where the correlation coefficient (r=0.92) evidences the existence of a high association and, in the same sense, of variation between the evidence cited and the corresponding advantage indicator. The second relationship exhibited a negative correlation coefficient (r= -0.09), which reveals that, with the increase in the level of competitiveness of the country in this market, its domestic supply of beef decreases in relative terms; this can be observed in the behavior of its exports, whose average rate was higher (37.1 %) during the period than the respective volumes of meat production (1.8 %).

Figure 3: Relationship between the foreign sales of beef and the comparative advantage of export of Mexico



Discussion

In relation to the quality and differentiation of the beef produced in Mexico and its carcass yield —both of which are variables related to the production and competitiveness of exports—, it is important to mention that various economic factors have had a long term influence on their behavior. Most prominent among such factors are the signature and implementation of NAFTA in 1994[15], and the structural problems of the economic policy applied by the federal government since 1982, which have been reflected by specific aspects of this productive activity such as the loss of profitability and competitiveness (in costs and sales prices), the disappearance of production units and the loss of jobs during this process of transition from being a protected activity to becoming inserted into the free market. In the years that followed this phenomenon, the domestic livestock breeding has gradually recovered from its negative impact.

As for the competitiveness of beef in the international market, the analysis of the TII showed that not all the countries that stand out as producers are also main exporters. A clear example of this is Italy, whose TII places it in the 49th position in competitiveness, when, according to its trade capacity, it was the eleventh exporter of beef from 2004 to 2013. Within this context, and according to the international specialization index, Mexican beef exhibited a low level of competitive advantage, as well as little exporter vocation, according to the reports for this country in the years 1980 to 2009[18] and as stated by Depetris *et al*[19] in relation to the competitive performance of the powdered milk production of Argentina and Uruguay during the 1990-2005 period.

The cited degree of competitiveness of Mexico may be improved with increases in the quality and differentiation of beef, given that beef is exported in the form of fresh, refrigerated and frozen meat; however, the preferences of the consumers of the meat-importing countries are oriented toward select cuts and determined by the content of marbled fat, degree of tenderness, and meat type[15,17]. In response to this demand in the domestic stockbreeding activity, traditional bovine races have been replaced with improved races, according to the demand of the market. In average, the carcass yield grew by 0.2 % per year from 1995 to 2014, which is low, compared to that of Australia, where this index increased by 1.4 %[5], an aspect related to the mean production cost.

On the other hand, it is possible to infer that, in the medium term the RCA index —whose relevance considers the allotment of productive resources in the economy[16]— exhibits a value above zero and a rising behavior, and does not fluctuate excessively, for an excessive fluctuation —as in the case of Mexican beef— indicates that the competitiveness does not rely on a strong economic base, but rather is a product of volatile factors such as variation in

the exchange rate parity and the imposition of non-tariff barriers to competitor countries, and therefore these opportunities benefits the export sales of this meat only occasionally.

This situation is consistent with the reports by Carrera and Bustamente[18], according to whom beef production in Mexico registered a low competitiveness in the world market from 1996 to 2003 because the CAE index was lower than the CAI index, the commercial aperture process in the country (NAFTA) having been the factor that reduced the competitiveness of the domestic production. Likewise, the findings of the present study agree with the results obtained by Carrera *et al*[17] and by Del Moral and Trujillo[20]. The former authors indicate that the situation of the Mexican beef farming is reflected by general a negative RCA for the 1990-2009 period; however, it has been recovering since 2004 as a result of restrictions to the importation of beef from the United States and Canada due to the BSE disease. The latter authors evidenced that beef production from 1908 to 2010 was characterized by its revealed comparative disadvantage, which is reflected in the reduction of the production of this meat and in the worsening of its trade balance.

Finally, the low degree of association found between the value of the indicator of RCA and beef production in Mexico is a result of the characteristics of the market and the commercial process. Firstly, there is in the country a deficient communication and commercialization infrastructure[21], as well as a growing participation by self-service stores in the distribution of meat products whose supply includes a large number of important products that have a negative impact on the value chain of domestic beef. Secondly, the gross margin of the commercialization process is relatively high compared to the price paid to the stockbreeders, who obtain merely a fourth of the total value generated and who are not organized to face the market power exercised by wholesalers and retailers; furthermore, imported beef at low prices conditions the price paid to the initial producers, resulting in a loss of profitability.

The third important characteristic of this association is the deficient access to cattle feeds, whose prices and quality are not equal to those of the United States, and the scarcity of governmental subsidies for this activity. The fourth is the lack of integration and coordination of the beef production chain, which results in higher production costs, failure to benefit from the misuse scale economies[22], and, therefore, a lower competitiveness of the chain. The last characteristic is the presence of natural phenomena[20] such as floods due to extreme meteorological events and long droughts, which have reduced the national beef production and increased its cost.

Conclusions and implications

During the 2004-2013 period, Mexican carcass beef exhibited a low level of competitiveness in the world market, as evidenced by the trade intensity, relative trade balance, international specialization and relative comparative advantage indices. A characteristic of the exportation of this meat is that it has a single main destination: The United States. Also, it has been proven that, since the 1990s, and as a result of various economic events, beef production has experimented a constant growth, which has had a positive impact on the generation of exportable surpluses; however, these represent only a small portion of the primary supply according to the competitive position. The exportation of beef does not rely on quality products or on institutional factors but is a result of volatile events related to the exchange rate and to the imposition of non-tariff barriers to competitor countries. Given the characteristics of the domestic beef production and its macroeconomic environment, the consolidation of a higher competitive position of the exportable supply that may allow the producers of the country to negotiate the prices requires improvement of both the quality and the differentiation of beef through the incorporation of added value, the meat yield per animal, and the aptitude of the commercial infrastructure to open new markets. These conditions will enable Mexico, in the medium term, to attain a better level of competitiveness and prominence in the international market of this meat. Furthermore, this scenario will also make it possible to increase the positive impacts of beef farming on the economy and the regional welfare of the country.

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