



International comparison of pig production costs 2018

Results of InterPIG

Robert Hoste

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The cost of pig production in the Netherlands is in a medium position, compared to the Netherlands' direct neighbours, as it is characterized by a high sow performance and feed efficiency, as well as high costs for environmental protection and animal welfare. In piglet production, the Netherlands has a rather favourable cost position. This analysis is based on the InterPIG network.

In light of the current market situation, it is necessary for European producers and supply chains to prepare for a future price collapse. Since the Western European market is a front-runner in focusing on sustainability and animal welfare, EU producers should focus on long-term cooperation and supply to high-end markets.

Key words: pigs, cost of production, competitiveness, InterPIG

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Preface

The Dutch pig production is part of a European and global market. To get insight into the competitive position of the Dutch pig production, an international cost comparison has been performed. This is part of the international InterPIG network with members of 17 countries, of which Wageningen Economic Research has been a member from the very beginning. Each year, InterPIG produces a comparison of pig production costs at farm level across several countries.

As of the end of 2019, market prices for pig meat have risen to an historically high level. Given the cyclical nature of the pig market, the so-called 'pig cycle phenomenon', a price drop is to be expected. To survive the price drop, insight is needed into strategic competitive advantages and disadvantages for policy making for dedicated strengthening of production circumstances. This analysis concludes that EU pig producers should no longer focus on short-term opportunistic sales markets, but on long-term cooperation within the supply chain and supply to high-end markets.

In the Netherlands in 2016, a small network of Dutch companies was founded, funding the activities of Wageningen Economic Research related to InterPIG. The following companies are members of the group: ABAB accountants, Agrifirm, Boehringer Ingelheim, Hendrix Genetics, Rabobank and Vion Food Group. We discussed with these companies about the results of the cost comparison and its implications for the Dutch pig production. We present the main results of the analysis in this report. The analysis focuses mainly on the competitiveness from a Dutch perspective.



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Summary

S.1 Key findings

Costs of pig production vary among countries, from €1.38 per kg hot carcass weight in Denmark to €1.88 per kg in Italy. Costs in the Netherlands amount to €1.52 per kg, leading to a medium cost position in Europe. Pig production in the Netherlands is characterized by a high sow performance and feed efficiency on one hand, and high costs for environmental protection and animal welfare on the other; these costs are reflected in Figure S.1. [See par. 2.1.](#)

In piglet production, the Netherlands has a rather favourable cost position (55 euro per 30-kg piglet) compared to Germany (62 euro). This explains the substantial piglet export to Germany. [See par. 2.3.](#)

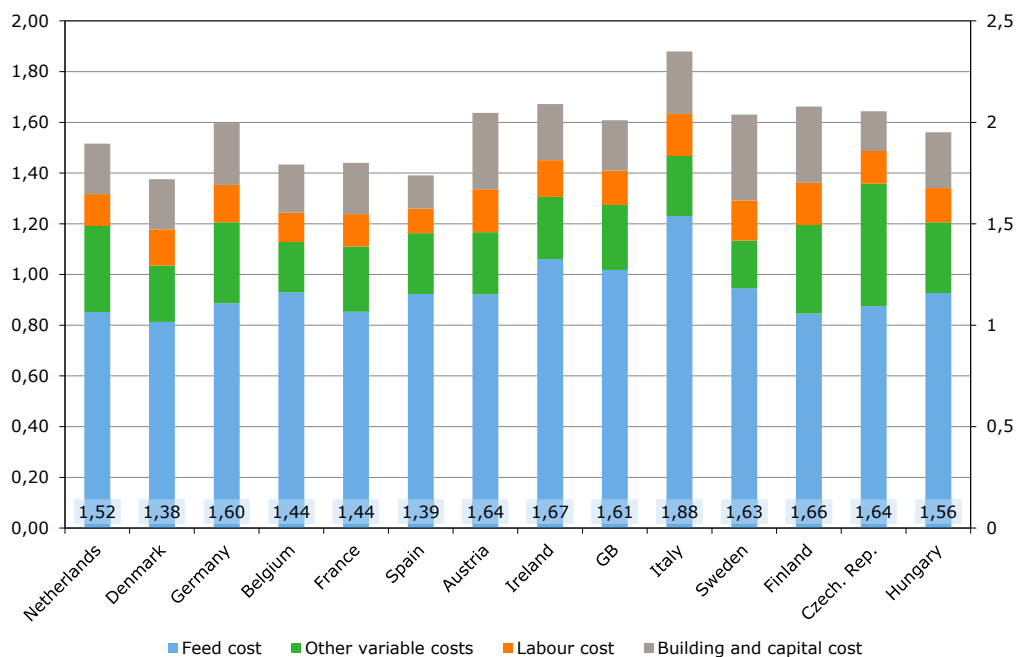


Figure S.1 Cost of production compared (€/kg hot carcass weight), split into cost categories in selected EU countries on a closed cycle pig farm

Source: InterPIG/Wageningen Economic Research, year 2018.

S.2 Complementary results

Cost differences among farms within a country are far bigger than among country averages: up to 20 euro per piglet or 30 eurocents per kg carcass weight. Main explanations for cost differences among sow farms in the Netherlands are labour costs, feed costs and sow replacement; farm size is not a major explaining factor. Cost differences among finishing farms are mainly explained by differences in feed costs, piglet purchase and labour cost and especially by farm size. [See Section 4.](#)

In the light of the current market situation, it is necessary for European producers and supply chains to prepare for a price collapse likely to come. Since the Western European market is a front runner in focusing at sustainability and animal welfare, EU producers should focus on long-term cooperation within the supply chain and supply to high-end markets.

S.3 Method

InterPIG is an independent forum of pig production economists in 17 countries, mainly in Europe, but also in the USA, Canada and Brazil. The method of data collection, parameter definitions and cost comparison has been developed and harmonised over time. Costs are expressed excluding VAT and per kg hot carcass weight. The cost comparison typically reflects conventional pig production. [See Appendix 1.](#)

1 Introduction

Cost analysis shows current strategic advantages and disadvantages of specific countries and production systems, and opportunities to improve. Against the background of a worldwide collapse of pig meat production due to African Swine Fever and high market prices around it might seem less relevant to analyse cost differences among pig producing countries. However, given the fluctuating nature of the global pig market, a price decrease is to be expected. Given the current peak in prices, a period of very low prices is even conceivable. To then survive, insight is needed into strategic competitive advantages and disadvantages for policy making for dedicated strengthening of production circumstances. However, for a full analysis on competitiveness, more aspects should be considered; see Hoste (2017).

The analysis in this report is based on the international InterPIG network with members of 17 countries, of which Wageningen Economic Research has been a member from the very beginning. Each year InterPIG produces a cost comparison of pig production at farm level. The analysis in this report focuses mainly on the competitiveness from a Dutch perspective.

Section 2 focuses at a comparison of European countries in InterPIG. A comparison of European and non-European countries is given in Section 3, but to a lesser detail. Section 4 gives insight into cost differences among farms in the Netherlands. Section 5 gives discussion and conclusions.

2 Cost comparison of European countries

2.1 Production costs 2018

In this Section we compare the production costs of pig production based on the year 2018. Costs are excluding VAT and expressed in euro per kg hot carcass weight. Great Britain cost figures reflect the indoor housing system. After the first comparison of these European countries, the analysis is focusing on the Netherlands and its competing neighbouring countries Denmark, Germany, Belgium, France and Spain.

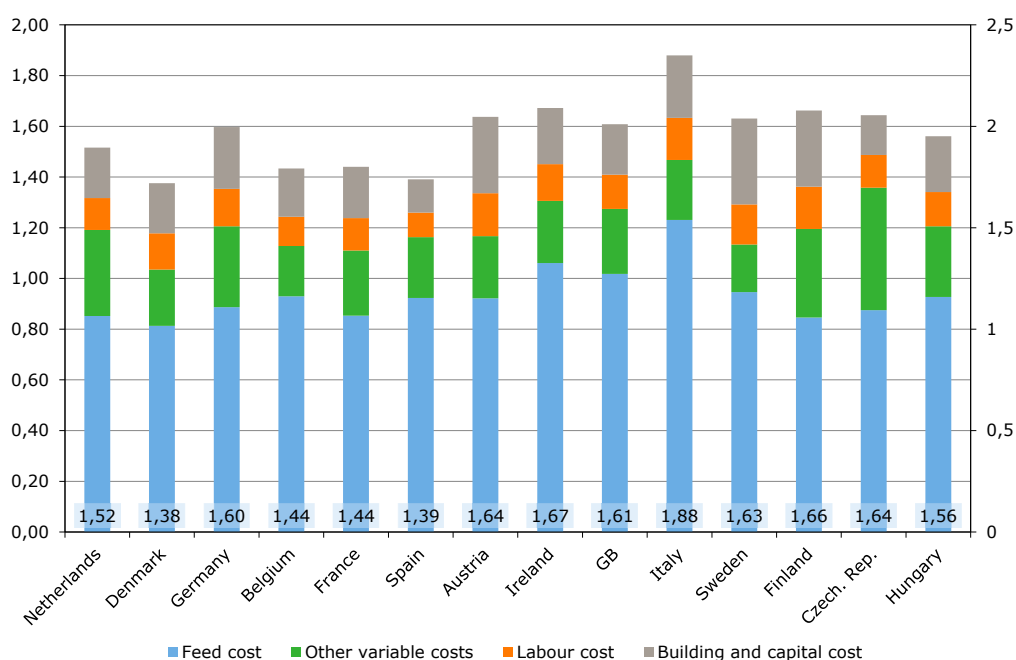


Figure 2.1 Cost of production compared (€/kg hot carcass weight), split into cost categories in selected EU countries given a closed cycle pig farm

Source: InterPIG/Wageningen Economic Research, year 2018.

The cost comparison in Figure 2.1 shows a bandwidth of costs from €1.38 per kg carcass weight in Denmark to €1.88 per kg in Italy. The lowest costs among countries in this comparison are €1.38-1.44 per kg. Besides Italy, the most expensive producer, due to the typically high slaughter weight, the most expensive producers in this group are Ireland, Finland, Czech Republic, Austria, Sweden and GB. High production costs go hand in hand with either rather small scale of production (like in Austria), high feed prices (Great Britain and Ireland), high other variable costs (Czech) or high building and capital costs, due to high animal welfare requirements (Sweden).

Table 2.1 shows costs in the Netherlands and five selected countries, which are the most important European competitors from a Dutch perspective; these 6 countries cover about 68% of the production of finishing pig in the European Union (Source: Eurostat). Costs are split into four categories: feed, other variable costs, labour and building and capital costs (See Appendix 1 for the data for all European countries). Differences among these countries are surprisingly big, with Germany ranking high in the different cost factors. The total cost of production in the selected countries is the lowest in Denmark and Spain, followed by France and Belgium.

Table 2.1 Costs in details for some selected countries (€/kg carcass weight)

Cost category	Netherlands	Denmark	Germany	Belgium	France	Spain
Feed cost	0.85	0.81	0.89	0.93	0.85	0.92
Other variable costs	0.34	0.22	0.32	0.20	0.26	0.24
Labour cost	0.13	0.14	0.15	0.12	0.12	0.10
Building and capital cost	0.20	0.20	0.24	0.19	0.19	0.13
Total costs	1.52	1.38	1.60	1.44	1.43	1.39

Feed efficiency

Feed prices (Table 2.2) are in the range of €233-269 per tonne, with the lowest prices in Denmark and France, countries with a high self-sufficiency in feed grains. The Netherlands, with an average price position, is favoured by the abundant availability of ingredients both by import from neighbouring countries and via the harbours, and as by-products from the large-scale domestic food industry. The highest feed prices are found in Belgium and Spain. The overall feed conversion ratio, covering the feed efficiency of the entire farm (farrow-finish) is the lowest in the Netherlands, which is an advantage in terms of environmental sustainability. However, this ratio is based on feed with higher contents of protein and energy (leading to higher feed prices), as well as due to a substantial part of producing intact boars with a better feed efficiency. In Belgium, the feed consumption is rather high, which relates to the typical ad libitum feeding regime in finishing pigs.

Table 2.2 Feed price and overall feed conversion ratio

Cost category	Netherlands	Denmark	Germany	Belgium	France	Spain
Average feed price (€/tonne)	255	231	247	269	233	263
Overall feed conversion ratio ¹	2.65	2.71	2.83	2.92	2.80	2.68

Other variable costs

Other variable costs consist of Artificial Insemination and sow replacement costs, health costs, energy, maintenance of buildings, levies, manure disposal costs and miscellaneous variable costs. The total of other variable costs in the Netherlands is higher than in other countries (see Table 2.1), most strikingly the high manure disposal costs (Figure 2.2). Other variable costs, excluding manure costs, are rather low in the Netherlands. Differences within a country however may be important, especially in Germany. For Spain, increasing costs for manure disposal are expected.

¹ The overall feed conversion ratio is calculated as the total feed consumption on a closed cycle farm, divided by the total slaughter weight (live weight) production of the farm.

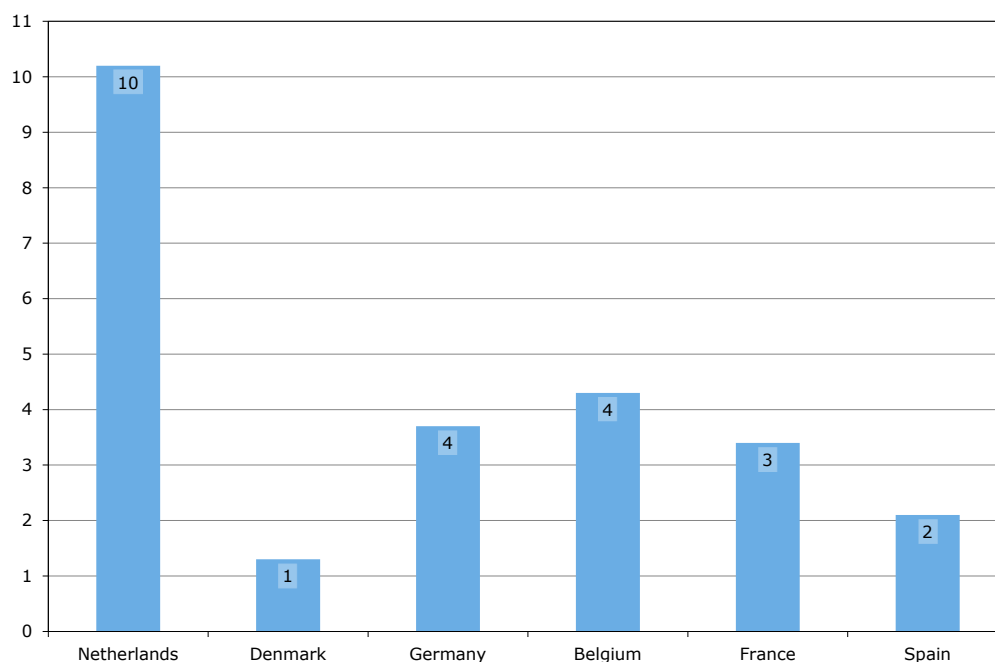


Figure 2.2 Average manure disposal costs (€/cent/kg carcass weight)

Labour costs

Labour costs cover both paid labour (employees) and non-paid labour (entrepreneur and family workers). Costs differ between countries due to differences in labour efficiency or hourly wage (tariff; Table 2.3). Countries with high labour tariffs typically have a lower labour input. This relates to the fact that expensive labour stimulates efficiency. This is reflected in the strikingly low labour input per sow in the Netherlands. Labour efficiency is also related to farm size. Still, Denmark and Spain, with larger sow farms on average, have higher labour input than in the Netherlands.

Table 2.3 Labour input per sow (hour/year) and per slaughter pig (hour), and tariff (€/hour) in selected countries

	Netherlands	Denmark	Germany	Belgium	France	Spain
Labour per sow	7.5	11.1	12.0	10.7	12.3	9.0
Labour per slaughter pig	0.21	0.18	0.32	0.30	0.15	0.22
Labour tariff	25.8	23.5	19.1	16.3	19.8	14.5

Buildings and capital

The total investment for one sow place including the corresponding places for rearing piglets and finishing pigs amounts to about €8,000 in the North-Western countries, with Germany exceeding €9,000 per place, and almost €4,000 in Spain due to a rather simple construction (Table 2.4).

Table 2.4 Investment per sow place including corresponding places for rearing piglets and finishing pigs in selected countries (€)

	Netherlands	Denmark	Germany	Belgium	France	Spain
Investment per sow place	7,900	7,500	9,300	7,700	8,000	3,800

Reasons for differences in investment level include national animal welfare requirements beyond EU legislation (sows: 2.25 m² for all pregnant sows including sows in first pregnancy, and starting from 4 days after insemination for the Netherlands; finishing pigs: 0.8 m² in the Netherlands, 0.75 m² in Germany, 0.65 m² in the other selected countries) is reflected in these amounts. Investments for manure storage and air scrubbers to reduce ammonia emission (Netherlands, Germany) is included as

well. Other reasons for different investment levels include farm size (smaller farms in Germany and Belgium), robustness of the building (Germany constructions are robust; Spain has rather simple construction), slaughter weight (low in Denmark), and the ratio of number of places (e.g. countries with a high sow performance need more piglet and finishing places per sow than with a lower performance (Netherlands)).

2.2 Cost development over time

The relative cost position of pig production in the Netherlands has clearly worsened between 2012 and 2016. However, this cost disadvantage has more recently improved. This improvement is partly due to methodological changes: different data source for feed prices (-3 cents) and depreciation period was adapted (-2 cents per kg carcass weight).

Figure 2.3 shows the relative cost position of some competitors compared to the Netherlands. For example: in 2012, Germany's pig sector had a cost disadvantage of about 15 cents compared to the Netherlands; 2017 had equal production costs and 2018 the disadvantage amounted to 8 cents per kg. Equal developments are seen in comparison with other countries.

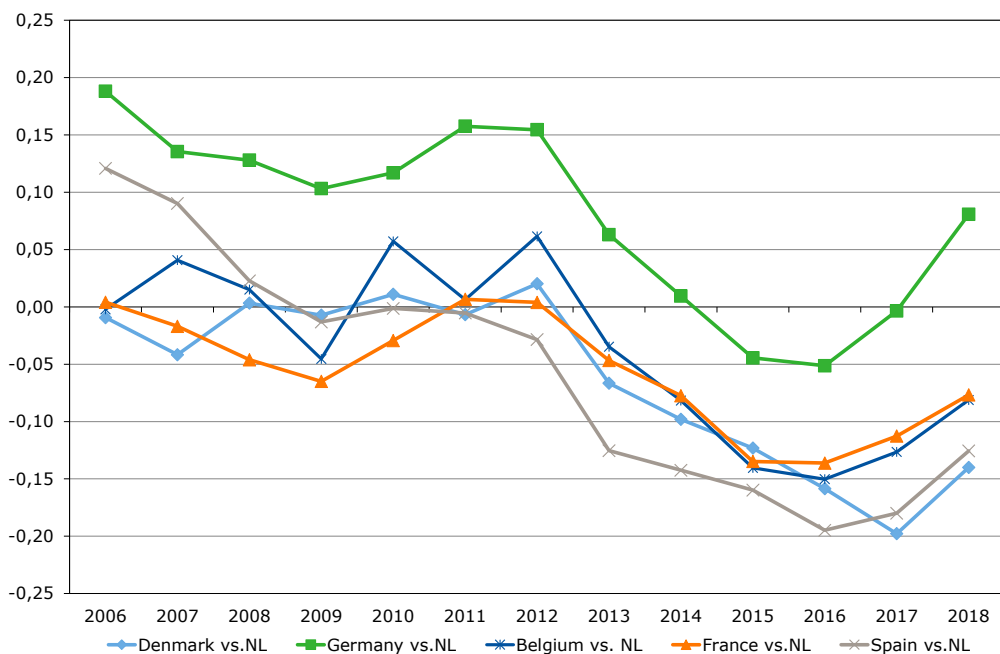


Figure 2.3 Development of differences in cost of production of some selected countries versus the Netherlands (€/kg hot carcass weight), 2006-2018

Feed costs

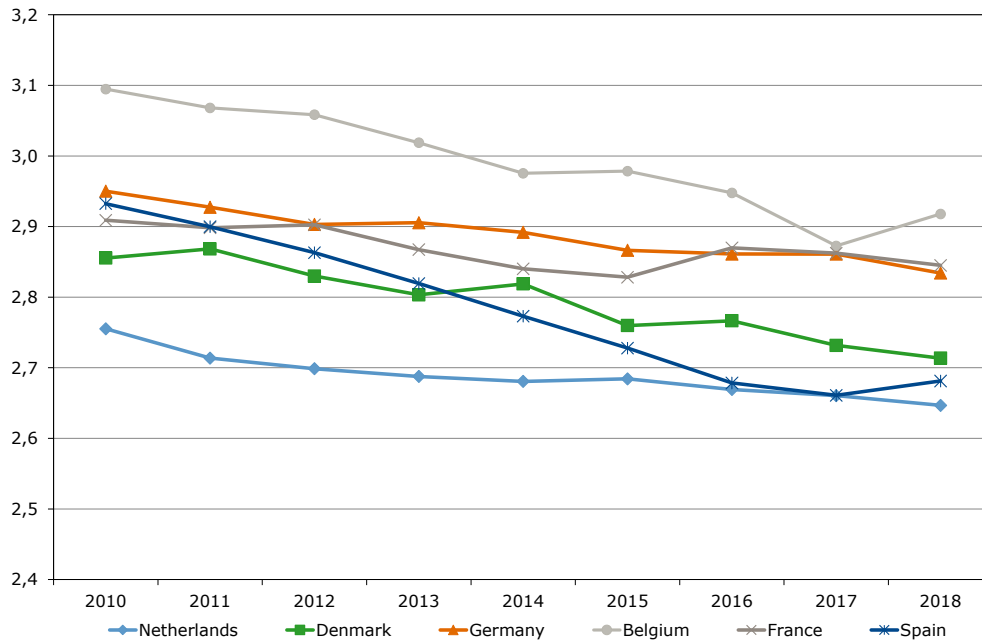


Figure 2.4 Development of overall feed conversion ratio in selected countries

The overall feed conversion ratio is calculated as the total feed use on a farm and divided by the total live weight production of the slaughter pigs; it reflects both the sow performance (slaughter pigs produced per sow and year) and the feed efficiency of all pigs. This ratio is lowest in the Netherlands. In all countries, small improvements have taken place, especially in Spain (Figure 2.4). Main factors for the low overall feed conversion ratio in the Netherlands include the rather high energy and protein contents of the feed, as well the large share of intact boars, which benefits feed efficiency. Spain (almost 100% intact boars) and Denmark are the next most efficient in feed use. A low slaughter weight of finishing pigs results in a better feed efficiency in the finishing stage. On the other hand, when it comes to the overall feed conversion ratio, a low slaughter weight softens this advantage, as the load of sow feed now has to be divided by less kg produced per sow and year. This dampens the positive effect of the very high production of slaughter pigs per sow and year in Denmark.

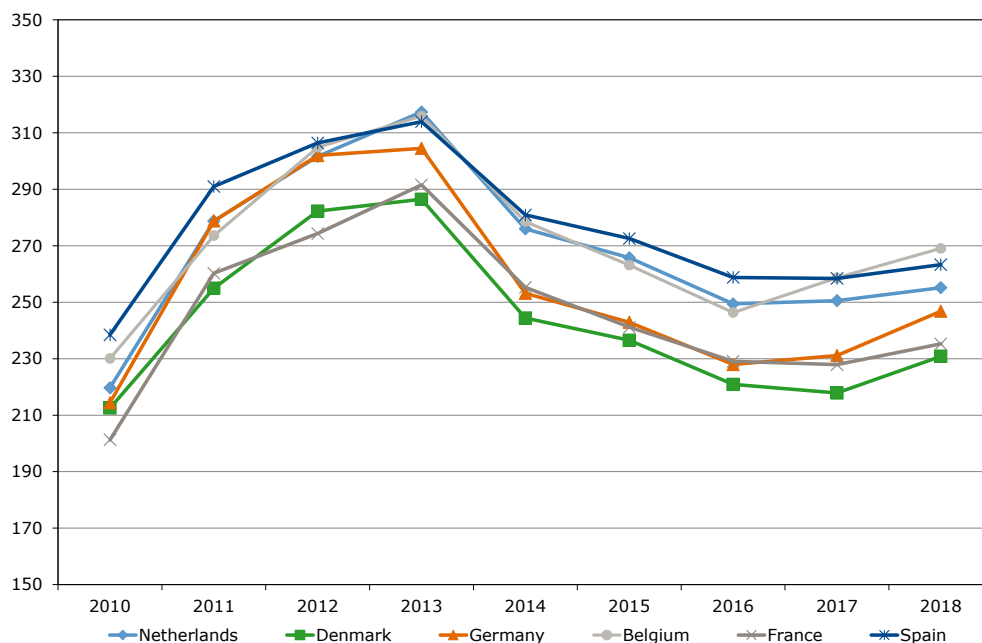


Figure 2.5 Development of feed prices in selected countries (€/tonne for the total feed volume on a closed cycle farm)

Feed prices in 2018 were increasing more in Denmark and Germany, due to adverse domestic grain harvests. By comparison, Spain and the Netherlands rely mainly on purchased ingredients, which are being bought, to a large extent in advance, which explains the rather flat price course.

Sow performance

The production performance, expressed by the number of slaughter pigs produced per sow and year shows an increasing line (Figure 2.6). However, the increase differs between countries, with Germany, Denmark and Belgium leading with about 0.6 slaughter pigs per sow and year increase since 2006. The attention to reducing piglet mortality seems to have reduced the increase in sow performance in the Netherlands and, as of 2018, in Denmark. Both countries also have a substantial piglet export.

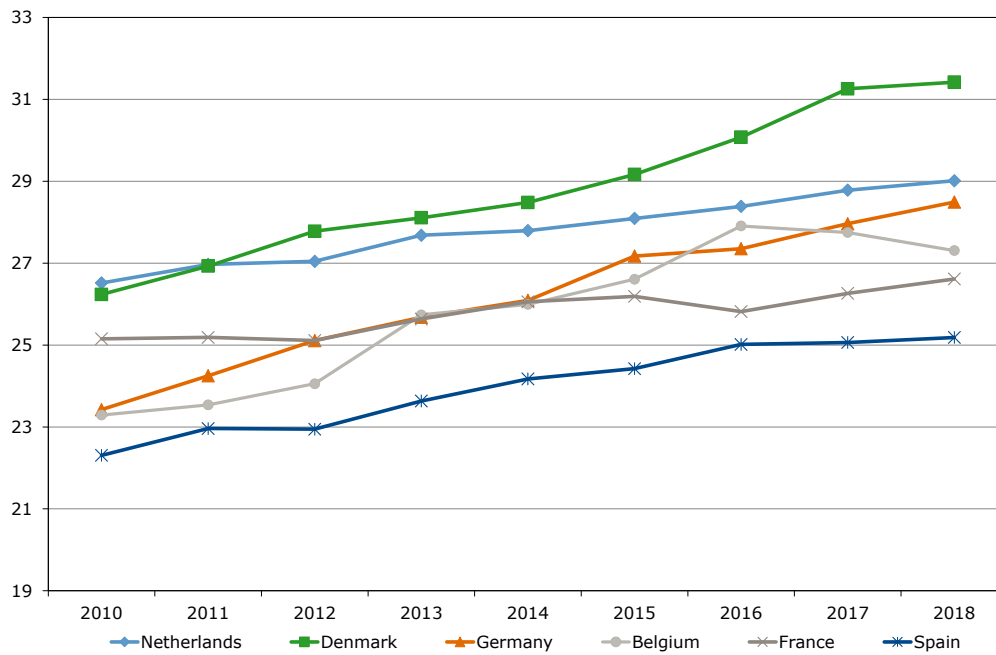


Figure 2.6 Development of slaughter pigs produced per sow and year in some selected countries

Health costs

Health costs are a relatively small cost factor, varying from 4 eurocents in Denmark and the Netherlands, to 6.5 eurocents in Germany and Spain. Several countries however face a shift in health costs from finishing to piglet production (Figure 2.7). Still the total health costs per kg carcass weight are more or less constant over time, as the performance per sow (in number of slaughter pigs and kg carcass weight per sow and year) has increased.

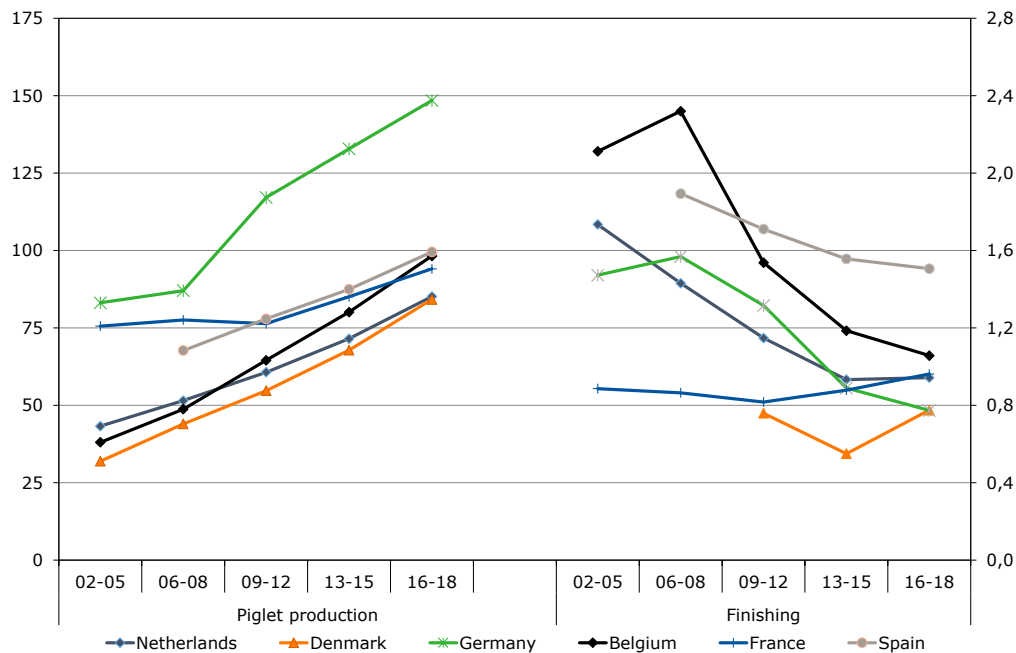


Figure 2.7 Development of health costs in piglet production (€/sow/year) and finishing (€/slaughter pig) in four periods in some selected countries

Health costs show a clear increase in piglet production and equally a decrease in finishing. This is probably related to additional costs for vaccination of piglets, resulting in lower health costs in finishing. The health costs in finishing in Denmark in the earlier years are left out for data quality reasons.

2.3 Split between piglet production and finishing

The sow performance shows quite a lot of differences between countries (see Figure 2.6). This influences the cost of production. Costs have been split into piglet production and finishing, to enable comparison of typical costs per production phase. For a meaningful comparison, we recalculated the piglet cost of production to a comparable weight of 30 kg; in the finishing phase, we calculated the marginal costs per additional kg live weight. This way, we bypass differences in typical delivery weights of reared piglets and slaughter pigs between countries (Figure 2.8). Results are an approximation. As live trade of pigs and piglets typically takes place within trade blocks (e.g. the EU), cost comparison is mainly important within these blocks. Therefore, comparison of piglet production costs is only shown between some selected European countries.

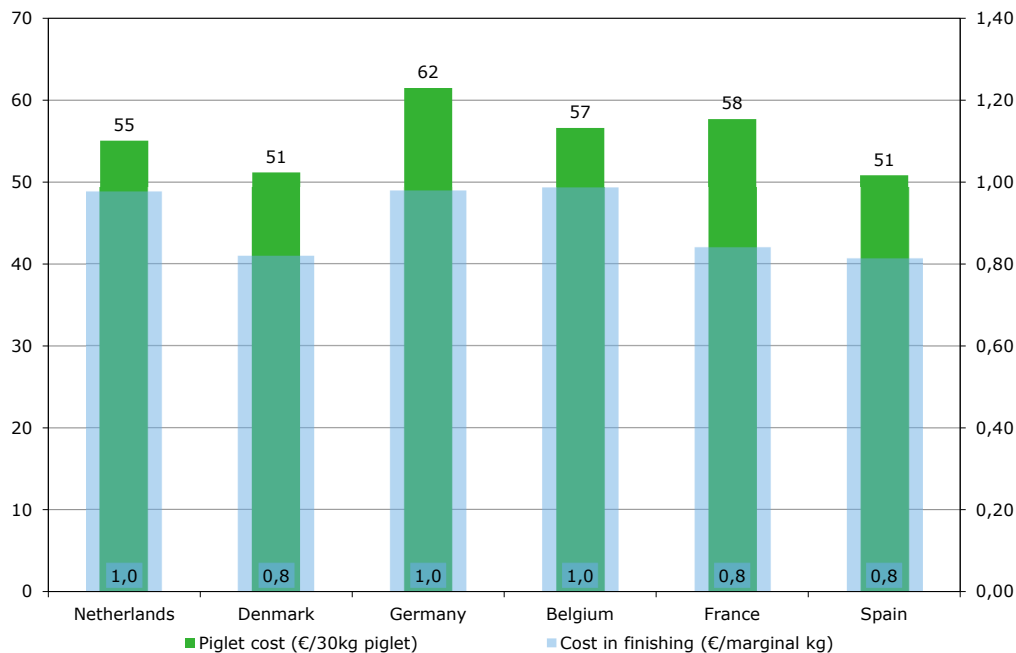


Figure 2.8 Cost of production per piglet (€/30-kg piglet) and in finishing (€/marginal kg live weight) in selected countries

The cost of a 30-kg piglet in the Western European countries varies from €51 in Denmark and Spain to €62 in Germany. Piglet cost of production in the Netherlands, although about €4 higher than in Denmark, is still lower than in Germany. The relative cost advantage in Denmark and the Netherlands over Germany corresponds to the increasing piglet influx into Germany from both supplying countries. Although finishing in Germany is more expensive than in Denmark, lots of piglets are imported. The meat industry in Germany is efficient, especially due to cheap labour. Plus, German farmers typically make use of the beneficial agricultural tax systems.

Although the Netherlands has a rather favourite cost position in piglet production, this position has worsened in the period 2006-2015. However, since 2015 the position has become better (Figure 2.9). In particular, the cost position of Germany has improved compared to the Netherlands, from a cost disadvantage of over 15 euro to less than 5 euro per piglet. After 2015, the cost position in piglet production in the Netherlands has improved to some extent, compared to its direct competitors. For Germany, one reason is that costs for manure disposal and ammonia emission reduction have relatively increased.

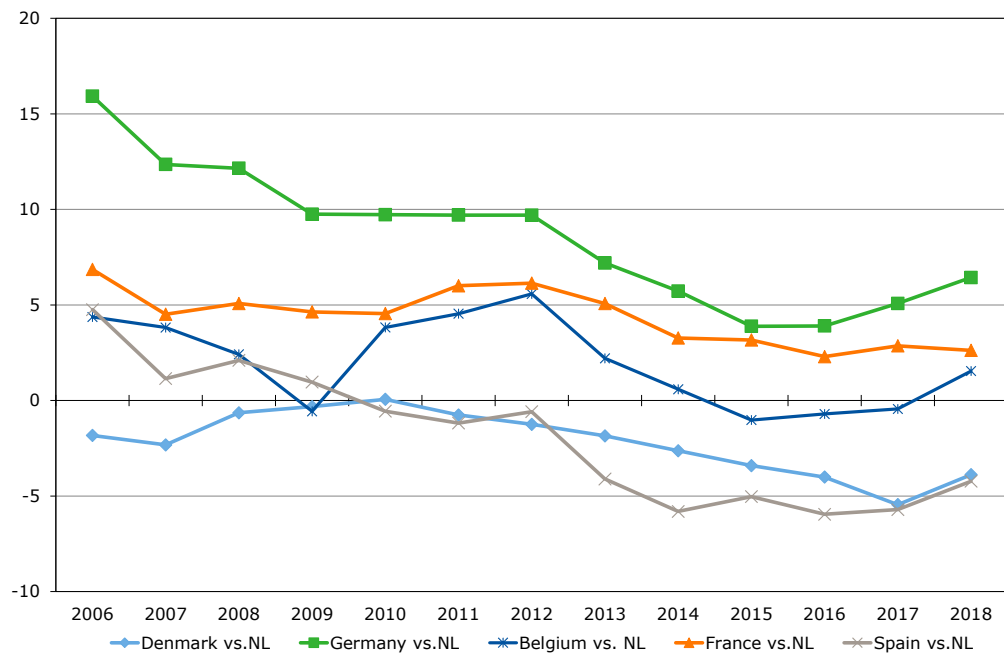


Figure 2.9 Development of differences in piglet cost of production between selected countries and the Netherlands (€/30-kg piglet)

Note: a positive amount on the y-axis means a higher cost for a specific country than in the Netherlands.

Costs of finishing per marginal kg live weight differs from about €0.8 per kg in Spain, Denmark and France, to almost €1.0 in the Netherlands and Germany (Figure 2.8). In the finishing phase, the Netherlands and Germany have a clear cost disadvantage. An important reason are the high manure disposal costs, which are about 7 cents per kg weight gain in the finishing stage in the Netherlands. Economy of scale also explains part of the difference.

3 Cost comparison worldwide

The InterPIG members outside the EU are Brazil, Canada and the USA. As differences in production systems and costs within Brazil are huge, Brazil is represented as two regions, Mato Grosso (Central region, abbreviated to MT) and Santa Catarina (South East region, abbreviated to SC). To compare the global competition, in terms of cost of primary production, an EU average is calculated on the basis of a simple average of the Netherlands, Denmark, Germany, Belgium, France and Spain.

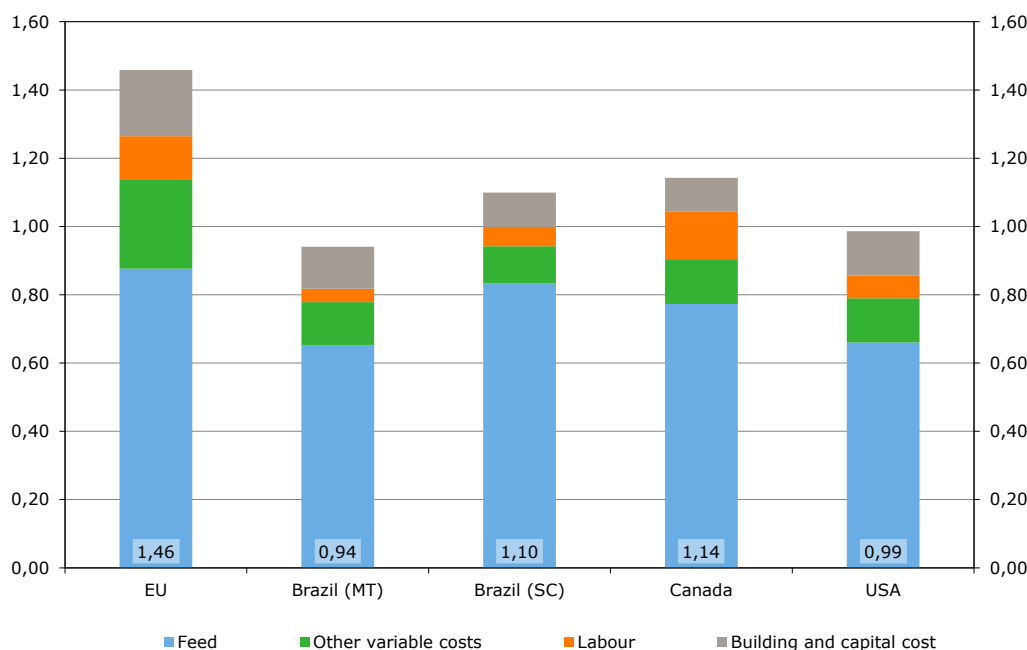


Figure 3.1 Production costs in the EU and non-EU countries compared (€/kg hot carcass weight), split into cost categories

Figure 3.1 shows that production costs in Brazil, Canada and the USA are lower than in the European countries (EU). Brazil Mato Grosso and the USA have very low costs, less than one euro per kg carcass weight. In particular, differences in feed costs explain cost differences between the countries/regions. Brazil, Canada and the USA have large quantities of feed ingredients available, which explains the low feed costs.

Labour is cheaper than in Western European countries, varying from over €3 per hour in Brazil to €11 in the USA and almost €15 per hour in Canada. Labour input per ton of carcass weight, however, is higher in Brazil and Canada than in the EU average. Manure costs are low in Canada and Brazil Santa Catarina or zero, opposite to main competitors in Western Europe. And these non-European countries have fewer regulations and less legislation, such as for environmental protection and animal welfare. Investments for buildings amount to 2,100 euro per farrow-finish sow place (including rearing and finishing) in Brazil and Canada to 3,200 euro in the USA, compared to an average of 7,400 in the EU countries, resulting in lower building costs.

The zootechnical performance is lower than the average (28.0) of the selected EU countries, varying from about 23 in Canada and 24.5 in the USA to about 27 in Brazil.

Cost calculations are presented in euros, which means that cost calculations also reflect currency exchange fluctuations (Appendix 2). Figure 3.2 shows the development of production costs in the non-

European countries since 2010, compared to the EU average. Differences fluctuate over time, especially due to feed supply and currency fluctuations. These results partially counter cost developments, e.g. Canada and the US show hardly any difference in 2016 compared to 2015, whereas Brazilian costs were firmly rising. Brazil experienced a huge maize harvest and distribution problem in 2016 and 2017, resulting in a substantial cost increase, esp. in Santa Catarina, but also in Mato Grosso. The relative cost increase in the USA in 2015 compared to 2014 is partly to be explained by the increasing value of the US Dollar.

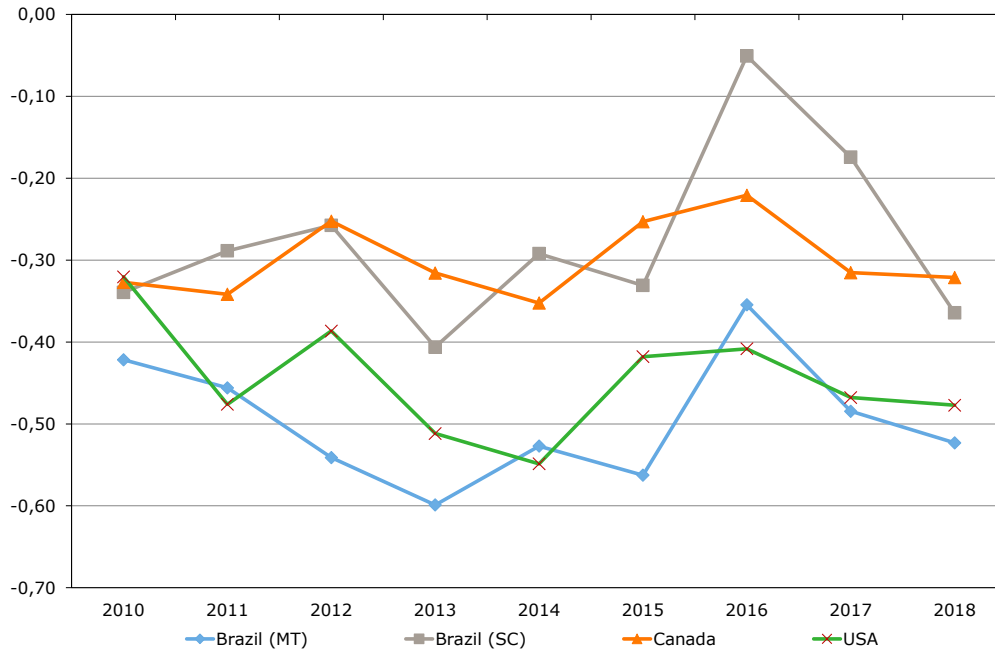


Figure 3.2 Development of cost advantage of production in Brazil, Canada and USA over the EU (€/kg hot carcass weight)

4 Cost differences among farms

Cost differences among countries give insight into some typical features of countries in pig production, like legal requirements, prices etc. However, cost differences among farms within a country are far bigger (Figure 4.1): up to 20 euro per 25kg-piglet or 30 eurocents per kg carcass weight (when extremes are left out).

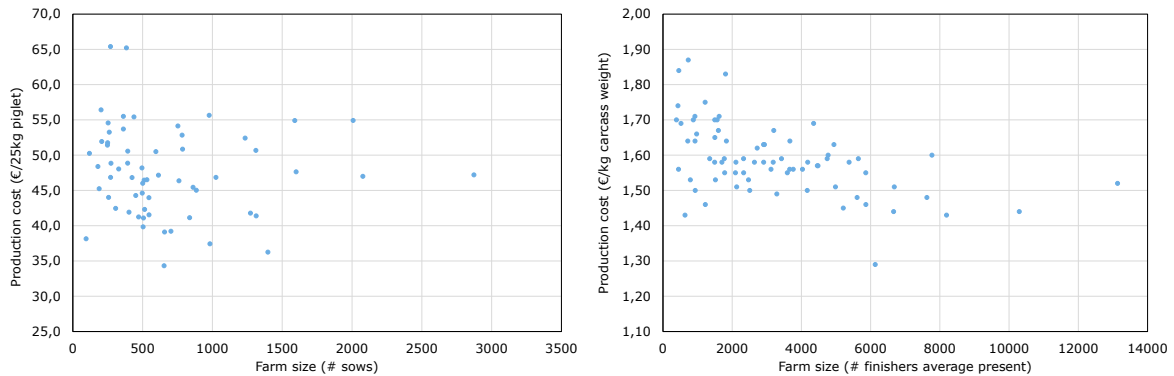


Figure 4.1 Production costs of piglets (€/25kg piglet on sow farms; left) and finishers (€/kg carcass weight on finishing farms) in the Netherlands, year 2017

Source: Farm Accountancy Data Network, elaboration Wageningen Economic Research.

Figure 4.2 shows the cost differences among farms clustered into cost groups, both for piglet production and finishing.

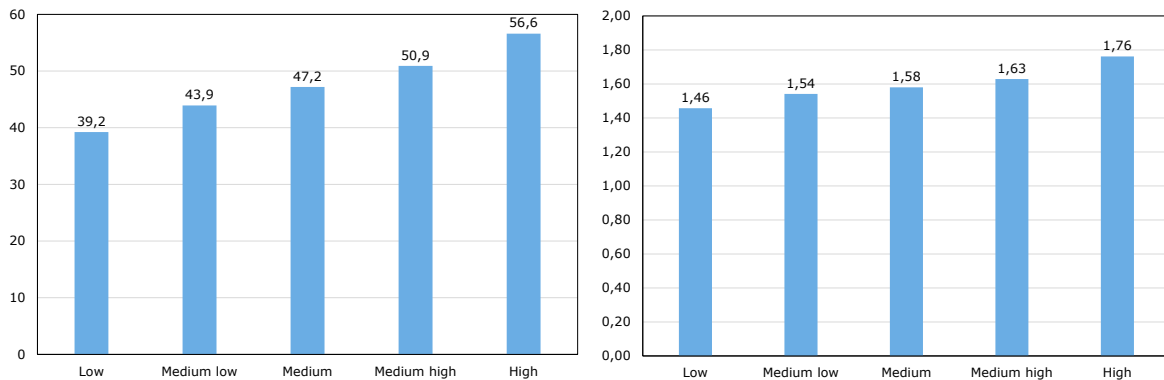


Figure 4.2 Cost of production clustered into quintiles (low to high) of piglets (€/25kg piglet on sow farms; left) and finishers (€/kg carcass weight on finishing farms) in the Netherlands, year 2017

Source: Farm Accountancy Data Network, elaboration Wageningen Economic Research.

Main causes for cost differences are the performance level and farm size. The cost clusters for sow farms show differences of over 17 euro per 25kg-piglet, or over 40% difference. The main explanations are labour costs (28%), feed costs (27%) and sow replacement (20%). Farm size is not a major explaining factor. The largest farms did not have the highest sow performance, nor the lowest cost of production; the middle size sow farms, between 450 and 600 sows, had the highest performance and lowest cost of production. The cluster with a high cost of piglet production has a lower sow performance than the other groups: 25.9 raised 25kg piglets per sow and year, compared to 29.7 on average for the other groups.

In conclusion, the quintiles show 30 cent per kg carcass weight cost difference. In the light of calculated labour cost of about 4 cents on the largest farms, this cost difference is rather huge. Irrespective of farm size, these 30 cents are mainly explained by differences in feed costs (28%), piglet purchase (24%) and labour cost (23%). Cost differences are clearly related to farm size, with the lowest cost on farms over 5,000 average present finishing pigs, 20 cents lower than on farms up to 1,000 finishing pigs, mainly explained by differences in labour costs (50%) and feed costs (21%).

5 Discussion and conclusions

Dutch cost position has worsened

The cost of pig production in the Netherlands in 2018 amounted to €1.52 per kg carcass weight. This is an in-between position among the large professional pig production countries in Western Europe, with Denmark and Spain as the cheapest (1.38-1.39/kg) and Germany (1.60/kg) as most expensive Western European producing country.

Cost disadvantages are typically related to a high-value market (Italy), rather small scale of production (like in Austria), high feed prices (Great Britain and Ireland), high other variable costs (Czech), high building and capital costs due to high welfare requirements (Sweden) or manure disposal and other environmental protection costs (Netherlands).

The Dutch cost position had worsened substantially in earlier years, but improved to some extent in the last few years. This is partly related to methodological adaptations (choice of data sources), and partly to feed cost disadvantages in countries like Denmark and Germany (with a high domestic feed ingredient production, and harvest reduction due to drought in 2018). A final reason is that zotechnical performance development, having improved less than in other countries in earlier years, recovered to some extent, showing an increase of 0.3 pigs marketed per sow and year.

Denmark and the Netherlands are among the cheapest piglet producers, explaining the increasing piglet export to Germany and other countries. This goes hand in hand with increasingly discouraging circumstances for pig and especially piglet production in Germany. In growing-finishing, the Netherlands, Germany and Belgium have cost disadvantages compared to the other Western European countries.

Although cost differences among countries are big, differences within a country are far bigger, with 20 euro per 25kg-piglet and 30 cents per kg carcass weight.

Cost analysis at the background of current market developments

As of the end of 2019, market prices were very high, exceeding 2 euro per kg carcass weight for slaughter pigs and 80 euro per 25kg piglet. The global pig meat market had lost some 25% in production volumes, leading to high prices, especially in China. Estimates and model calculations suggest a period to come of several years with high prices. However, the current market situation is unparalleled and developments can hardly be prognosticated. What is more, an outbreak of African Swine Fever (ASF) in Western European countries would lead to an economic disaster, not only for those farms hit, or where a transport ban will come in place, but also for the rest of the country due to market disruptions.

Large pig producing countries hit by African Swine Fever (like China) are working hard to recover from the contagious disease, by improving biosecurity measures, logistics and a focus on high-tech housing and processing systems in vertical integrations. Still, several years are needed in order to build up a well-functioning system, from feed supply and breeding to farming, meat processing and sales. For the long term, it is necessary to start with sufficient modern breeding material, which however is not sufficiently available worldwide. There is also the risk of new outbreaks of ASF, which could break down production structures for several years, as shown in Russia. So, a recovery of the market to full production capacity may take several years. Meanwhile, other countries are expanding production, such as the USA, Brazil, Mexico, Russia and to some extent also the EU. What is more, on the demand side, consumers are adapting their consumption pattern, to e.g. poultry meat or beef, mutton, fish or fewer animal proteins. It is well conceivable that a new equilibrium will be found only after a period of massive overproduction of pork worldwide. As China comes back into production, and other countries raise their production substantially, it is to be expected that consumers meanwhile partially have

switched to other proteins. In this case, it is highly probable the market is going to be flooded with pig meat, and a price collapse is very likely and to be expected.

In line with Porter's generic strategies (1980), companies have to choose between a cost strategy or a differentiation strategy (or market focus). Cost reduction has long been the prevailing strategy and still is the case. Although cost differences among farms are large, showing ample room for many farms to further decrease the production cost, this strategy will not help European producers in the long term. Production costs are substantially higher in European countries than in the Americas, and given the increasing globalization of pig meat trade, European producers face a structural competitive disadvantage with cost-driven commodity-based trade. Especially in light of the current global turmoil in pig meat production and the likely dramatic price consequences after the market recovers, it is necessary for farmers to prepare for the near future. For the Dutch pig supply chain, it is advised to strongly increase supply chain cooperation, based on trust, equivalence and long-term cooperation. Additionally, in terms of exports, a decision should be made towards either what could be called the Japanese model, based on trust, quality and a rather high price level, or what could be called the Chinese model, being characterized by opportunism in sales with highly volatile prices.

The European Union has a self-sufficiency degree of almost 120% in pig meat products. The 20% not consumed in the EU is exported to third destinations worldwide—not only edible offal, but also muscle meat. The risk of dependency to third-market exports for a high-cost producer like the EU is the sensitivity to unpredictable and uncontrollable influences, like oil prices, border closures, protective measures etc. Since the Western European producers are front runners in focusing on sustainability and animal welfare, which perfectly fits with the high demands of domestic consumers and citizens and European ethics, EU producers should no longer focus on short-term opportunistic sales markets, but on long-term cooperation within the supply chain and supply to high-end markets, for consumers prepared to pay more for a higher-positioned product.

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Appendix 1 Description of InterPIG and Method

InterPIG is an independent forum of pig production economists in 17 countries, mainly in Europe, but also in the USA, Canada and Brazil. The network started in 2003 with six European countries and expanded since then. InterPIG aims to compare costs of professional pig production, based on a representative sample per country and typically reflecting the conventional pig production. For the United Kingdom, the costs data were split between indoor and outdoor production as of 2018. Before, UK data reflected a blend of conventional in-house and free-range pig production.

Members select samples and data sources for their country. InterPIG organises an annual meeting where data, and developments in the pig production per country, are being presented and discussed. Besides, collected data are peer-reviewed among members. The method of data collection, parameter definitions and cost comparison have been developed and harmonised. Main methodological assumptions are the following:

- Farm-gate production costs: costs on the farm are included, as well as (e.g.) direct subsidies. Levies and taxes in the abattoir are not seen as on-farm costs but taken into account as deductions of the sales price.
- Opportunity cost method. Supplies from the farm such as labour, own capital or farm-produced feed stuffs are being valued as if these inputs had to be purchased against market prices.
- Costs are expressed excluding VAT, and per kg hot carcass weight.

Still, due to limitations in available data and sometimes arbitrary decision making, the cost comparison is merely indicative for cost differences between countries and cost developments over time. The InterPIG group also functions as a forum for information exchange.

Abbreviations

Seventeen countries are member of InterPIG, in alphabetic order (with abbreviations): Austria (AT), Belgium (BE), Brazil (BR), Canada (CA), Czech Republic (CZ), Denmark (DK), Finland (FI), France (FR), Germany (DE), Great Britain (GB), Hungary (HU), Ireland (IE), Italy (IT), the Netherlands (NL), Spain (ES), Sweden (SW) and the USA (US). As differences in production systems and costs within Brazil are huge, Brazil is represented as two regions Mato Grosso (BR-MT) and Santa Catarina (BR-SC).

Forum

InterPIG is an informal forum. Meetings are being held annually in one of the member countries and are chaired by the host country. The InterPIG Development Group (comprising members of the UK, Denmark, the Netherlands and France, plus the representative of the host country) prepares discussions and decisions. Membership for new countries is possible under the precondition of sufficient (quality of) data supply. InterPIG does not produce a joint publication; however, some members do so individually.

Collaboration with agribenchmark Pigs

Agribenchmark Pigs is an initiative of Thünen Institute in Germany, aiming to set up a worldwide network of specialists in pig production and providing a (cost) comparison of typical farms per country. The agribenchmark network is also active in different sectors, especially in beef and sheep, and cash crops. The approach of agribenchmark Pigs shows some overlap with InterPIG, and some overlap exists between members of both networks.

Other methodological assumptions

For the Netherlands, several sources are used, e.g. Kengetallenspiegel (Agrovision), Bedrijveninformatienet and Agrofoodportal (Wageningen Economic Research), Biggenprijzenschema and KWIN Veehouderij (Wageningen Livestock Research) and some market quotations for animal prices.

A production rights system is applicable in the Netherlands and Belgium. An average price of €65 per right was assumed in the Netherlands. Only interest costs of production rights are being taken into account, to reflect a more practical situation. Costs are taken into account in other variable costs.

Costs in this report are being expressed per kg hot carcass weight. Costs are calculated for a closed cycle farm (piglet production, rearing and finishing). Additionally, a split is made between costs of piglet production and finishing. However, the split is mainly of interest to countries such as the Netherlands, Denmark and Germany and has little focus in other countries; therefore, the results in such countries might be less comparable.

As of 2018, some changes resulted in a cost reduction of about 5 cents per kg carcass weight. These consist of use of another data sources in the Netherlands for feed prices (Bedrijveninformatienet, rather than Kengetallenspiegel) and a longer depreciation period of the housing, to better reflect the practice.

The costs in the Netherlands typically represent a conventional pig production, without focus on a specific market segment or programme.

The text of this section is an update of the text in Hoste (2017).

Appendix 2 Cost breakdown and some parameters and prices per country

Table A2.1 Cost of pig production per country, split into cost categories (€/kg hot carcass weight, excluding VAT)

Cost type	NL	DK	DE	BE	FR	ES	AT	IE	GB	IT	SW	FI	CZ	HU	BR-MT	BR-SC	CA	US
Feed	0,85	0,81	0,89	0,93	0,85	0,92	0,92	1,06	1,02	1,23	0,95	0,85	0,88	0,93	0,65	0,83	0,77	0,66
Other variable costs	0,34	0,22	0,32	0,20	0,26	0,24	0,25	0,25	0,26	0,24	0,19	0,35	0,48	0,28	0,13	0,11	0,13	0,13
Labour	0,13	0,14	0,15	0,12	0,13	0,10	0,17	0,15	0,14	0,17	0,16	0,17	0,13	0,14	0,04	0,06	0,14	0,07
Building and capital costs	0,20	0,20	0,24	0,19	0,20	0,13	0,30	0,22	0,20	0,25	0,34	0,30	0,16	0,22	0,12	0,10	0,10	0,13
Total costs	1,52	1,38	1,60	1,44	1,44	1,39	1,64	1,67	1,61	1,88	1,63	1,66	1,64	1,56	0,94	1,10	1,14	0,99

Table A2.2 Some production parameters and prices in pig production (for an explanation, see below)

Cost type	NL	DK	DE	BE	FR	ES	AT	IE	GB	IT	SW	FI	CZ	HU	BR-MT	BR-SC	CA	US
Average feed price	255	231	247	269	235	263	250	296	281	274	242	220	249	228	188	250	204	174
Overall FCR	2.65	2.71	2.83	2.92	2.85	2.68	2.95	2.75	2.82	3.68	2.92	2.87	2.76	3.29	2.64	2.54	3.04	2.83
Final weight	121	113	122	116	120	112	121	113	110	170	124	124	119	109	110	121	128	127
Labour tariff	25.8	23.5	19.1	16.3	19.8	14.5	16.5	15.0	13.2	14.9	21.9	18.2	7.2	5.5	3.3	3.1	14.6	11.2
Labour input	4.9	6.1	7.7	7.1	6.5	6.7	10.3	9.6	10.2	11.1	7.2	9.2	18.0	24.8	12.1	18.3	10.5	5.9
Manure disposal costs	10.2	1.3	3.8	4.3	3.4	2.1	-0.8	1.8	1.1	1.9	-1.6	2.1	0	-0.7	0	1.8	0	0
Investment per place	7.9	7.5	9.3	7.7	8.0	3.8	10.5	4.8	4.7	7.9	9.7	11.4	4.8	7.7	2.1	2.1	2.1	3.2

Explanation: Average feed price (€/tonne) relates to the feed consumption farrow-finish (closed cycle farm) and includes cost savings by home-mixing; Overall FCR is the overall Feed Conversion Ratio, reflecting the entire feed consumption farrow-to-finish divided by the total live weight production of slaughter pigs; Final weight (kg live weight); Labour tariff (€/hour); Labour input (hour per tonne carcass weight); Manure disposal costs (eurocent/kg carcass weight); Investment is the total amount for one sow place farrow-finish (including corresponding places for rearing piglets and finishing pigs; €*1,000/place).

Appendix 3 Currency exchange ratios

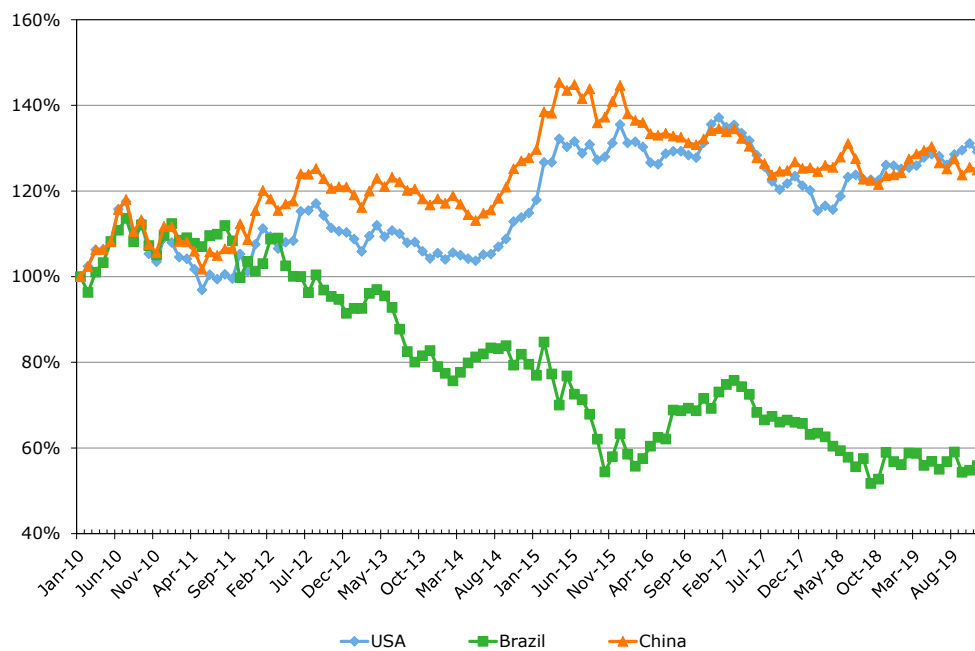


Figure A3.1 Monthly currency exchange ratios of US Dollar, Brazilian Real and Chinese Renminbi compared to the euro (Index January 2010=100%)

Source: InforEuro, processing Wageningen Economic Research.

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