



Production costs of the Mexican poultry and pig sector

Quick scan on the consequences for the EU poultry and pig sector after free trade with Mexico

Peter van Horne, Robert Hoste, Coen van Wagenberg

Production costs of the Mexican poultry and pig sector

Quick scan on the consequences for the EU poultry and pig sector after free trade with Mexico

Peter van Horne, Robert Hoste, Coen van Wagenberg

This study was carried out by Wageningen Economic Research and was commissioned and financed by the Dutch Ministry of Agriculture, Nature and Food Quality within the context of research theme Agro Economics (project number BO-43-014.01.008)

Wageningen Economic Research
Wageningen, March 2018

MEMORANDUM
2018-034

Peter van Horne, Robert Hoste, Coen van Wagenberg, 2018. *Production costs of the Mexican poultry and pig sector; Quick scan on the consequences for the EU poultry and pig sector after free trade with Mexico*. Wageningen, Wageningen Economic Research, Memorandum 2018-034. 30 pp.; 14 fig.; 4 tab.; 36 ref.

Wageningen Economic Research conducted a study on the potential consequences of a free trade agreement between Mexico and the EU. The Dutch government is concerned that giving access to products from countries with a lower level of animal welfare could undermine the EU welfare standard. This study shows that production costs are lower in Mexico compared to the EU in all three sectors investigated: egg production, poultry meat and pig meat. In egg production in particular, the welfare standard in Mexico is far below the EU standard. Nevertheless, it is concluded that for all products (eggs, egg products, poultry meat and pig meat) in a free trade situation no large amount of imports from Mexico can be expected.

Key words: Mexico, EU, free trade, poultry, pigs, competition, animal welfare

This report can be downloaded for free at <https://doi.org/10.18174/443735> or at www.wur.eu/economic-research (under Wageningen Economic Research publications).

© 2018 Wageningen Economic Research
P.O. Box 29703, 2502 LS The Hague, The Netherlands, T +31 (0)70 335 83 30,
E communications.ssg@wur.nl, <http://www.wur.eu/economic-research>. Wageningen Economic Research is part of Wageningen University & Research.



For its reports, Wageningen Economic Research utilises a Creative Commons Attributions 3.0 Netherlands license.

© Wageningen Economic Research, part of Stichting Wageningen Research, 2018
The user may reproduce, distribute and share this work and make derivative works from it. Material by third parties which is used in the work and which are subject to intellectual property rights may not be used without prior permission from the relevant third party. The user must attribute the work by stating the name indicated by the author or licensor but may not do this in such a way as to create the impression that the author/licensor endorses the use of the work or the work of the user. The user may not use the work for commercial purposes.

Wageningen Economic Research accepts no liability for any damage resulting from the use of the results of this study or the application of the advice contained in it.

Wageningen Economic Research is ISO 9001:2008 certified.

Wageningen Economic Research Memorandum 2018-034 | Project code 2282100249

Cover photo: Shutterstock

Contents

1	Introduction	5
2	Eggs	6
	2.1 International trade	6
	2.2 Production systems and animal welfare in Mexico	7
	2.3 Production costs	8
	2.4 Free trade	10
3	Poultry meat	13
	3.1 International trade	13
	3.2 Production systems and animal welfare in the Mexico	13
	3.3 Production costs	14
	3.4 Free trade	17
4	Pig meat	18
	4.1 International trade	18
	4.2 Production systems and animal welfare in Mexico	19
	4.3 Production costs	21
	4.4 Free trade	22
5	Discussion and Conclusions	24
	5.1 Discussion	24
	5.2 Conclusions	25
	References and websites	27

1 Introduction

At the request of the Ministry of Agriculture, Nature and Food Quality, Wageningen Economic Research conducted a study on the potential consequences of a free trade agreement without import tariffs between Mexico and the European Union (EU). The Dutch government is concerned that giving access to products of countries with a lower level of animal welfare could undermine the EU welfare standard. Can a substantial increase in imports from Mexico be expected in a situation where there is a free trade agreement?

In a separate report, Wageningen Livestock research described the legislation on animal welfare and the actual situation on the farms (Bracke and Vermeer, 2017). This report from Wageningen Economic Research focuses on the production costs in the EU and Mexico with special attention to animal welfare as a cost item. From here we drew qualitative conclusions on possible imports from Mexico.

In this quick scan research, the actual situation in husbandry, with special attention to animal welfare, is described and production costs of producing eggs, egg products, broilers and pigs are calculated. Wageningen Economic Research collected information available in literature, from the Internet and from industry contacts. We updated the benchmark for an international comparison of production costs. The report discusses the egg (Section 2), poultry meat (Section 3) and pig meat (Section 4) sectors. For every sector, we report on trade statistics, describe the sector, describe the animal welfare situation in Mexico, compare production costs between the EU and Mexico, and discuss the potential consequences of free trade. Finally, Section 5 provides a general discussion and the conclusions.

Wageningen Economic Research collected information from several sources and had many contacts via email with several organisations and industries. We thank all these persons for providing relevant information.

2 Eggs

2.1 International trade

The European Union is a large importer of eggs and egg products, with egg powder being the most important imported product from third countries. According to the European Commission (EC, 2017a), Ukraine was the largest supplier in 2016 with 8,000 tonne egg equivalent. Second and third were the United States of America (USA) and Argentina with 3,400 and 1,900 ton equivalent of eggs. Table 2.1 gives the imports from the main exporting countries. The amount of imports per year is fluctuating. The recent imports of Ukraine are a result of a trade agreement with the EU and quota given for import without import levies. The imports from the USA were low in 2015 because of outbreaks of Avian Influenza (AI) in the USA resulting in high egg prices in the domestic market. Also exchange rates influence the imports of a specific country.

Table 2.1 Import volume of egg products into the EU from different countries (years 2012 to 2016; in thousand tonnes egg equivalent a)

	2012	2013	2014	2015	2016
Ukraine	0	0	0.2	3.7	8.0
USA	15.2	6.9	4.2	2.7	3.4
Argentina	10.2	5.8	1.4	3.2	1.9
India	3.7	3.9	5.6	5.7	0.8
Others	8.6	3.7	2.2	3.6	2.4
total	37.7	20.3	13.6	18.9	16.5

a) Egg equivalent: volumes of dried product are converted into volumes of shell eggs.

Source: EC (2017a).

EU trade with Mexico

Mexico is not an important supplier of eggs or egg products to the EU. Table 2.2 gives an overview of the import (in value and volume) of EU countries from Mexico. France imported a small number of eggs (shell eggs) in recent years with a highest value of 523,000 euros in 2016. Germany imported egg products and egg whites in 2012.

Table 2.2 Import of eggs, egg products and egg white in EU countries from Mexico a)

	Value (1.000 euros)					Volume (tonnes)				
	2012	2013	2014	2015	2016	2012	2013	2014	2015	2016
Eggs:										
France	70	35	62	152	523	3	2	3	7	23
Italy	0	0	0	10	9	0	0	0	0	0
Egg products:										
Germany	222	0	0	0	0	79	0	0	0	0
Egg white:										
Germany	512	0	0	0	0	89	0	0	0	0

a) Eggs: codes 040721 and 040790, egg products: code 0408 and egg white: code 3502.

Source: Comext/Eurostat, elaboration by Wageningen Economic Research.

The export of eggs and egg products from EU countries to Mexico is limited. See Table 2.3. Belgium and Spain exported a small volume of eggs to Mexico in 2015. Belgium and Italy exported egg

products to Mexico in 2015 and 2016. Egg white was exported to Mexico from Germany, Italy and the Netherlands in several years. None of the countries export products with a value of more than half a million euros per year.

Table 2.3 *Export from EU countries to Mexico a)*

	Value (1.000 euros)					Volume (tonnes)				
	2012	2013	2014	2015	2016	2012	2013	2014	2015	2016
Eggs:										
Belgium	0	0	0	66	0	0	0	0	5	0
Spain	0	0	0	57	0	0	0	0	48	0
Egg products:										
Italy	0	0	0	0	389	0	0	0	0	69
Belgium	0	0	0	70	0	0	0	0	50	0
Egg white:										
Germany	5	159	136	327	150	1	21	12	52	31
Netherlands	4	6	0	2	466	1	1	0	0	36
Italy	0	0	179	0	0	0	0	20	0	0

a) Eggs: codes 040721 and 040790, egg products: code 0408 and egg white: code 3502.

Source: Comext/Eurostat, elaboration Wageningen Economic Research.

Egg and egg product balance in Mexico

Mexico is a net importing country of eggs and egg products. Compared to the amount of imports the total volume of exports is low. In 2013, 2014 and 2015, Mexico imported 45,000, 26,000 and 17,000 tonnes of eggs and egg products, respectively. The most important trading partner of eggs and egg products of Mexico is the USA. Some minor import volumes come from some EU countries (Windhorst, 2017; Table 2.3). Due to outbreaks of AI between 2012 and 2014, Mexico had a reduced production of eggs and consequently a higher need for imports. Mexico has a trade agreement with the USA and Canada (North American Free Trade Agreement, NAFTA).

Also for exports of eggs or egg products the USA is the main trade partner of Mexico. Traditionally Mexico has also been exporting egg products, especially dried egg whites, to Japan. However, due to outbreaks of AI between 2012 and 2014 foreign markets were closed. Currently, Mexico is slowly gaining markets again. The export to Japan recovered in 2016. During the 2015 High Pathogenic Avian Influenza (HPAI) outbreak in the USA, Mexico exported limited quantities of shell eggs for breaking to processing facilities in the USA (FAS, 2017d). The devaluation of the Mexican peso against the American dollar provides Mexico both incentives for cheap exports and disincentives for expensive imports.

2.2 Production systems and animal welfare in Mexico

Animal welfare

Mexico has no legislation or code of practice for keeping laying hens on farms, according to a survey of the International Egg Commission (IEC, 2017a). However, Mexico has a regulatory framework with regulations for the slaughter of animals (NOM-033-SAG/ZOO-2014) and transportation of animals (NOM-051-SAG/ZOO-1995) (Alvarez, 2016). Recently, a discussion on animal welfare on farms in Mexico was started and the Mexican congress initiated some projects. However, the industry is stressing the importance of finding a balance between animal welfare and production (Avicola, 2017).

Almost all laying hens in Mexico are kept in conventional cages, according to the annual report of the International Egg Commission (IEC, 2017b). Laying hens on commercial farms are kept with a low space allowance per hen, compared to the EU. An industry source mentioned an average surface per hen during the laying period of 380 to 420 cm² (Hendrix Genetics, 2017). In a manual for good practice (Sagarpa and Senasica, 2016a), the advice is to keep laying hens in cage with a density of 450 cm² per hen (3 hens in a cage). Recently, FAS (2017d) reported that some alternative cage-free

systems have started, because of demand from younger generations. However, a substantial increase of these alternative systems is not foreseen in the short- to mid-term (FAS, 2017d).

Layer sector in Mexico

Mexico is the 6th largest egg producing country in the world. In 2016, egg production amounted to 2.8 million tonnes (UNA, 2018). The number of laying hens was 159 million in 2016 (IEC, 2017b). Egg consumption in Mexico is one of highest in the world at 23 kg (around 360 eggs) per capita per year (UNA, 2018). The self-sufficiency rate in 2016 was 99% (IEC, 2017b).

Laying hen operations in Mexico are in general large. The market leader is Proteina Animal (PROAN) with 30 million layers. This company is the second largest egg producer in the world. Other Mexican companies in the world's top 20 list of egg producers are El Calvario (10 million layers) and Empresas Guadalupe (10 million layers). The top 5 companies in Mexico have a combined market share of 40% (Windhorst, 2013).

Laying hens are kept in open houses with curtains on the side of the poultry house (approximately 60% of the hens) or in modern closed poultry houses with advanced climate control (industry source, 2017). The layer industry is concentrated in the two states Jalisco (55% share) and Puebla (15% share).

Mexico is not self-sufficient in feed. Layer feed is mainly a mix of corn and soy beans. More than half of these feed ingredients are imported from the USA (UNA, 2018).

Avian Influenza

Mexico had severe outbreaks of Avian Influenza (AI) in the centre of the poultry industry between 2012 and 2014 (Windhorst, 2017). These outbreaks caused a considerable reduction in production of shell eggs. The outbreaks were controlled with federally supported vaccination programmes. In Jalisco and Puebla, also in 2015 and 2016, AI outbreaks were reported, again controlled through vaccination of laying hens (FAS, 2017d). The bio-sanitary situation has improved since the outbreaks. However, the sector remains concerned about potential new outbreaks, because of the migratory patterns of wild birds and the short distance between farms.

2.3 Production costs

The international competitiveness of the poultry sector is largely determined by the primary production costs. Figure 2.1 compares the production cost of shell eggs of the EU with Mexico and four other countries, the USA, Ukraine, Argentina and India. These four countries are competitors or potential competitors of the EU on the world market. In the current study, the results of these four countries as described in van Horne and Bondt (2017a) are updated to 2016 and Mexico is added.

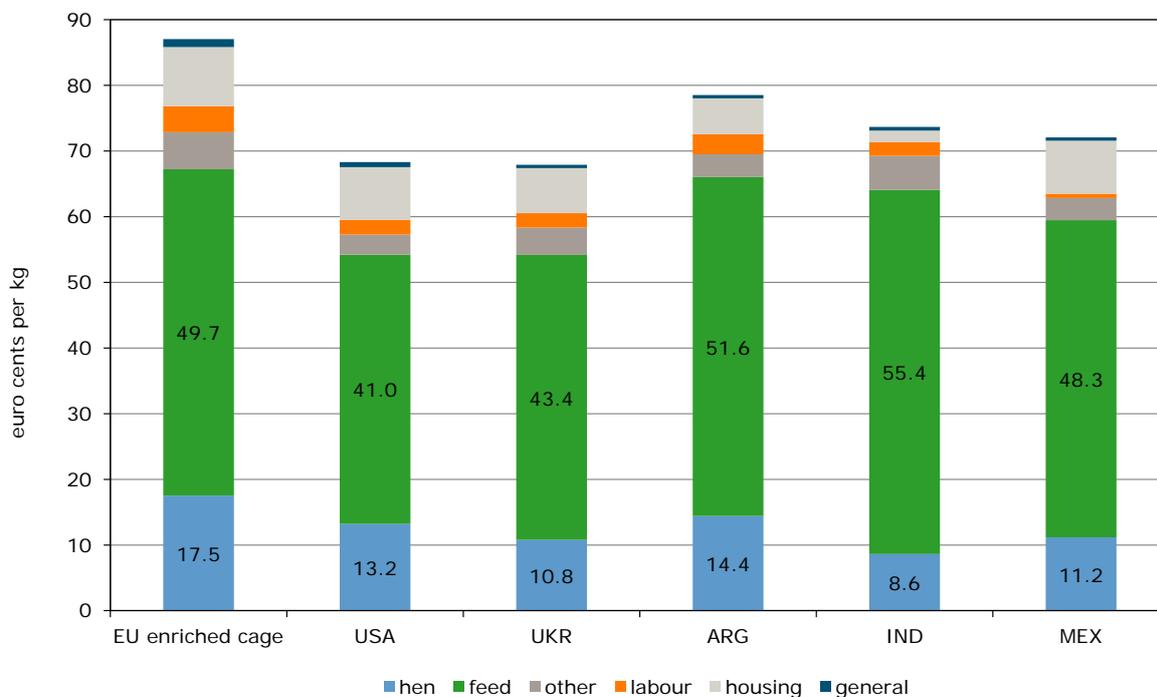


Figure 2.1 Production costs of cage eggs (euro cents per kg) in the EU, Ukraine (UKR), the United States (USA), Argentina (ARG), India (IND) and Mexico (MEX) in 2016

The average production costs in the EU were 87 euro cents per kg. The 2016 production costs in Mexico were 72 euro cents per kg. Production costs in the USA and Ukraine were even lower. The difference in production costs between Mexico and the EU can largely be explained by the lower cost of young hens, cheaper labour and a lower feed price. Mexico has the advantage of a large supply of maize and soy beans from the USA. The lower feed price also contributes to the lower price for young hens in Mexico. Mexico benefits from lower housing costs, because of the warm climate, cheaper labour and less stringent environmental and animal welfare regulations. Van Horne and Bondt (2017a) estimated that 16% of the total primary production costs for laying hen farmers in the EU are directly related to EU regulations on animal welfare (including surface area per hen and cage enrichment), environment (Nitrates Directive/manure regulation and ammonia emissions) and food safety (salmonella, no use of animal meat and bonemeal in animal feed, and no use of specific genetically modified organisms (GMOs) in animal feed) (Figure 2.2).

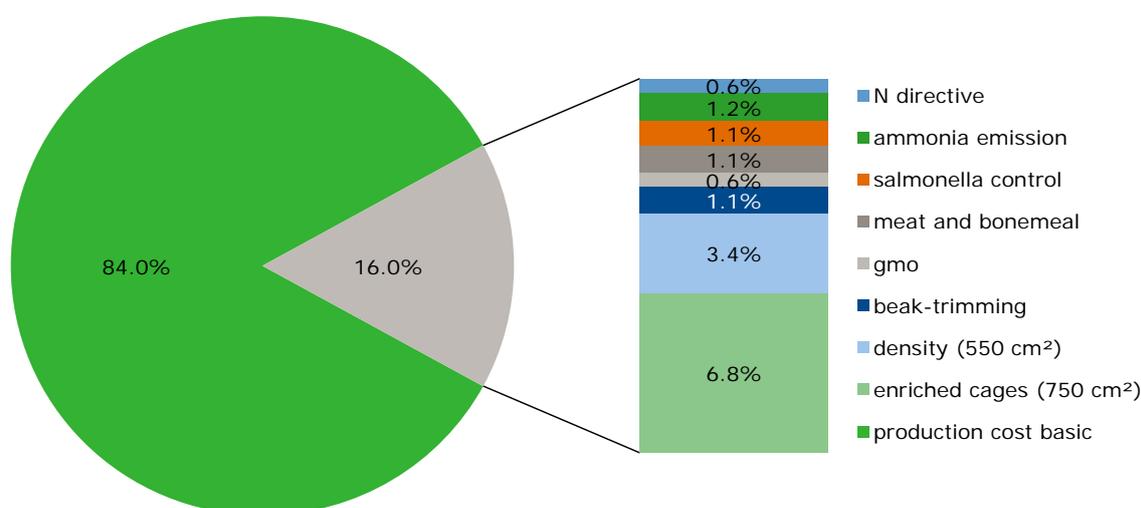


Figure 2.2 Basic egg production costs (84%) and costs directly related to EU legislation (16%) in 2015

International trade over long distance in shell eggs is limited. The EU is mainly importing egg powder from third countries. The advantages of trade in egg powder are the long shelf life and lower transportation costs. For this reason we also calculated the production costs of egg powder in the EU and some third countries, based on the costs of eggs and the costs of processing. Figure 2.3 compares the costs of whole egg powder in the EU and some third countries.

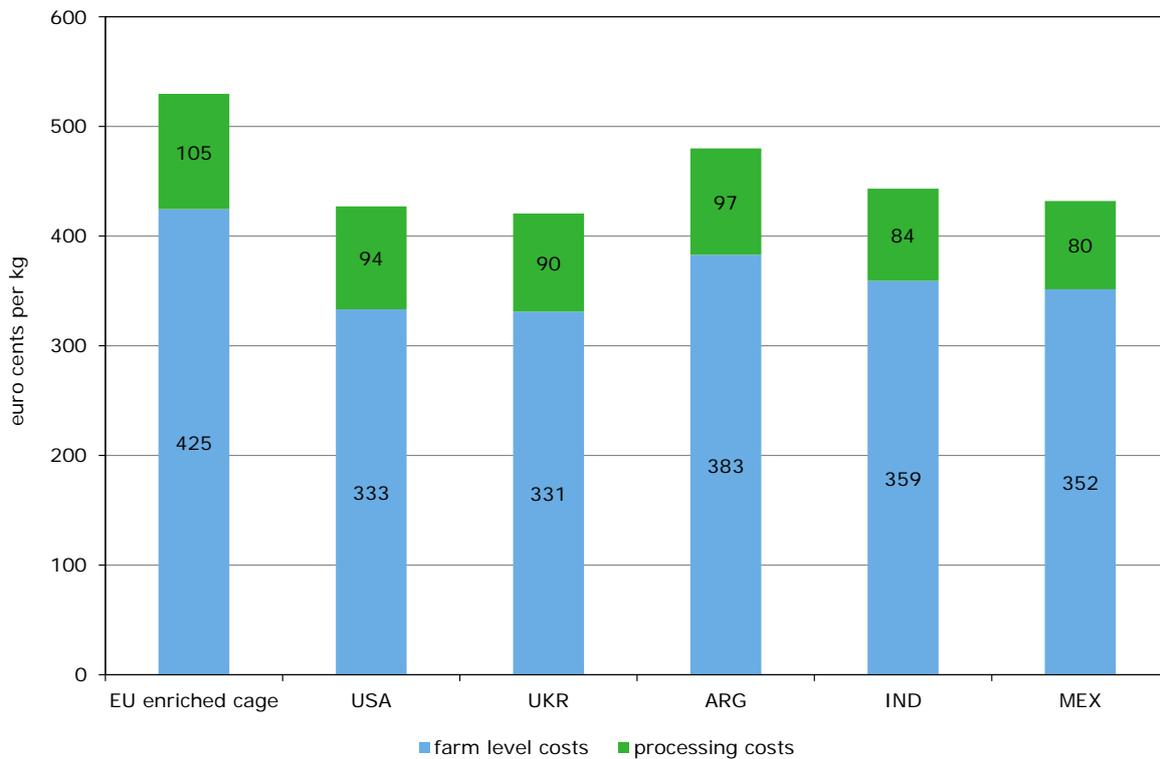


Figure 2.3 Production costs of whole egg powder made of cage eggs (euro cents per kg) in the EU, Ukraine (UKR), United States (USA), Argentina (ARG), India (IND) and Mexico (MEX) in 2016

Figure 2.3 shows that the total costs to produce egg powder are 18% lower in Mexico compared to the EU average. The USA and Ukraine have the lowest costs. Mexico has the advantage of cheaper labour which results in lower costs for processing compared to the EU. For all countries, processing costs are 18 to 20% of the total costs.

2.4 Free trade

Some third countries can offer eggs and egg products at a much lower price than the EU sector. Because the market for table eggs demands a fresh product there is no real threat to this market segment from imported eggs from Mexico or the USA. Free trade will mainly have an impact on imports of egg powder. Egg powder has a long shelf life and can be transported at low costs. Potential future scenarios on import tariffs and exchange rates were elaborated on in van Horne and Bondt (2017a). In the current study, the data from that report were updated to 2016 and Mexico was included. Figure 2.4 shows that import tariffs protect the EU market. The offer price of Mexico and the other four countries, after transportation and import levies, is higher than the EU price.

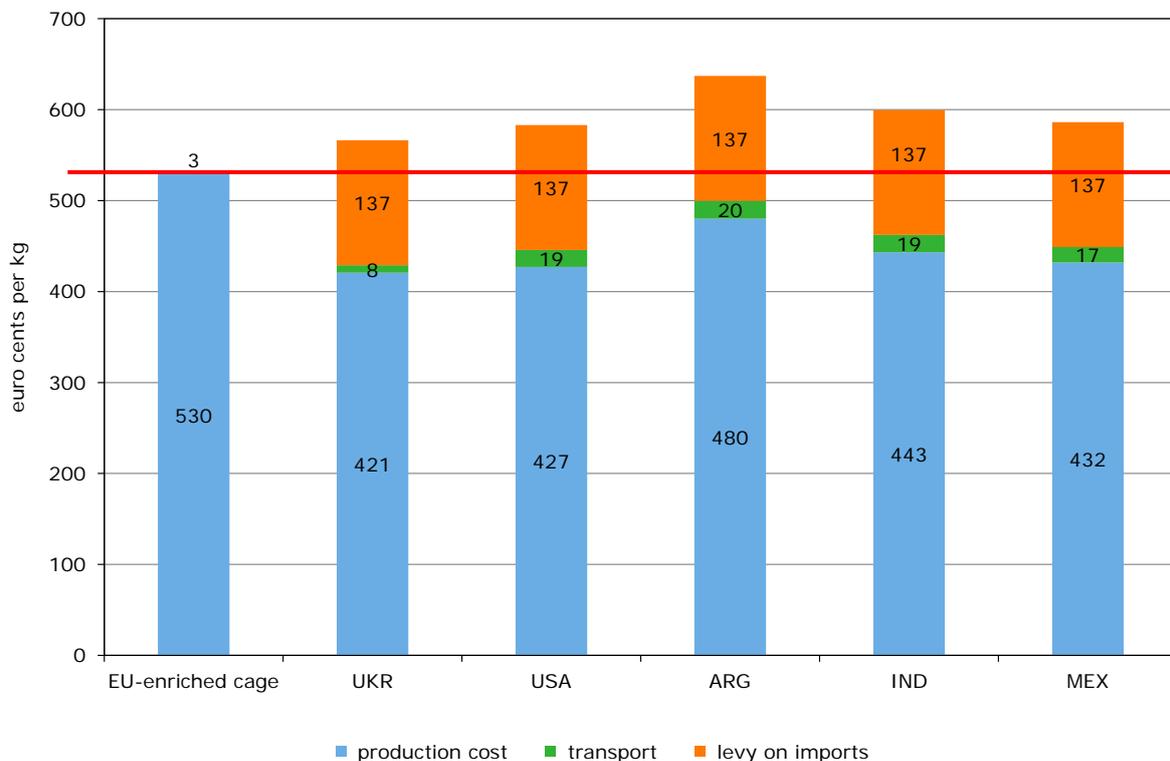


Figure 2.4 Offer price of whole egg powder in the EU from EU average and United States (USA), Ukraine (UKR), Argentina (ARG), India (IND) and Mexico in 2016 at the current import tariffs

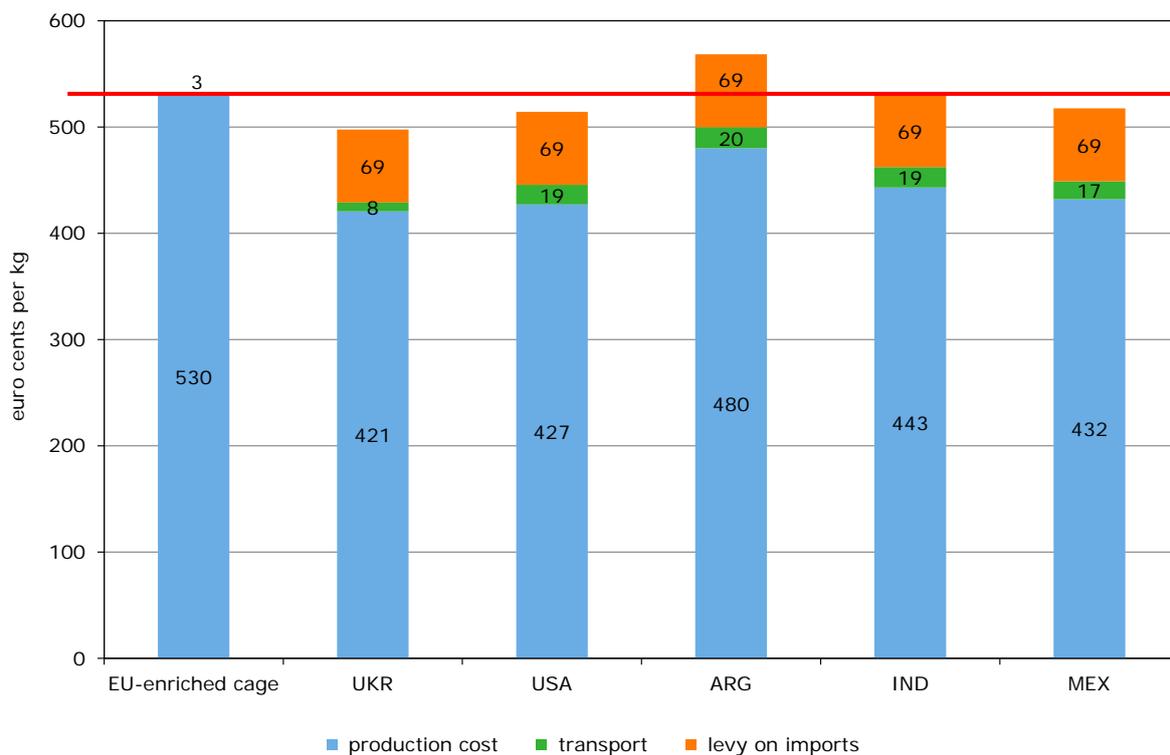


Figure 2.5 Offer price whole egg powder in the EU from EU average and United States (USA), Ukraine (UKR), Argentina (ARG), India (IND) and Mexico (MEX) in 2016 with a 50% reduction in import tariffs

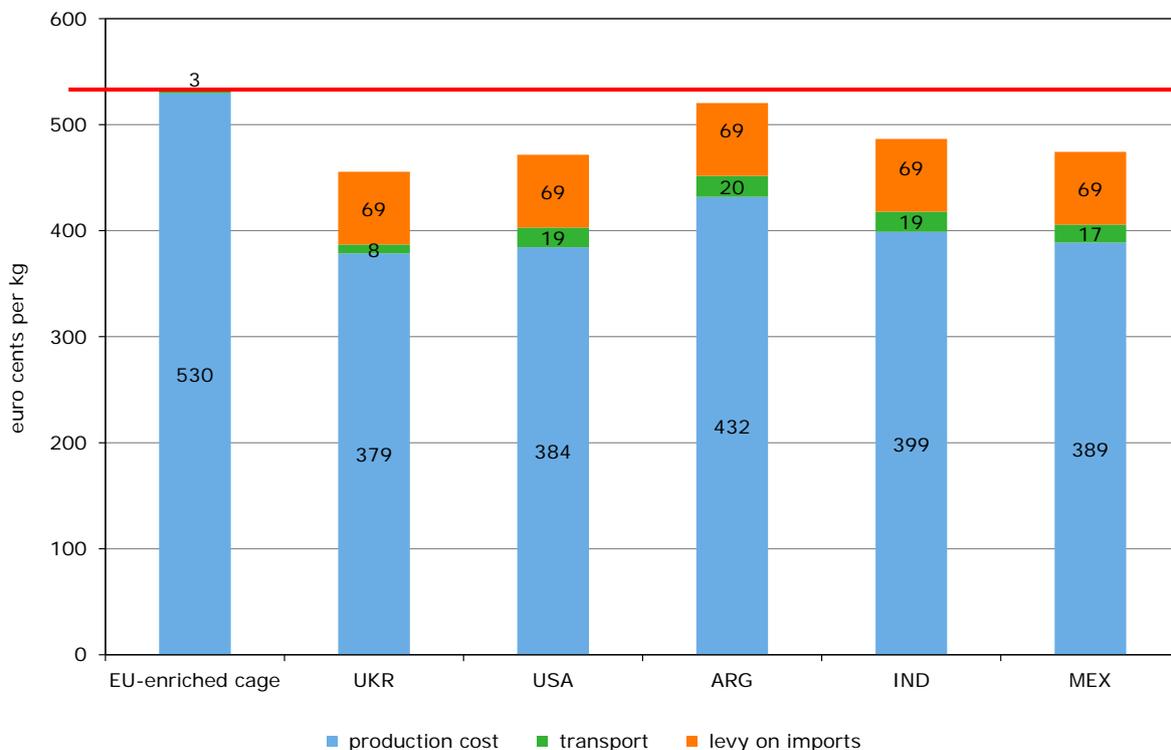


Figure 2.6 Offer price whole egg powder in the EU from EU average and United States (USA), Ukraine (UKR), Argentina (ARG), India (IND) and Mexico (MEX) in 2016 with a 50% reduction in the import tariffs and a 10% lower exchange rate of all non-EU currencies

Figure 2.5 shows the situation when the EU import tariff is reduced by 50% and figure 2.6 combines this 50% tariff reduction with a 10% lower exchange rate of all non-EU countries. In both scenarios, the Mexican offer price for whole egg powder is lower than the price of EU producers. It can be concluded that if the import tariff is substantially reduced, whole egg powder from the Mexico is competitive with that produced in the EU. However, Ukraine and the USA are even more competitive. The amount of egg powder Mexican producers can export to the EU depends on the actual situation with the tariff quota volume (with a reduced import tariff) and the value of the import tariff. Since 2000, the EU has an agreement on trade and trade related matters with Mexico (regulation EC1362/2000). In this agreement, the following annual tariff quota volumes are mentioned: eggs of poultry (300 tonnes), egg yolks, bird eggs not in shell (1,000 tonnes) and egg albumin (3,000 tonnes). Within these quota, the import tariffs are zero or very low. However, as mentioned in Section 2.1, imports from Mexico have been far below 100 tonnes per year. This indicates that Mexico is not an important supplier of eggs or egg products to the EU, despite the clearly competitive cost price. Apparently other factors (such as administration procedures, certification, product quality or disease status) are more relevant than just price. Therefore, a change in the free trade agreement with Mexico is not expected to result in a large change in imports of eggs and egg products in the EU from Mexico.

3 Poultry meat

3.1 International trade

The EU is a large exporter and also a large importer of poultry meat. Exports relate, in general, to low value products like leg meat. Imports from third countries are mainly high value chicken breast meat. Table 3.1 shows that Brazil was the largest supplier in 2016 with 502,000 tonnes carcass weight, followed by Thailand with 289,000 tonnes (EC, 2017b). These two countries account for 85 to 90% of the total import in the EU in recent years. Brazil, Thailand, Ukraine and Chile have tariff rate quotas. Within these quotas, imports have no or a low import levy. In general the quota given for poultry meat were filled.

Table 3.1 Volume of poultry meat imports into the EU from third countries in 1,000 tonnes carcass weight, 2012-2016)

	2012	2013	2014	2015	2016
Brazil	583	514	501	499	502
Thailand	198	228	250	274	289
Ukraine	0	0	20	42	48
Chile	42	31	26	22	29
China	16	18	20	18	17
Argentina	14	11	11	9	6
Other	13	12	10	7	8
Total	866	814	838	871	899

Source: EC (2017b).

EU trade with Mexico

Mexico is not on the list of main suppliers of poultry meat to the EU. The trade between EU countries and Mexico is limited. According to Eurostat data (Comext/Eurostat, 2018) there was no import of poultry meat in EU countries from Mexico from 2012 to 2016. Export from EU countries to Mexico was also limited. The Eurostat data between 2012 and 2016 show exports of only 48,000 kg of poultry meat (code 0207) from Belgium to Mexico in 2012.

Mexico has a trade agreement with USA and Canada (NAFTA). For the USA, the top three destinations for poultry meat export are Mexico, Canada and Hong Kong (NCC, 2017).

3.2 Production systems and animal welfare in the Mexico

Animal welfare

Mexico has no legislation on broiler housing (Bracke and Vermeer, 2017). However, Mexico has a regulatory framework with regulations for slaughter and killing of animals (NOM-033-SAG/ZOO-2014) and transportation of animals (NOM-051-SAG/ZOO-1995) (Alvarez, 2016). A manual for good practice (Sagarpa/Senasica, 2016b) advises to keep broilers at a maximum density of 36 to 39 kg per m² or 15 to 19 birds per m² poultry house. An industry source mentioned an average density 14 to 16 broilers in modern poultry houses with tunnel ventilation. Bird weight is in a range of 1.8 to 2.5 kg. The highest density of 16 broilers per m² with a live weight of 2.5 kg would result in 40 kg of live weight per m² (Cobb-Vantress, 2018). EU legislation sets a maximum at 39 to 42 kg per m² poultry house.

The broiler industry is using the regular fast growing breeds. Broilers are kept in similar houses as in the USA: long poultry houses with tunnel ventilation and litter on the floor. In these houses the

density is 14 to 16 birds per m². Some smaller companies still use open-sided houses with natural ventilation and only 10 to 12 birds per m². Performance of the broilers is similar to the USA. However, due to disease problems the mortality rate in Mexico averages 8 to 10%, more than twice the 4% average in the USA. In the Netherlands mortality rate of fast growing broilers in 2016 was on average 3 to 3.5%.

Broiler sector in Mexico

Mexico is the 6th largest poultry meat producer in the world. In 2017 the production was 3.5 million ton (UNA, 2018). Consumption of poultry meat is steadily growing and reached 32 kg per capita per year in 2017 (UNA, 2018). The self-sufficiency rate for poultry meat in 2016 was 90%. Mexico is not able to meet demand by domestic production. Imports, mainly leg quarters from the USA, balance the supply deficit (Windhorst, 2017). However, Chile and Brazil continue gaining market share. Given the extension of the period in which poultry meat may enter Mexico duty free under a tariff rate quota (TRQ) Brazil will be a competitor in the Mexican market in the coming years (FAS, 2017d). Mexico has just some minor exports of poultry meat. Mexico is still working on reopening foreign markets that were closed after the AI outbreaks between 2012 and 2014. Export estimates for 2017 are 6,000 tonnes.

Operations in Mexico are in general large. Market leader is Industrias Bachoco (27%). Other large companies are Pilgrim's de Mexico and Tyson de Mexico (Windhorst, 2017). These three companies have a combined market share of around 50%. Most of the poultry meat companies are vertically integrated and have slaughterhouses, feed mills and hatcheries. Broiler production is more evenly distributed over the country than laying hen production. The main production regions are Veracruz (12% of total production), Aguascalientes (11%) and Queretaro (10%) (UNA, 2018).

The broiler industry uses the regular fast growing breeds. The major breed is Ross with a market share of 76%. The market share of Cobb is estimated to be 19% (UNA, 2018). Broilers are grown to two different weights. About 60% of the broilers are grown to a weight of 1.8 to 2.5 kg and are processed in a slaughterhouse (Cobb-Vantress, 2018). The other 40% are kept to a higher live weight of 3.0 to 3.2 kg and are sold as live birds to the customer.

Mexico is not self-sufficient in feed. Poultry feed is mainly a mix of corn and soy beans. More than half of these feed ingredients are imported from the USA (UNA, 2018).

Avian Influenza

The economic impact of the AI outbreaks between 2012 and 2014 on poultry meat production and consumption was much lower than in egg production. Although the number of broilers decreased by 6% this did not result in a massive reduction of broiler meat (Windhorst, 2017).

3.3 Production costs

The competitive strength of the poultry sector is largely determined by the primary production costs. Figure 3.1 compares the production costs of poultry meat of the EU with Mexico and four other countries, the USA, Thailand, Brazil and Argentina. These countries are competitors or potential competitors of the EU on the world market. In the current study, the results of these four other countries as described in van Horne (2017b) are updated to 2016 and Mexico is added.

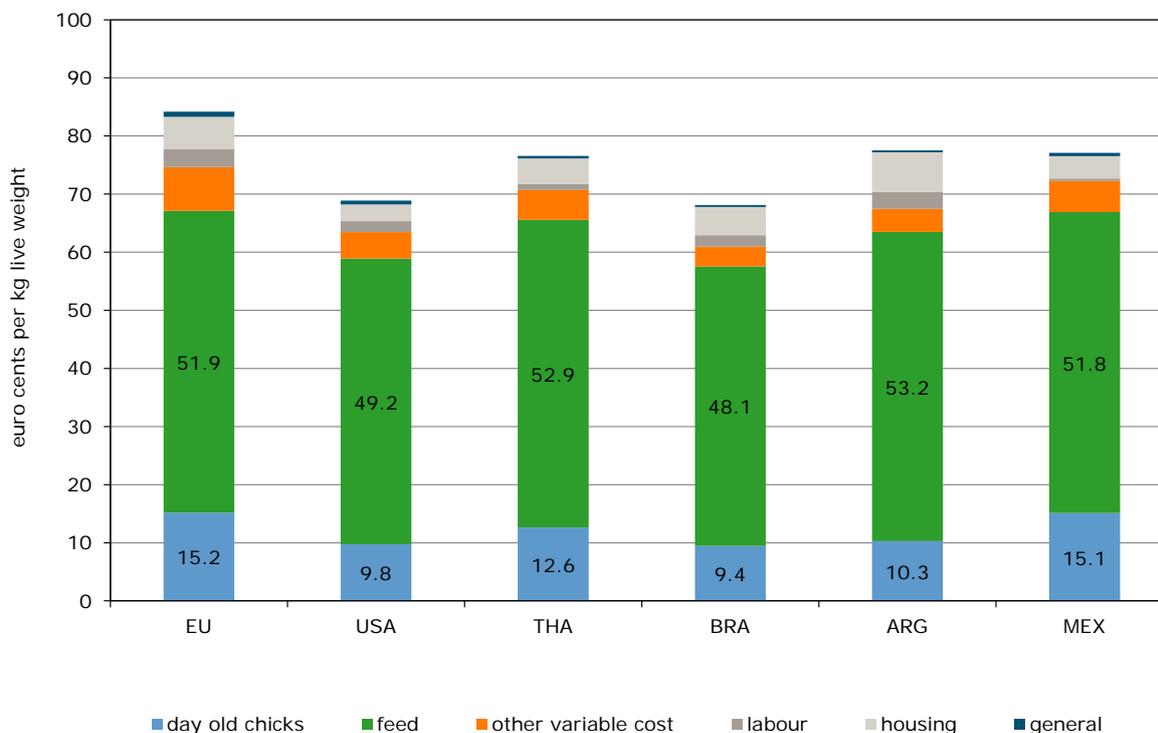


Figure 3.1 Production costs of broilers (euro cents per kg live weight) in the EU, United States (USA), Thailand (THA), Brazil (BRA), Argentina (ARG), and Mexico (MEX) in 2016

In the EU the average primary production costs were estimated at 84 euro cents per kg live weight. Brazil and the USA have significantly lower primary production costs than the EU, mainly due to low feed and day-old chick costs. Brazil and the USA have a lower feed price because of the domestic availability of sizeable quantities of maize, soybeans and other feed ingredients. The production costs in Mexico are higher than in the USA and lower than in the EU. Compared to the EU, Mexico has the advantage of cheaper feed, lower housing costs and cheap labour. Costs are also lower as a result of the absence of environmental and animal welfare legislation.

Farmers in the EU are confronted with regulations on environmental protection (nitrate directive, manure regulation, ammonia emissions), food safety (salmonella control, in the EU antimicrobial growth promoters, meat and bonemeal, and specific genetically modified organisms (GMOs) are not allowed in broiler feed), and animal welfare (surface area). Van Horne (2017b) estimated that 6% of the total primary production cost for broiler farmers in the EU is directly related to such EU regulations, In figure 3.2 this is illustrated: additional costs of regulations are 5 euro cents out of the total of 86.4 euro cents.

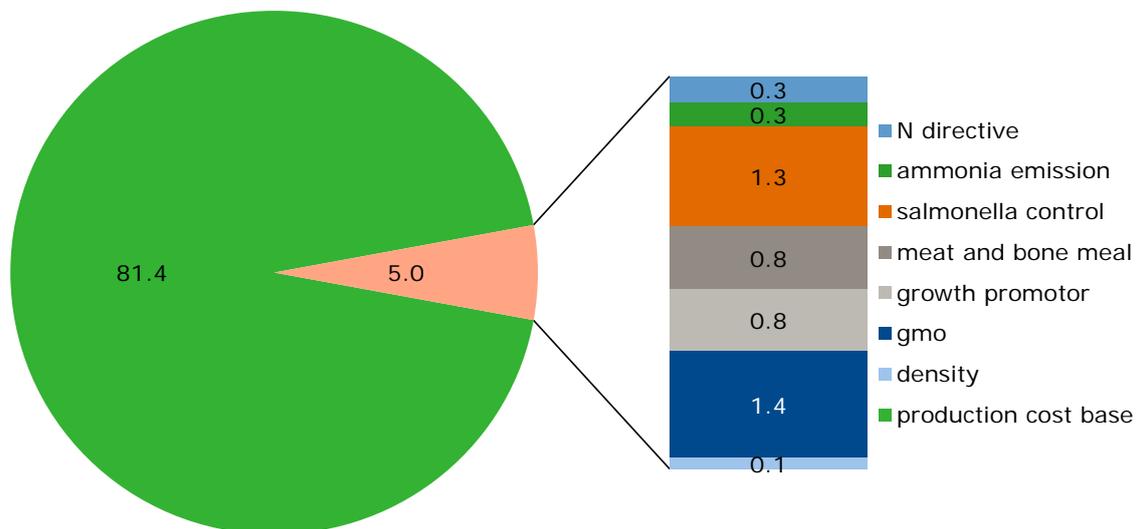


Figure 3.2 Production costs in euro cents per kg live weight directly related to EU legislation in 2015

In addition to the costs of primary production, the costs of slaughter also play an important role in the international comparison of competitiveness. These costs are calculated based on the slaughter of broilers in a large commercial slaughter house. For all countries these costs are calculated based on the components labour, building / equipment and other costs. Figure 3.3 shows that in the EU the average production costs after slaughter are 148 euro cents per kg carcass weight. All third countries have lower costs after slaughter than the EU. In Mexico the cheap labour lowers the costs of slaughter.

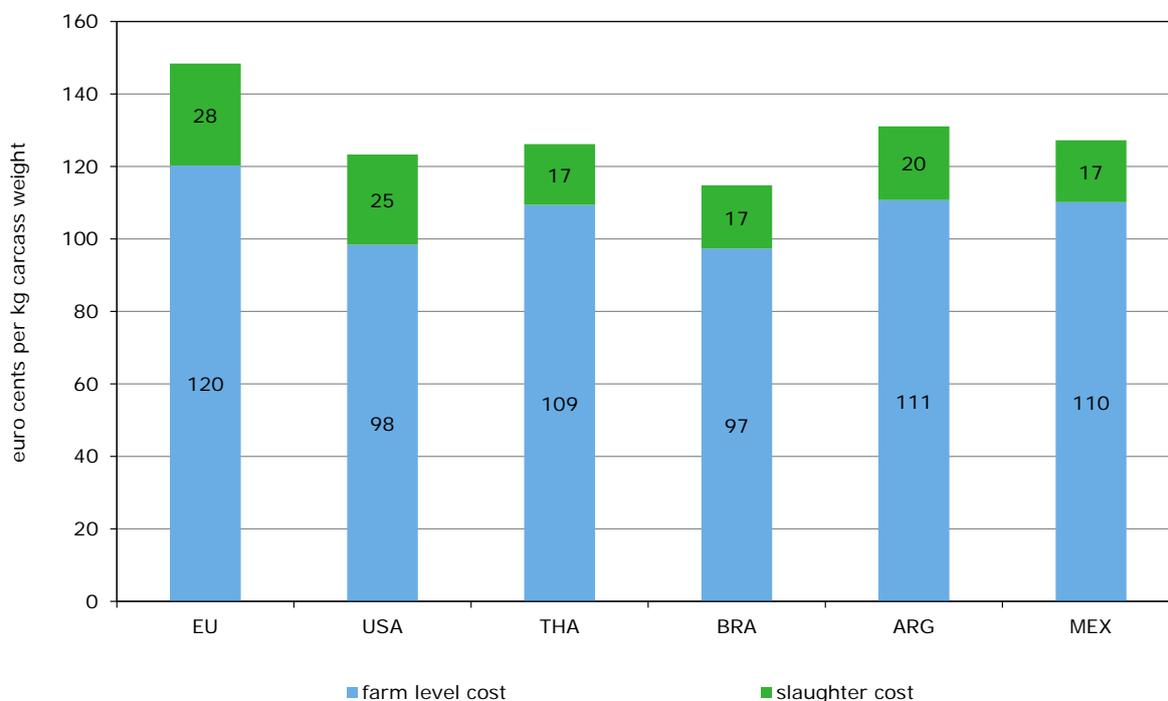


Figure 3.3 Costs of primary production and slaughter of broilers (in euro cents per kg live carcass weight) in the EU, United States (USA), Thailand (THA), Brazil (BRA), Argentina (ARG), and Mexico (MEX) in 2016

3.4 Free trade

There is a high demand for chicken meat (mostly fillet) in northwestern Europe. However, most is for fresh products which have not been frozen. Imports of chicken meat from third countries are generally frozen products. The EU frozen chicken meat market is limited. Most chicken meat imports in the EU at the moment are within quota at a zero or low import tariff. Only a limited amount of chicken fillet is imported from Brazil paying the full import levy. Figure 3.4 shows the offer price for chicken fillet produced in the EU, Brazil, the USA and Mexico. The offer price takes into account the transportation costs and an import tariff of 1.02 euros per kg fillet. With this import tariff, the offer price of all three third countries is higher than the EU offer price. Only if the import tariff would be reduced to almost zero, the Mexican offer price would come below the EU offer price. Even then, it remains to be seen whether Mexico can compete with Brazil on the EU market. The offer price of chicken fillet from Brazil is much lower than the Mexican price (Figure 3.4). If free trade with Mexico would be agreed and the offer price of Mexican chicken fillet would drop below the offer price of other third countries, the Mexican products could squeeze out a portion of imports from other third countries. However, as the EU market for frozen chicken fillet is limited, Mexican import would not be directly at the expense of EU production.

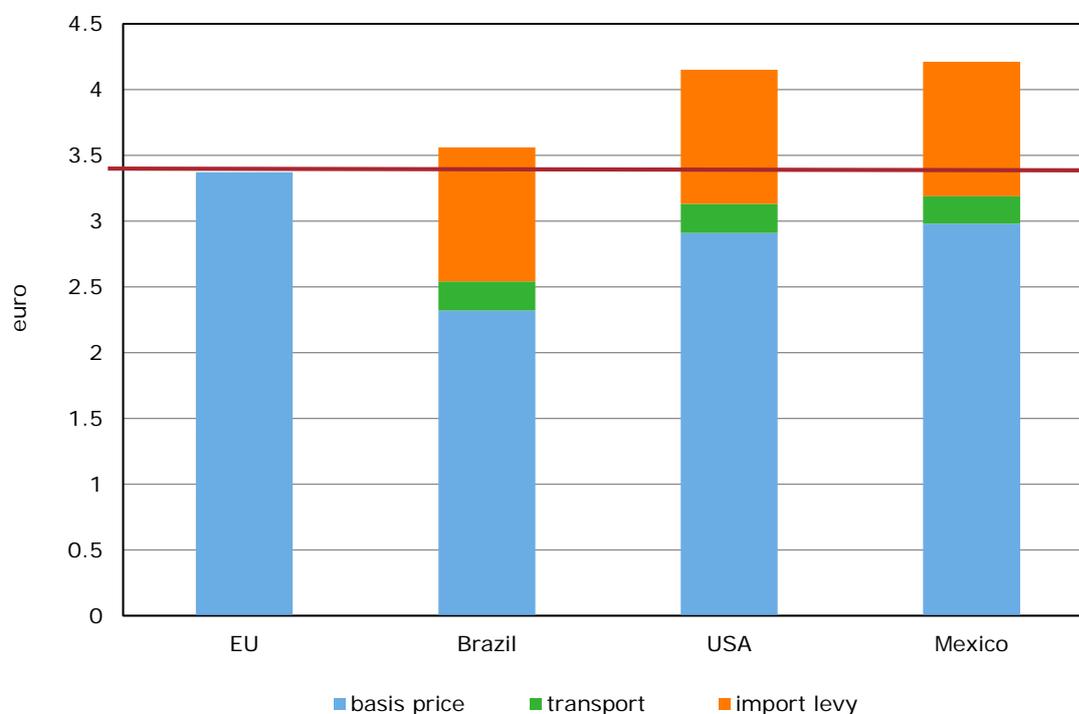


Figure 3.4 Offer price of chicken fillet in the EU after transport costs and import tariff in 2016

It is unclear from the retrieved data if SPS (sanitary and phytosanitary) EU requirements, will block chicken meat imports from Mexico. Possibly, Mexican slaughterhouses are using decontamination methods similar to the USA. Due to these decontamination methods imports of poultry meat from the USA are not allowed. So, similarly, imports from Mexico could be not allowed.

On the other hand, in a free trade agreement with Mexico the EU poultry industry could have more opportunities to export leg meat to Mexico. Leg meat is in large supply in the EU and in high demand in Mexico. Currently, the EU exports leg meat to many countries in Africa. Mexico could be a new destination.

4 Pig meat

4.1 International trade

The EU is the second largest producer of pig meat worldwide, after China, and the largest exporter. The self-sufficiency rate in the EU has increased in the last decades to 114% in 2016. Exports of pig meat and products mainly go to China, Japan and South Korea. In 2016, the total export of pig meat and pig meat products was 2.4 million tonnes and of edible pig offal was 1.6 million tonnes (EC, 2017c). The EU has a very limited import of pig meat and products and edible pig offal. The total import volume in 2016 amounted to 8 thousand tonnes pig meat and products per year and 22 thousand tonnes edible offal (EC, 2017c). This reflects about 0.2% of the pig meat consumption in the EU.

EU trade with Mexico

The EU imports negligible amounts of edible pig offal from Mexico (a few tons per year in some years) and no pig meat and pig meat products at all. Trade barriers (import tariffs) and veterinary and food safety issues (use of antimicrobial growth promotor Ractopamine, contagious diseases, lack of appropriate Identification and Registration system) hinder import of pig meat and products into the EU.

The EU exports around 3 thousand tonnes of pig meat and products, and (mainly) edible pig offal per year to Mexico. This is less than 0.1% of the total EU export. Main supplier from the EU to Mexico is Spain with over 70% of the total export, at a distance followed by Denmark (Figure 4.1). Pig meat and pig meat product exports to Mexico, although less than 500 tonnes per year, almost completely originated in Denmark (Figure 4.1).

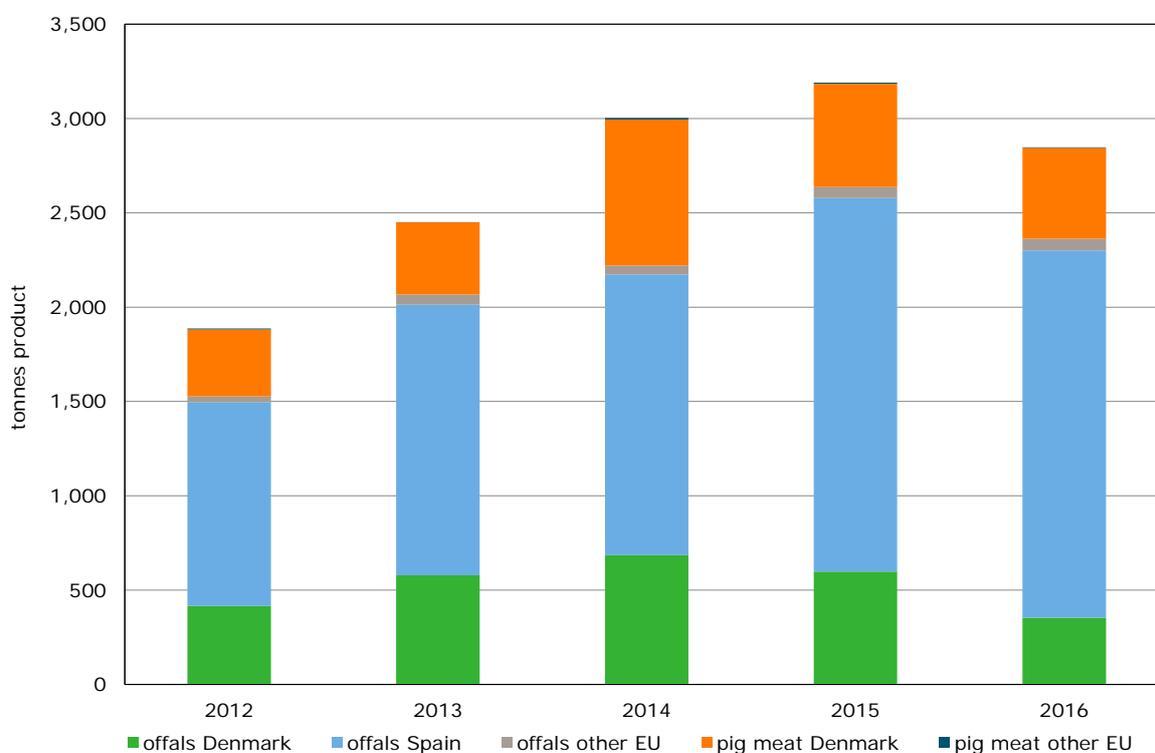


Figure 4.1 Export of pig meat and products, and edible pig offal (in tonnes product) from selected EU Member States to Mexico, years 2012-2016

Source: Comext/Eurostat, elaboration Wageningen Economic Research.

Pig meat balance in Mexico

Mexico is a net importer of pig meat, with a self-sufficiency rate of about 60% (Figure 4.2). The USA is the main foreign supplier (86%), followed by Canada (FAS, 2017c). According to FAS (2017c), Mexico is seeking to diversify its import of red meat, for instance from Brazil. Imported pig meat consists of in-bone hams, carcasses and mechanically deboned meat.

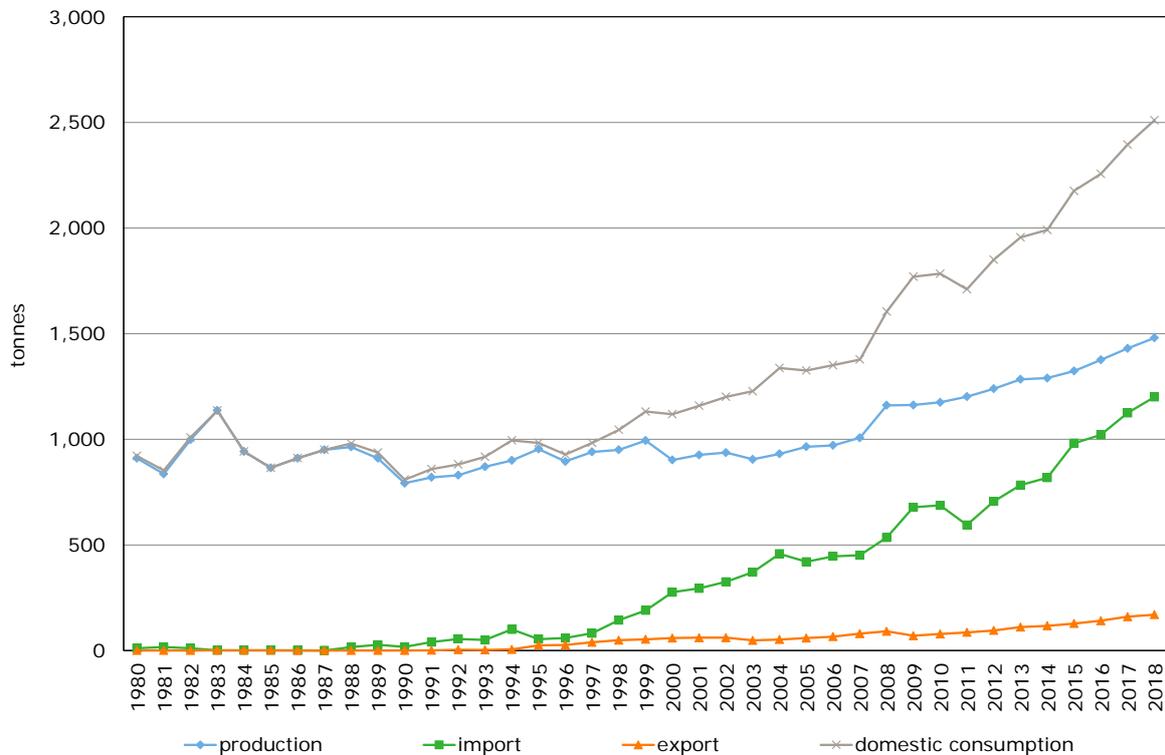


Figure 4.2 Pig meat production, import, export and domestic consumption in Mexico (1,000 tonnes carcass weight equivalent)

Source: FAOStat.

The Mexican export mainly focuses on East Asian countries: Japan as biggest, South Korea and China. Countries such as Japan and Korea demand special, tailor-made pig meat products that Mexico can deliver, and Mexico has a comparative advantage due to relatively cheap labour (FAS, 2017a). Recently, Mexico has been developing its export to other countries such as Canada, Hong Kong, and Singapore (Mexicanpork.org).

4.2 Production systems and animal welfare in Mexico

Animal welfare

Mexico has no animal welfare legislation for pig husbandry. Husbandry practises in the Mexican pig sector seem to be quite similar to the USA. The Mexican government has issued a Best Practices Manual in cooperation with the farmers organisation Porcimex (Sagarpa and Senasica, 2016c). Best practices include rather detailed biosecurity measures (mainly on prevention of infection from outside). The text of the Best Practices Manual is somewhat unclear on minimal area requirements, because the numbers in the main text deviate from the numbers in the Annex. No information is available on the degree to which these best practices are being implemented. Bracke and Vermeer (2017) indicate that pregnant sows are usually kept individually in stalls, which are 65 cm wide and 2.20 m long. Most pigs are kept on fully slatted floors. For new weaner houses 0.4 m²/pig and for growing-finishing pigs 1.0 m² is advised (Bracke and Vermeer, 2017). Most pig houses have open side walls to stimulate ventilation and prevent heat stress in Mexico's tropical/desert climate (Bracke and

Vermeer, 2017). Tails are docked and male pigs are castrated (Bracke and Vermeer, 2017). Weaning of young piglets is typically done at about 21 days. It can be concluded that animal welfare in the Mexican pig husbandry is less regulated than in the EU. Advised living area requirements seem to comply with EU requirements, but it is unclear to what degree these best practices have been implemented.

Mexico has legislation on animal transport (NOM-051-SAG/ZOO-1995) and on slaughter and killing of animals (NOM-033-SAG/ZOO-2014). The Best Practices manual (Sagarpa and Senasica, 2016c) indicates that transport duration should be a maximum of 20 hours, with a rest on the truck after every 8 hours driving, and should last no longer than 1 hour. Transport is only allowed for animals who are fit-for-travel. Loading density is advised, with a minimum space of 0.45 m² per pig of 100 kg (which corresponds to 223 kg/m²), and in summer at least 10% more space. Bracke and Vermeer (2017) indicate that it is recommended to give pigs during transport spray cooling on hot days to prevent heat stress and that the floor should offer grip to prevent slipping. Finally, pigs at the slaughterhouse should undergo a veterinary inspection (Bracke and Vermeer, 2017).

The discussion about animal welfare in the pig sector has only started recently, with a special issue of the magazine *Porcicultores* focusing on animal welfare in 2016. The Mexican restaurant chain Grupo Toks announced to serve only crate-free pork (PigSite, 2016).

Pig sector

Mexico produces about 20 million slaughter pigs per year, corresponding to about 1.5 million tonnes carcass weight. Increasingly, these pigs are being produced in vertical integrated companies and it is estimated that currently already more than half of the pig production is vertically integrated. Mexican Pork is an association of 10 large pork producers (mexicanpork.org), who jointly produce an estimated one third of the Mexican pig production. Other large producers include Granjas Carroll and Kekén (with each about 70,000 sows and processing). The pig production in Mexico is concentrated in the states of Jalisco, Sonora, Puebla and Yucatan. These four states account for more than half of the total pig meat production. Consumption of pig meat per capita is on a moderate level of about 19 kg per capita per year, and showed a steady increase in the last two decades doubling from 9.6 kg per capita in 1996.

Alongside municipal slaughter houses are federally inspected facilities (known as TIF or Federal Inspection Type). The Mexican government stimulates abattoirs to move towards this last type. Only meat from TIF plants is eligible for export. The National Association of TIF Establishments (ANETIF) stated that 39 percent of pork consumed in Mexico was processed in a TIF establishment in 2015.

According to Alltech (2018), Mexico has 501 feed mills, with a total output of 34.4 million tons per year, of which 4.8 million tons for pigs and 16.1 million tons for poultry production. According FAS (2017b), 60% of the commercial animal feed production is done by integrated producers. Because Mexico has insufficient supply of feed ingredients, it imports considerable amounts of corn (7.7 million tons in 2015) and soybean meal (1.5 million tons) and DDGS (FAS, 2017b). Such imported feed ingredients are often more expensive than locally produced feed ingredients, such as sorghum. The Best Practices Manual (Sagarpa and Senasica, 2016c) recommends not to use beta-agonists in animal feed. However, in practise Ractopamine is being used (Van Dongen, personal communication, February 2018). The use of ractopamine is not allowed for export to the EU. Antibiotics registered at SAGARPA can be used as growth promotors.

Animal diseases

Porcine Epidemic Diarrhoea (PED) and Porcine Reproductive & Respiratory Syndrome (PRRS) are present among pig farms in Mexico. However, the state of Yucatan is still free of PED. Mexico is free of Classical Swine Fever (CSF) and Foot and Mouth Disease (FMD), as recognized by the OIE (www.oie.int).

4.3 Production costs

Primary production costs are an important determinant for the competitiveness of the pig sector. Based on InterPIG international cost comparison and collected information, a comparison of the average primary production cost was made between the Netherlands and Spain (an EU country with lowest primary production costs), as representatives of the EU, Canada and the USA as large competitors for the EU, and Mexico (Figure 4.3).

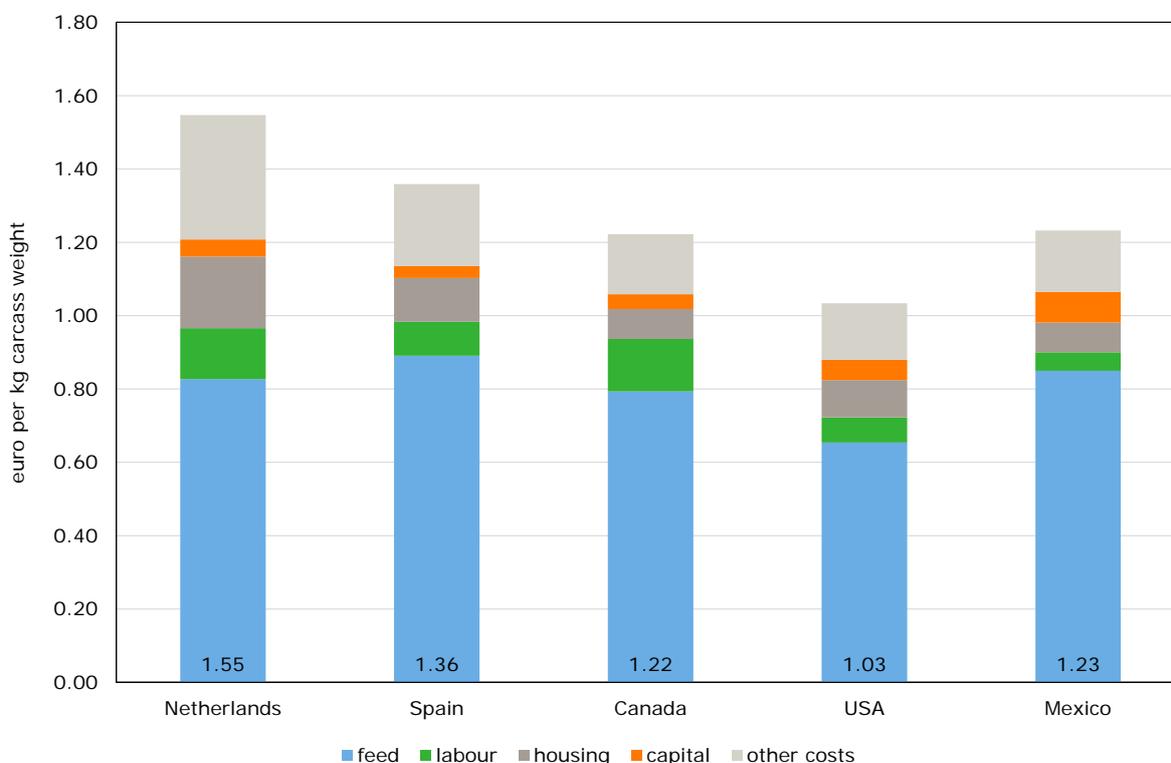


Figure 4.3 Production costs of slaughter pigs (euro per kg carcass weight) in the Netherlands, Spain, Canada, USA and Mexico in 2016

Source: InterPIG/Wageningen Economic Research.

The estimated production costs in Mexico amounted to 1.23 euros per kg carcass weight, equal to Canada and higher than the USA. Feed costs are a main determinant in cost differences. Feed costs in Mexico are substantially higher than in the USA (about 20 euro cents/kg). In Mexico cheaper labour and housing compensate for higher interest costs and less good zootechnical performance, compared to the USA. Mexico is cheaper than the EU countries Spain and the Netherlands. Labour and housing are far more expensive in the Netherlands than in Mexico, but can partly be offset by the high efficiency (zootechnical performance). Furthermore, the higher production costs in the Netherlands and Spain can partly be explained by legal requirements on animal welfare (including minimum space per pig, group housing of pregnant sows, enrichment material etc.), environment (Nitrates Directive/manure regulation and ammonia emissions) and food safety (salmonella, meat-and-bone-meal, GMOs, antibiotics). According to Hoste (2013), the associated costs amount to 19 euro cents per kg carcass weight in the Netherlands and 8 euro cents in Spain (Figure 4.4). Recently, the manure disposal costs in the Netherlands have risen further (+ 4 euro cents), resulting in about 23 euro cents per kg carcass weight to comply with the societal requirements (Hoste, 2017).

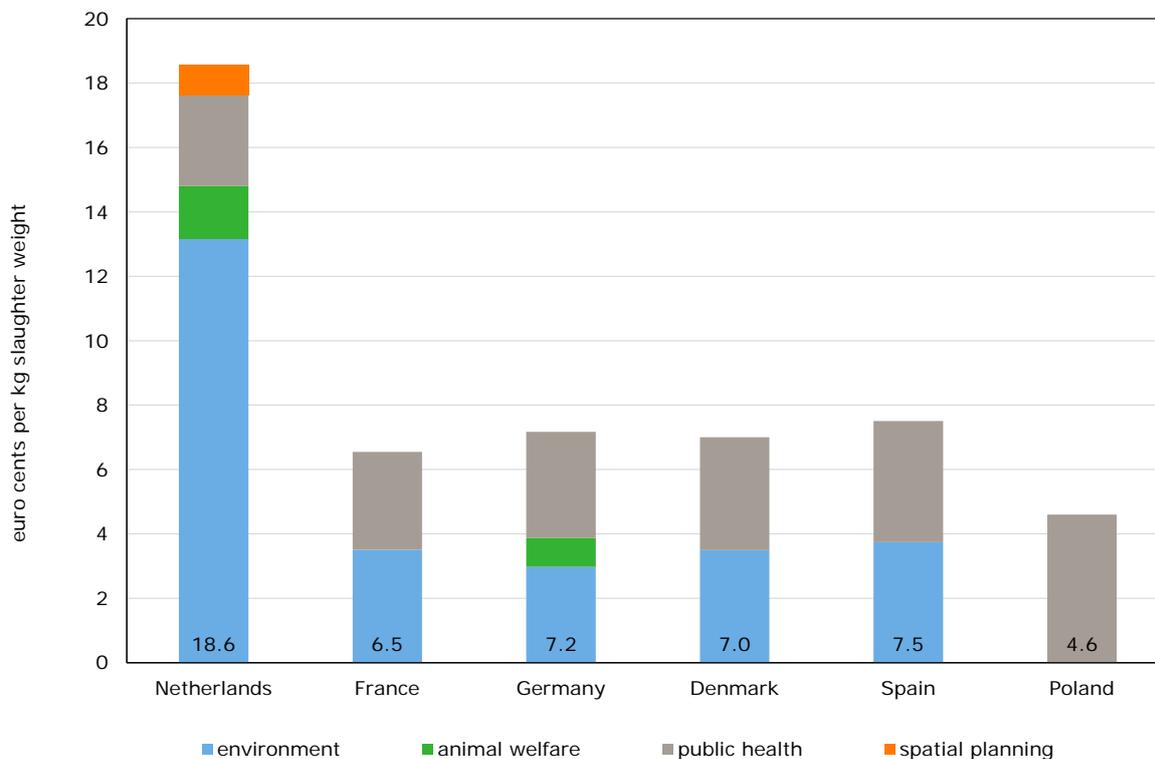


Figure 4.4 Costs for societal requirements in selected European countries in 2011 (euro cents per kg carcass weight)

Source: Hoste, 2013.

No recent studies are available for comparison of production costs including slaughter, processing and transport. A comparison of Hoste and Bondt (2006) showed that export of selected pig meat products from Brazil to the Netherlands could happen at about the same offer price as the local products, after including import tariffs on the Brazilian products. Furthermore, it can be argued that Mexico has an advantage over the EU in cheaper labour. Based on ILO (2016), labour costs in Mexico are in the range of 2 euros per hour, compared to 15-25 euros per hour in the EU. Though labour is just a part of the processing costs and high labour costs (tariff per hour) are typically partly compensated by a higher efficiency (both in labour itself, automation and organisation of the supply chain), it can still be expected that processing costs in Mexico are considerably lower than in the EU.

4.4 Free trade

Mexico has entered 11 free trade agreements with 46 countries (CRS, 2017). Its first agreement was the NAFTA, with the USA and Canada, followed by agreements with Chile, the EU, Uruguay, Japan, Colombia, Israel, Peru, Central America and Panama. Mexico is also a party in the Trans-Pacific Partnership Agreement, that is still in negotiation. The Free Trade Agreement with the EU entered into force in 2000. According to CRS (2017), 'tariff negotiations were deferred on certain sensitive products, including meat, dairy products, cereals, and bananas. Most non-tariff barriers, such as quotas and import/export licenses, were removed upon implementation of the agreement.' Pig meat was no part of the negotiation and no specific agreement was made. So, trade of pig meat between the EU and Mexico is according to general rules of import tariffs. In 2015, Mexico and the EU announced to launch negotiations for a modernised Free Trade Agreement.

For Mexico to be able to export pig meat to the EU, it has to deal with a few issues such as the use of Ractopamine and the lack of a separate veterinary control system for export-oriented products (Balkantrading.com, 2017). It is conceivable that Mexico sets up a program 'Pork for the EU', equal to the USA, with clear guarantees on origin, veterinary control system, and use of Ractopamine.

Vice versa, opportunities for the trade of pig meat from the EU to Mexico could arise for specific products that are less popular in the EU and more in Mexico. Opening an additional market would give more possibilities for European meat processors to valorise all parts of the pig carcasses at the Mexican market.

5 Discussion and Conclusions

5.1 Discussion

Primary production costs can vary between countries, regions and farms, due to difference in access to feed materials, climatic conditions, labour costs and management skills, for example. This goes for the EU, but also for Mexico. So, even when a product from Mexico might not be competitive based on average production costs, a producer with low production costs in Mexico might be a serious competitor for a producer with high costs in the EU.

International trade is mainly done on specific products. There is just limited trade in whole carcass chickens or half carcasses of pigs. For chicken long-distance trade is done on breast meat fillet or leg meat. For eggs trade can be done on dried egg white or egg yolk. For pigs trade is done on specific parts such as hams, bellies, middles, or further processed products like spare ribs or bacon. For this reason information on the production costs of the carcass has limited value to compare the competitiveness of a country. Estimating the potential export opportunities for these specific products is complicated. It is advised to set clear quotas for the different products.

The impact of free trade with Mexico is difficult to estimate, if parallel to a free trade agreement with Mexico, free trade with other countries is agreed. In such situation imports from Mexico could remain limited because other third countries such as the USA or Ukraine are more competitive than Mexico.

Changes in exchange rates are expected to lead to fluctuations in the flow of products to Europe as the final offer price in euros will vary depending on the exchange rate. This is expected to lead to greater price fluctuations than at present for both producers and consumers. Figure 5.1 gives the development of the euro exchange rate against the US dollar and the Mexican peso. Both the American dollar and the Mexican peso have experienced large exchange rate swings in recent years. The Mexican peso devaluated further in 2017. The calculations in this report were made for the base year 2016. At the 2017 exchange rate, the production costs in Mexico would be even lower expressed in euros.

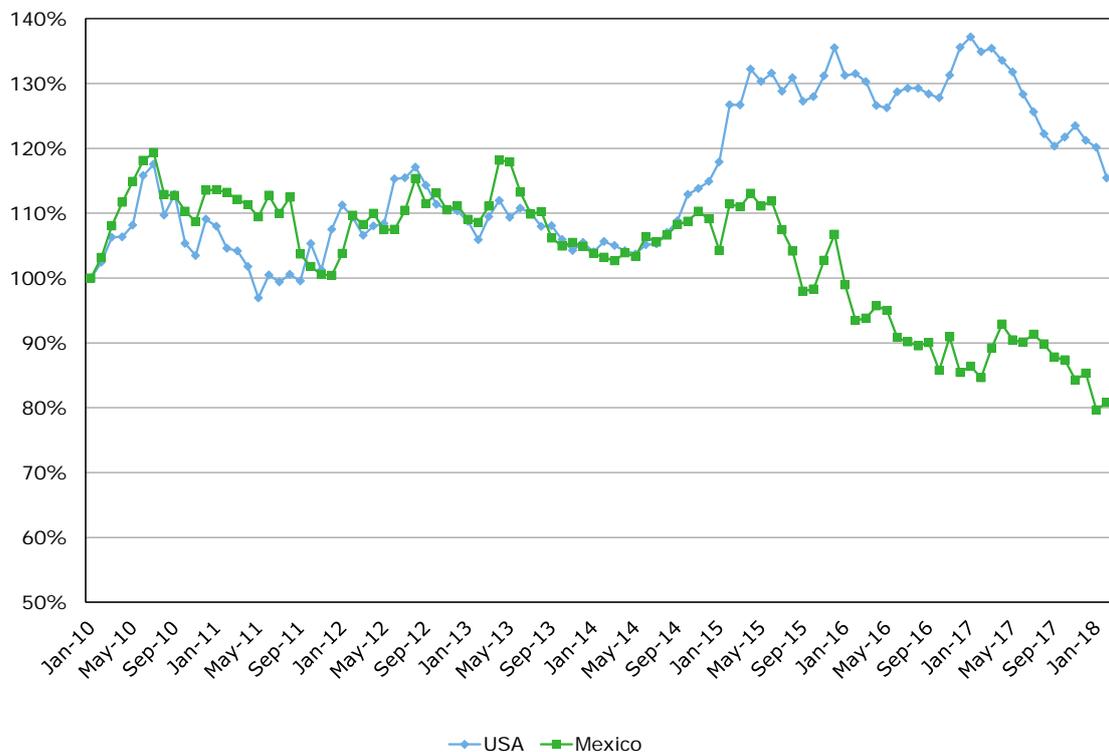


Figure 5.1 Exchange rate of the Mexican peso and US dollar against the euro, January 2010 - February 2018 (ratio of euro to Mexican peso or US dollar, in percentage of the ratio in January 2010)
Source: InforEuro, elaboration Wageningen Economic Research.

5.2 Conclusions

Eggs and egg products

- The EU is a large importer of egg products (mainly egg powder) from third countries, such as Ukraine, the USA and Argentina.
- The introduction of a ban on traditional cage housing in the EU led to a serious discrepancy between the animal welfare level in the EU and third countries.
- Animal welfare in Mexico is not regulated by law and the government only issued a best practices manual. Laying hens are kept in conventional cages with an average surface per hen of 380 to 420 cm² per hen. The best practice manual advises 450 cm² per hen.
- The current Mexico offer price of shell eggs and whole egg powder is clearly below the EU producers price.
- Increasing imports of shell eggs are not to be expected, because the EU market only demands fresh eggs which cannot be supplied from Mexico.
- Increasing imports of egg powder from Mexico are a low risk. Currently the tariff quota volumes of egg powder for Mexico are not filled, because other countries can supply the EU with the same products at lower prices.
- In recent years Mexico had many problems with Avian Influenza (A.I.) and vaccination is part of their control strategy. This A.I. situation can be a reason to ban imports from Mexico.

Poultry meat

- The EU is a large importer of poultry meat. Especially breast meat is imported in large volumes from Brazil and Thailand. These countries have tariff-rate quotas with access at zero or low import levies.
- Animal welfare of broilers in Mexico is not regulated by law. The government only issued a best practices manual, in which bird densities are advised at or below the EU standard. Mortality rates in Mexico are very high and exceed the EU standards.
- Currently Mexico has an intermediate price position between the EU and a low cost producer Brazil.

-
- There is a high demand for chicken breast meat in north-western Europe. Mexico could offer this product at a lower price than the EU, at least within quota at a zero or low import tariff. However, Brazil is much more competitive and offers breast meat at a lower price than Mexico.

Pig meat

- The EU has a very limited import of pig meat and products and edible pig offal. Imports from Mexico are negligible amounts.
- Mexico has no animal welfare legislation for pig husbandry. A best practices manual, issued by the government and the sector, is not clear on minimal area requirements. Pregnant sows are usually kept individually in stalls. Most pigs are kept on fully slatted floors.
- In the comparison on production costs at farm level Mexico has an intermediate position between the EU and low cost producer USA.
- Pig meat imports from Mexico are not expected, as the country has no export-oriented veterinary control system and antimicrobial growth promoters, such as Ractopamine, are used.

References and websites

- Alltech, 2018. *7th annual Alltech global feed survey 2018*.
- Alvarez, 2016. *Desafios futuros para la aplicacion de las normas de bienestar animal de la OIE en el ambito nacional*. Director General de salud Animal at SENASICA Presentation at 4^e Conferencia mundial de la OIE sobre Bienestar animal. Guadalajara. Mexico. 6-8 December 2016.
- Avicola, 2017. *Avicultura Mexicana*. IndustriaAvicola, September 2017. www.WATTAgNet.com
- Balkantrading.com, 2017. *Russian meat deal could benefit Mexico*. <http://www.balkantrading.com/news/russian-meat-deal-could-benefit-mexico>, 23 February 2017; accessed 5 February 2018.
- Bracke, M. and H. Vermeer, 2017. *Pig & Poultry Welfare in Mexico*. Report in press. Wageningen Livestock Research.
- CIA World Fact Book, 2018. <https://www.cia.gov/library/publications/the-world-factbook/geos/mx.html>; accessed February 2018.
- Cobb-Vantress, 2018. Broiler breeding company. Personal communication by mail giving information on the Mexican broilers sector. January 14, 2018.
- Comext/Eurostat, 2018. Statistics from Eurostat. Elaboration by Wageningen Economic Research.
- CRS, 2017. *Mexico's Free Trade Agreements*. Congressional Research Service. Prepared by : M. Angeles Villarreal. April, 2017.
- EC, 2017a. *EU market situation for eggs*. European Commission. Brussels, Februari, 2017
- EC, 2017b. *EU market situation for poultry meat*. European Commission. Brussels, Februari, 2017
- EC, 2017c. *Meat Market Observatory*. https://ec.europa.eu/agriculture/market-observatory/meat/pigmeat/statistics_en; accessed: 15 March, 2017
- FAOStat. *Pig meat balance in Mexico*. <http://www.fao.org/faostat/en/#data>; Accession date: 15-1-2018.
- FAS, 2017a. *Mexico - Livestock and Products Semi-annual*. GAIN report number 7006.
- FAS, 2017b. *Mexico - Grain and Feed Annual*. GAIN report number MX7007.
- FAS, 2017c. *Mexico - Livestock and Products Annual*. GAIN report number 7033.
- FAS, 2017d. *Mexico: Poultry and Products Semi-annual*. GAIN report MX7002.
- IEC, 2017a. International Egg Commission. *Overview of legislation on welfare for laying hens in member countries*. www.internationalegg.com London. 2017.
- IEC, 2017b. International Egg Commission. *Annual review 2017*. www.internationalegg.com London. 2017

-
- Hendrix Genetics, 2017. Broiler breeding company. Personal communication by mail giving information on the Mexican layer sector. December 1, 2017.
- Horne, P. van and N. Bondt, 2017a. *Competitiveness of the EU egg sector*. Report 2017-062. The Hague. June 2017.
- Horne, P. van, 2017b. *Competitiveness of the EU poultry meat sector*. Report 2017-005. The Hague. January 2017.
- Hoste, R., 2017. *Cost disadvantage of Dutch pig production compels improved cooperation*.
<http://www.agrofoodportal.com/SectorResultaat.aspx?subpubID=2232§orID=2255&themalD=2269>.
- Hoste, R., 2013. *Production costs of pigs: Results of InterPIG in 2011* (In Dutch: Productiekosten van varkens; Resultaten van InterPIG over 2011). The Hague, LEI-Wageningen UR, report 2013-030.
- Hoste, R. and N. Bondt, 2006. *Production costs of pig meat* (In Dutch: Productiekosten varkensvlees). Den Haag, LEI, Report number 2.06.01.
- ILO, 2016. *Global Wage Report 2016/17; Wage inequality in the workplace*.
- InforEuro. *Monthly accounting rate of the euro*.
http://ec.europa.eu/budget/contracts_grants/info_contracts/inforeuro/index_en.cfm.
- Mexicanpork.org. *MexicanPork*. <https://mexicanpork.org/>, accessed 5 February 2018.
- NCC, 2017. National chicken council. www.nationalchickencouncil.org. Washington. December 2017
- OIE. *Official disease status*. <http://www.oie.int/animal-health-in-the-world/official-disease-status/>, accessed 6 February 2018.
- PigSite, 2016. *First Mexican Restaurant Chain Commits to Crate-Free Pork*.
<http://www.thepigsite.com/swinenews/42217/first-mexican-restaurant-chain-commits-to-crate-free-pork/>
- Sagarpa and Senasica, 2016a. *Manual de buenas practicas pecuarias en la produccion de Huevo para plato (eggs)*. 2^{da} edition 2016. Manual by Sagarpa and Senasica (Ministry of Agriculture).
- Sagarpa and Senasica, 2016b. *Manual de buenas practicas pecuarias en la produccion de Granjas Porcícolas (pigs)*. 2^{da} edition 2016. Manual by Sagarpa and Senasica (Ministry of Agriculture).
- Sagarpa and Senasica, 2016c. *Manual de buenas practicas pecuarias en la prucción de pollo en engorda (broilers)*. 2^{da} edition 2016. Manual by Sagarpa and Senasica (Ministry of Agriculture).
- UNA, 2018. *Compendio de Indicadores Economicos del sector Avicola*. Edition 2017. www.una.org.mx
- Windhorst, H.W., 2013. *Atlas of the global Egg Industry*. IEC report. London. September 2013.
- Windhorst, H.W., 2017. *Mexico's poultry Industry. New AI outbreaks and Peso devaluation endanger recovery*. University of Vechta. Germany

Personal communications

Van Dongen, F., COV, 8 February 2018

Wageningen Economic Research
P.O. Box 29703
2502 LS The Hague
The Netherlands
T +31 (0)70 335 83 30
E communications.ssg@wur.nl
www.wur.eu/economic-research

Wageningen Economic Research
MEMORANDUM
2018-034

The mission of Wageningen University and Research is "To explore the potential of nature to improve the quality of life". Under the banner Wageningen University & Research, Wageningen University and the specialised research institutes of the Wageningen Research Foundation have joined forces in contributing to finding solutions to important questions in the domain of healthy food and living environment. With its roughly 30 branches, 5,000 employees and 10,000 students, Wageningen University & Research is one of the leading organisations in its domain. The unique Wageningen approach lies in its integrated approach to issues and the collaboration between different disciplines.



To explore
the potential
of nature to
improve the
quality of life



Wageningen Economic Research
P.O. Box 29703
2502 LS Den Haag
The Netherlands
E communications.ssg@wur.nl
www.wur.eu/economic-research

Memorandum 2018-034

The mission of Wageningen University and Research is "To explore the potential of nature to improve the quality of life". Under the banner Wageningen University & Research, Wageningen University and the specialised research institutes of the Wageningen Research Foundation have joined forces in contributing to finding solutions to important questions in the domain of healthy food and living environment. With its roughly 30 branches, 5,000 employees and 10,000 students, Wageningen University & Research is one of the leading organisations in its domain. The unique Wageningen approach lies in its integrated approach to issues and the collaboration between different disciplines.

