agri benchmark

Johann Heinrich von Thünen-Institut
Institute of Farm Economics

Increasing cost of production – effects on commodity prices and the EU competitiveness

A global study based on *agri benchmark* data

Study on behalf of DG Agri

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Claus Deblitz Coordinator ***agri benchmark*** Beef and Sheep, von Thünen Institute (vTI), Braunschweig, Germany

Yelto Zimmer Coordinator ***agri benchmark*** Cash Crop, von Thünen Institute (vTI), Braunschweig, Germany

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1 Summary

Analysis focused on the two product areas **cash crop** and **beef**. The reasons are:

a) The importance of crop production for European agriculture.
b) The extent of border protection which is devoted to beef.
c) Both commodity areas are well developed within the *agri benchmark* Network.

The study attempts to provide answers to what degree the increase in prices can be attributed to respective increases in cost and whether there is evidence that EU farms were affected differently than non-EU farms.

Results on crop production

Analysis of the evolution of output prices and input prices (fertiliser and energy) during the period of 2000/2003 until 2010/2011 has led to the finding that all major input prices increased substantially more than output prices.

The cost structures for typical *agri benchmark* farms are being used to generate a scenario calculation for cost of production according to the prices for inputs which were in place in the period 2000 to 2003. The calculations yielded the following results:

(1) Increases in prices for fertilisers and energy led to an increase in total cost of production – excluding land cost - of about 20 to 30 % in rapeseed and wheat.

(2) Even though percentage wise the increase in input cost was significantly higher than the increase in output prices the net effect on farm profits was rather positive. This is because output prices for the two crops analysed went up by about 150 % while cost of production only increased by 20 to maximum 30 %.

(3) Given the fact that increases in prices only is in the range of 30 % maximum it is rather unlikely that increasing cost have been the driver for increasing prices for outputs. Rather it has to be assumed that the price increase is demand driven.

(4) There is no systematic interrelation between the location of the typical farm and the increase in cost of production. However, it seems that at least in wheat non-EU farms have been hit by cost increases more than EU farms.

(5) Given the fact that profitability of arable production has gone up so strongly it can be concluded that mid-term a lower price level is very well possible. Of course the condition for such a development is a remarkable supply response towards the price incentives by the global agriculture.

Results on beef production

The time series of identical typical *agri benchmark* beef finishing farms were used to address the research questions. In all farms and countries considered, prices and costs went up in the period 2005 to 2010 considered. The following results were obtained:

(1) Cost developments in non-European countries were more pronounced than in Europe. Cost increases were highest in Argentina, Brazil and China. The same applies to beef price increases in Argentina and Brazil. The historic

cost gap between high cost and low cost countries is closing continuously. Reasons were a mix of exchange rates and local price increases resulting from overall demand due to positive economic development, rising grain, land and energy prices.

(2) Exchange rate impacts on year-to-year changes are at least as important as domestic price and productivity changes. Main cost drivers in the last years were animal purchase costs / livestock prices and feed costs / prices.

(3) Beef and livestock prices are correlated. Beef price – purchase cost ratio is around 2 and relatively similar throughout countries, production systems, low-cost and high-cost producers and over time. Exceptions are farms using the Holstein breed.

(4) The proportion of feed costs in total costs depends on the production system. Silage systems are more sensitive to feed and energy price variations than pasture and feedlot systems. Beef / feed costs ratios are varying but with a tendency to decrease to the disadvantage of beef.

(5) Overall profitability in non-European countries is better than in Europe despite government payments in some EU farms. This relation has, however nor changed with the latest price and cost increases.

(6) We cannot confirm that the increase in input cost has caused commodity prices to go up. In almost half of the cases analysed the beef price rises were higher than the cost rises. Further, the increase in returns has been compensated by increases in cost in roughly half of the cases analysed but not so in the other half of the cases.

(7) The analysis also shows that EU farms were not hit harder by the cost increases than their colleagues in non-EU countries in the 5 years period considered.

2 Introduction

2.1 Background

In recent years a significant increase in global agricultural commodity prices has been experienced – together with an increase in volatility (see figures in the following chapters). Since many EU commodity markets are closely connected with global markets, this development took place in the EU as well. At the same time, many major inputs for agricultural production such as fertilisers, feed and diesel became more expensive too. Percentage wise in some cases the increase in input cost has been even stronger than in output prices.

In the political arena it became rather popular to draw three major conclusions from this development:

(1) The increase in input cost was a major driver for commodity prices to go up.

(2) The increase in turnover has been eaten up by increases in cost so that profit margins for farmer didn't improve or even have gone down.

(3) EU farms were hit harder by the increase in input cost than their colleagues in non-EU countries.

2.2 Aim of the study

Against this background, the study aims to:

a) shed some light on the evolution of revenues, cost and margins in crop and beef production.

b) More specifically, it will explore to what degree the increase in prices can be attributed to respective increases in cost and

c) whether there is evidence that EU farms were affected differently than non-EU farms.

2.3 Concept and data

One approach to analyse the questions laid out would be to use the changes in terms of trade between agricultural prices and input prices. However, the major limitation is that such a shift does not tell us anything about the importance of the changes in the different cost categories relative to revenue. If for example a ratio between a certain cost component – let's say diesel prices – and crop prices has narrowed but the share of diesel in revenue is only minor the net effect on the profit margin of growers is by no means obvious.

Therefore we have to look at figures for either detailed gross margin figures or for total cost of production. While for a number of countries – especially in the EU – gross margin figures are available they are at the same time rather inhomogeneous in terms of definitions and in terms of the breakdown of individual elements. Hence such an international comparison would not work, especially if non-EU countries have to be analysed as well.

Therefore *agri benchmark* data for typical farms is the most appropriate resource to analyse this question. The major advantage of this approach is the harmonized approach across countries as well as the availability of farm specific physical data regarding inputs and outputs and respective prices.

For both products considered, data in national currencies were converted into USD to make them comparable on a global scale and to allow comparing the results of this study with others on global scale.

The data available from the *agri benchmark* Cash Crop as well as Beef and Sheep Network cover different time periods. While the Beef and Sheep Network can rely on data from 2005-2010 for a sufficient number of farms to cover the crucial period of the years 2007-2009, the Cash Crop data do not go back that far.

As a consequence, a different approach to answer the question needs to be taken for the products considered.

Cash Crop analysis

Due to a lack of data available for the time before the recent price hike started, the analysis of crop production will make use of official price series for key inputs as well as for outputs. As far as input prices are concerned analysis will be based on World Bank prices[1] for:

(1) Nitrogen
(2) Phosphate
(3) Potash
(4) Diesel

That means any possible increases in labour cost and machinery will be excluded. Given the fact that these cost elements are not seriously driven by energy or commodity prices this simplification is considered to be reasonable. However, this way the net effect of price increases on profit margins will be slightly underestimated. In other words, profits from crop production in reality are a little less than what will be presented here.

On the other hand this approach also implies a certain chance to overstate the cost increase caused by higher input cost. Intensity level realized by the typical farms is based on high commodity prices during recent years. That means it might very well be the case that in the reference scenario back in 2000 to 2003 under much lower output prices grower have been used less inputs than nowadays.

The calculation will be done in the following manor: The most recent economic situation of typical farms reflecting the latest input structure and price for inputs as well as for outputs will be calculated by using a 3-year average from 2008, 2009 and 2010. To use an average is very important in crop production because yields vary often rather strongly. Since the final statement about the impact of price increases on margins will be made on a per ton basis a realistic figure for yields is important.

The next step is to calculate a reference scenario for the situation before the recent price hikes took place. As will be demonstrated in greater detail in Chapter 4, the most stable, low cost and low price market conditions can be found during the period 2000 to 2004. Therefore respective data for inputs as well as for outputs will be used to calculate the reference point for the price development.

When looking at crop production in principle this kind of analysis could be performed for a whole range of crops. However, given the similarity in both price developments as well as in cost structures for all grains the analysis will focus on **wheat** as the major and in economic terms most important crop for many European farms. In order to capture the situation of a rather different crop **rapeseed** has been chosen as the second model crop to run the analysis. With

[1] See World Bank Commodity Price Data ("Pink Sheet")
http://data.worldbank.org/data-catalog/commodity-price-data

this selection there is one rather high value crop with high intensity represented and one more modest value crop with only modest intensity as far as fertiliser input is concerned.

Beef analysis

The beef analysis will be performed in terms of time series analysis with the available data from the *agri benchmark* Beef and Sheep Network. Annual data (and no averages of years) will be analysed as performance typically varies much less than in crop production.

The beef analysis covers the period 2005 to 2010 and compares identical typical farms. Farm data which were incorporated later than 2005 were taken into the analysis, reflecting the fact that of the missing years in the calculations and charts. Thus, the beef analysis does not cover the same period as the crop analysis but the data compared are not based on a scenario but on the annual variations for each country and farm individually. All output and input prices and – if necessary – performance parameters (growth rates, yields, productivity) are updated on an annual basis.

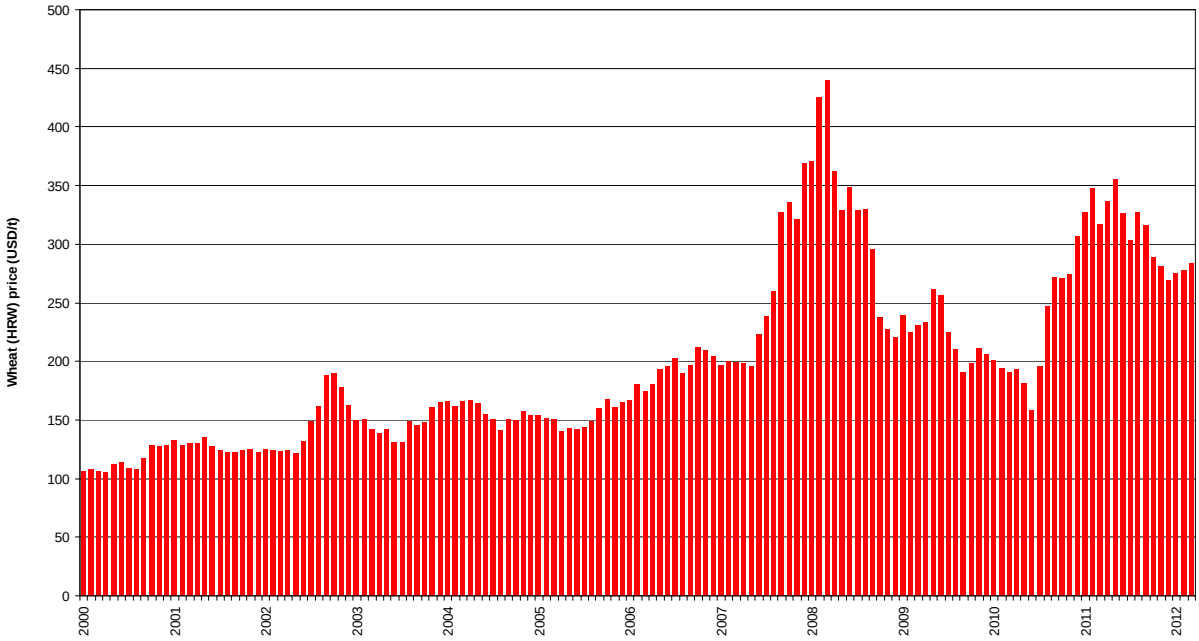
Analysis is done on a year-to-year basis and for specific questions by calculating summaries and averages of years, regions and farm types.

3 Evolution of output and key input prices

3.1 Evolution of wheat and rapeseed prices

As can be seen in the subsequent graphs prices for the two crops[2] looked at here have experienced a rather similar development since 2000. Until 2006 prices have been rather constant or displayed a rather modest increase. Starting in 2007 there were two prices hikes, one in 2008 and another one in 2011.

Figure 3.1: Evolution of wheat prices (USD per ton)

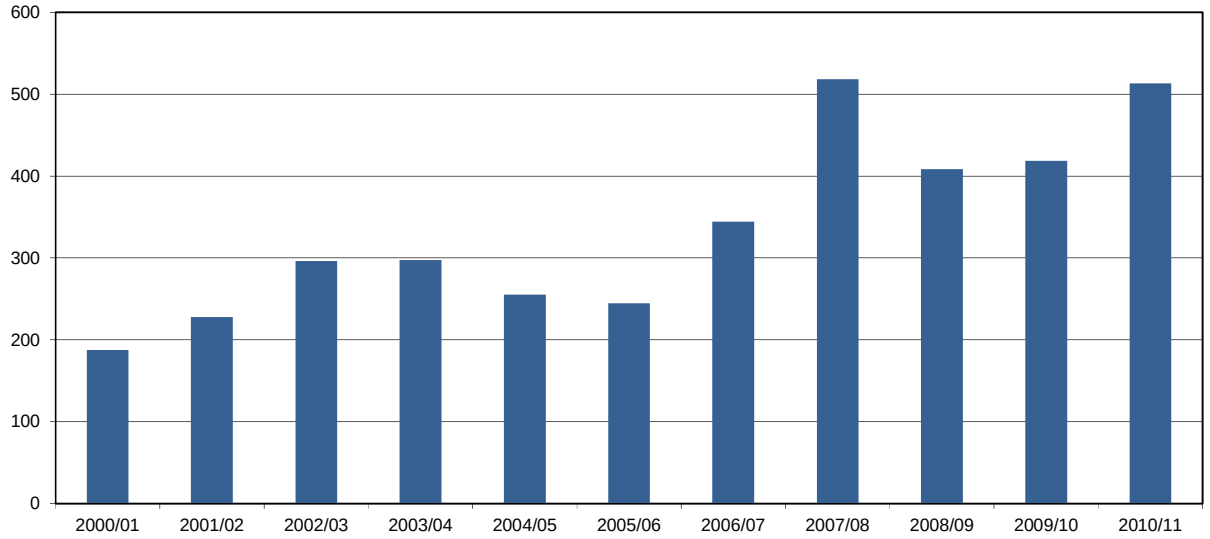


Source: World Bank (2011), own calculations

Even though wheat prices went down again somewhat after 2011 the price went from about USD 120 per ton to roughly USD 300 per ton which equals an increase of app. 150 %. In rapeseed the evolution started at about USD 200 per ton while at the end of the period looked at prices have been in the range of USD 500 per ton which implies an increase of roughly 150 % as well.

[2] Unfortunately there is not one uniform data base available for the two crops. Therefore the graphs do look differently and they also cover a slightly different time span.

Figure 3.2: Evolution of rapeseed prices (USD per ton, cash Vancouver)



Source: FAPRI (2012), own calculations

What is different though between the evolution of the prices for the two crops is the fact that wheat did hit a very low level between 2010 and 2011 while the dip in rapeseed prices during this time span was much less pronounced.

3.2 Evolution of beef and livestock prices

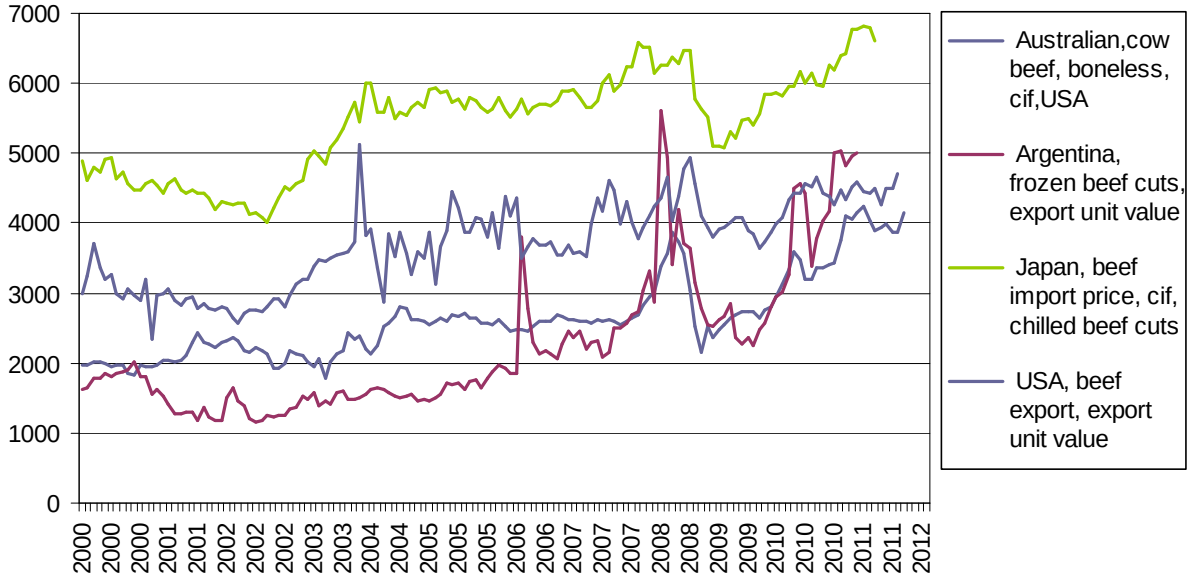
World beef prices on the rise

Global beef prices have been on the rise since their low point in the post-(European)-BSE and -FMD year 2002 (Figure 3.3). Main reasons are overall positive global economic development and associated increases in demand. Within the general positive development, the economic crisis in 2008/2009 left a clear mark on the price development.

Price increases were different for different types and origins of beef. International lead prices from the U.S., Japan and Australia have gone up between 1.5 to 1.9 times since 2002. The Argentine price almost quadrupled and overtook the Australian price level in 2008 and later the U.S. and Australian prices in 2010.

This was the combined effect of land competition and policy targeting the trade and price levels of beef in Argentina which eventually lead to the dramatic beef price increase in 2010 which continued in the first half of 2011. Further, the beef prices only recently arrived at historically high levels, exceeding the high price period in the beginning of the Nineties.

Figure 3.3: Evolution of key global beef prices (USD per ton)



Source: FAOStat (2012), own calculations

National prices upwards

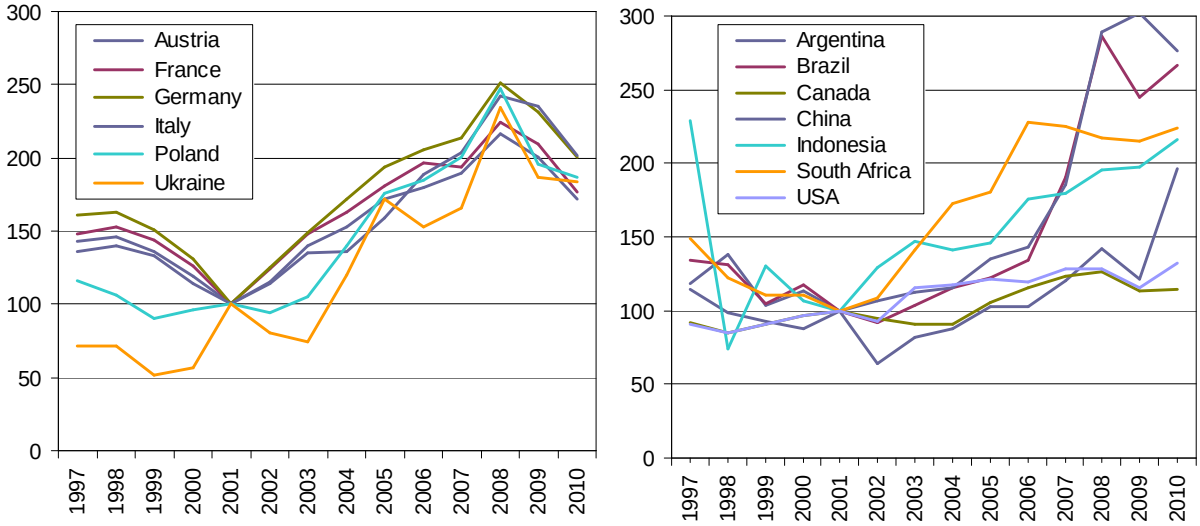
Beef price developments on the national level were converted into USD and then indexed based on the year 2001, a low point in beef prices for most countries. In all countries considered, beef prices in 2010 were higher than in 2001. It should be noted that due to the conversion into USD price developments contain exchange rate effects.

Figures 4 and 6 indicate that price increases were significant in all countries considered, at least temporarily exceeding 200 percent in many cases. Unsurprisingly, European prices were moving more or less in parallel, albeit on different levels. Prices peaked in 2008, in which grain prices were at their peak and the Euro was strongest against the USD.

Outstanding price increases could also be observed in Brazil and China, the first was mainly currency-driven, the second mainly demand-driven. Indonesia, South Africa and recently Argentina were also countries which experienced significant price increases.

It should also be mentioned that EU price levels came from a higher basis in 2001 than Non-EU price levels. The developments shown mean nevertheless that absolute beef prices narrowed over time, especially between the EU and the classical low-price and low-cost countries such as Argentina and Brazil.

Figure 3.4: Evolution beef prices in selected European and non-European countries (USD, Index 2001 = 100)



Source: *agri benchmark* based on national statistics

Livestock prices increased, too

Beef and livestock prices are correlated. Figure 3.6 indicates that livestock prices, i.e. prices for calves, weaners and backgrounders used for beef finishing (see Figure 3.5 for explanation of the categories), increased, too.

Figure 3.5: Categories of livestock used for beef finishing

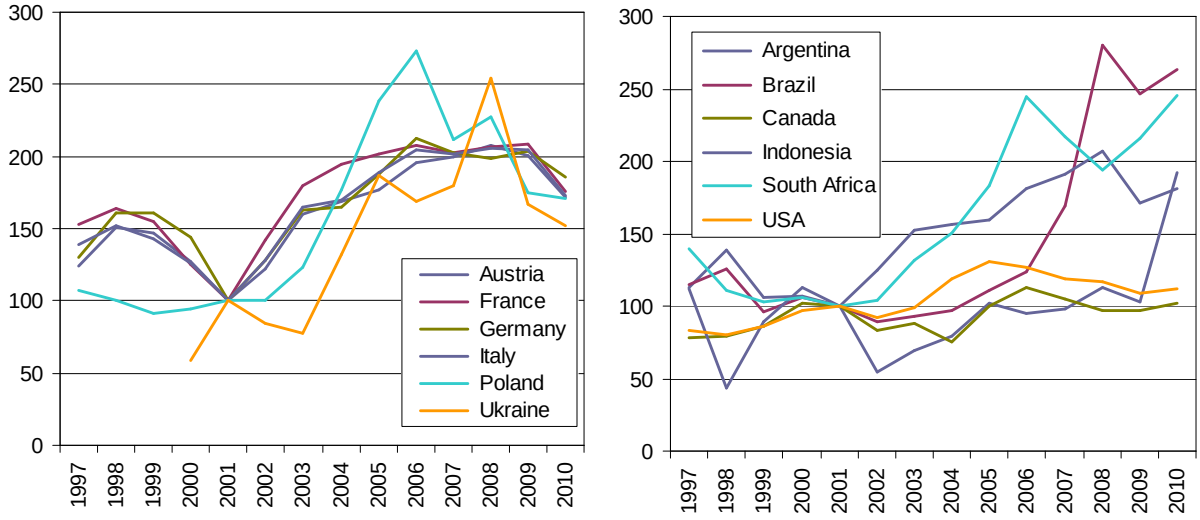
	Dairy origin		Cow-calf origin
Animal type Young animals (calves, weaners)	▪ Calves ▪ 7 days Holstein	▪ 'Starter' ▪ 2 months Simmental	▪ Weaners 6-9 months ▪ Beef breeds and crosses
Animal type Pre-finished backgrounders/ stockers/stores	▪ Backgrounders ▪ 6-7 months ▪ 190 kg	▪ Backgrounders ▪ 5-6 months ▪ 190-200 kg	▪ Backgrounders ▪ 11-12 months ▪ 320-360 kg
Animal type Finished slaughter cattle	▪ Bulls ▪ 18-19 months ▪ 600-690 kg	▪ Bulls ▪ 17-18 months ▪ 650-720 kg	▪ Steers ▪ 15-16 months ▪ 550-610 kg

Source: *agri benchmark* Beef and Sheep Report 2011

The relative movements of livestock prices were very similar to the beef price movements. In the 2010 vs. 2006 comparison, in many cases livestock price movements were even more pronounced than beef price movements, indicating that a high proportion of the absolute beef price changes is transmitted into livestock prices. For the 2010 vs. 2009 comparison, the transmission seems to have been less pronounced.

Similar to the beef prices, cost developments in the European countries were more or less parallel and on similar overall levels as in the Non-EU countries considered here.

Figure 3.6: Evolution of livestock prices in selected European and non-European countries (USD, Index 2001 = 100)



Source: *agri benchmark* based on national statistics

3.3 Evolution of feed prices

Time series on feed prices were not analysed separately in this study. The reasons are:

1. Feed price developments are closely linked to grain and oilseed prices developments which were analysed in more detail in the previous chapter. For single composite feed they provide sufficient guidance.
2. Data for international compound or concentrate prices are difficult to find.
3. Price effects for purchase feed are reflected as a weighted average of single price developments via feed rations in the *agri benchmark* beef data. Thus, all kind of feed types are reflected in great detail.

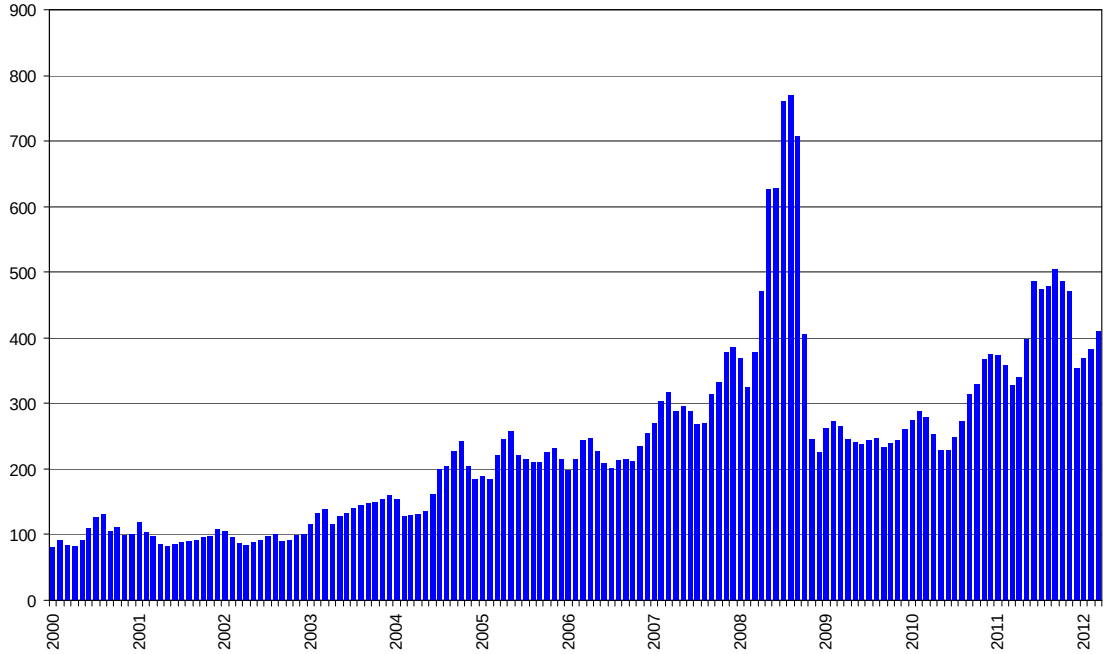
3.4 Evolution of key input prices

In this section the evolution of key input prices such as urea, phosphate, potash and diesel will be described briefly.

Urea

As Figure 3.7 shows, urea prices were almost flat in the first half of the last century. In 2005 an increase of about 50 % took place. This development culminated in a first price hike in 2008/2009. Afterwards prices went back to previous levels for roughly two years but in 2011/2011 another major increase occurred. Altogether from about USD 100 per ton the prices increased to app. USD 400 per ton (+ 300 %)

Figure 3.7: Evolution of urea prices (USD per ton)

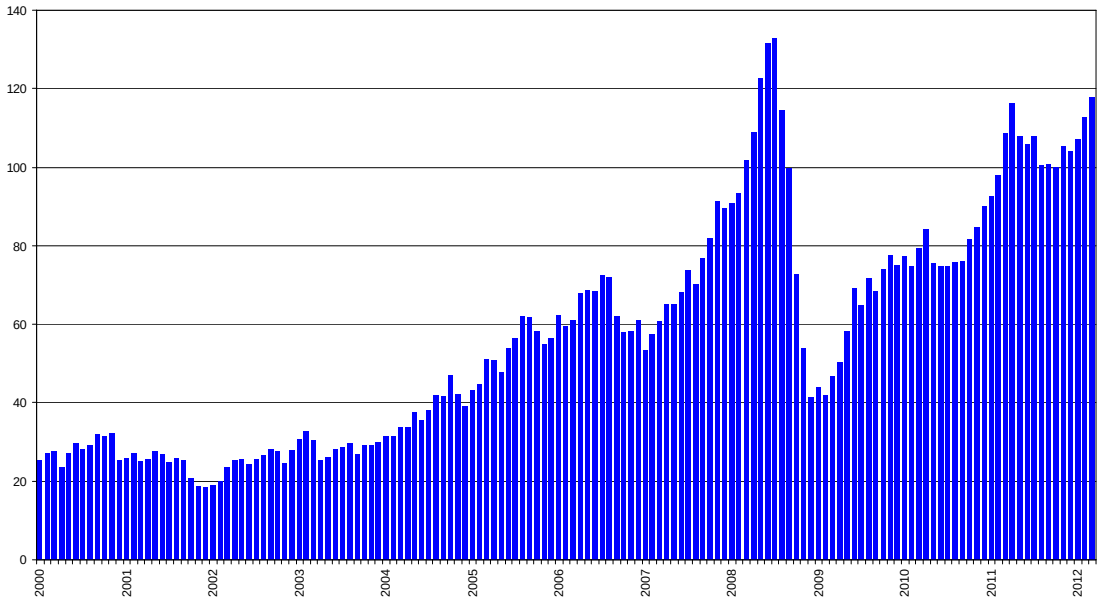


Source: World Bank (2012), own calculations

Diesel

Given the fact that World Bank does not report prices of diesel but they do report on crude oil the respective figures are used to generate a value for the increase in diesel prices. In 2000 the prices started at about USD 30 per barrel while since 2011 a plateau of app. USD 100 per barrel has been reached (+ 230 %).

Figure 3.8: Evolution of crude oil prices (USD per barrel)



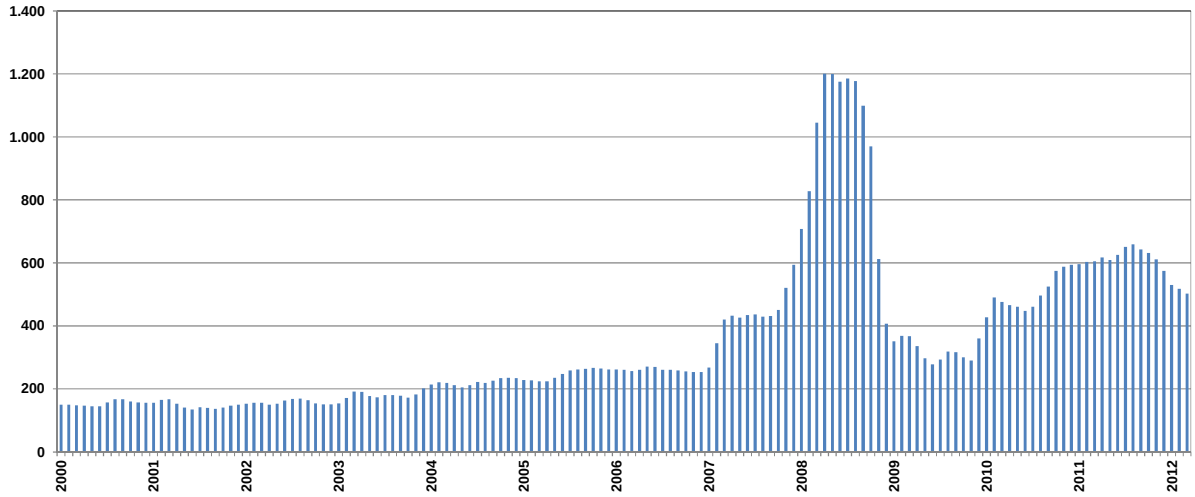
Source: World Bank (2012), own calculations

Phosphate

Next to nitrogen, phosphate is a very important fertiliser in many crops. Therefore in Figure 3.9 prices for the relevant time span are being documented.

The pattern appears to look the same as in crude oil prices. What is important for this analysis is the fact that in the first part of the last decade prices were fairly stable and – compared to the prices in spring 2012 – rather low. When looking at the evolution in summary it appears that starting from about USD 180 ton the new level is now in the range of USD 600 per ton (+ 230 %)

Figure 3.9: Evolution of phosphate (DAP) prices (USD per ton)

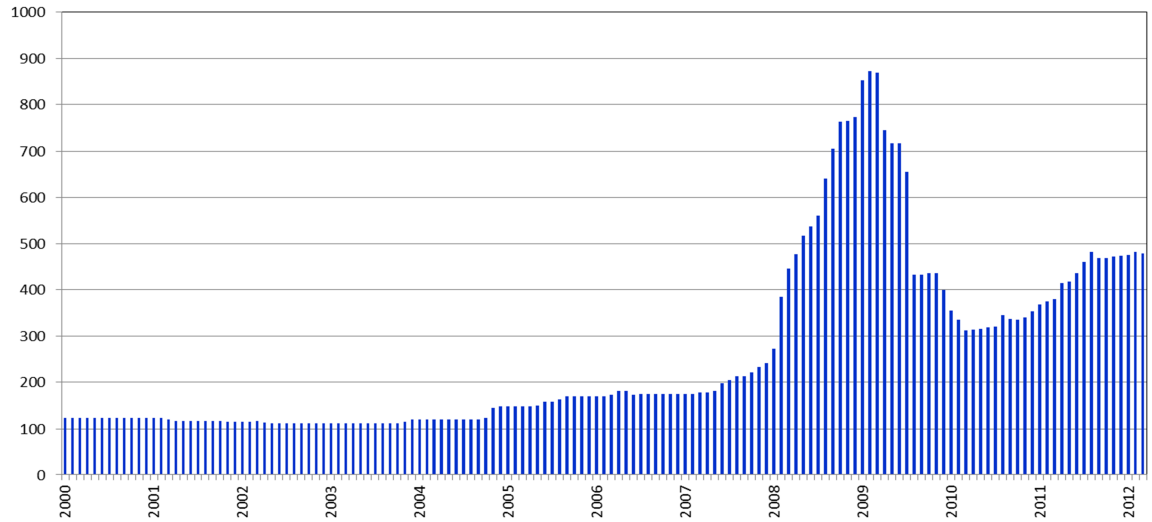


Source: World Bank (2012), own calculations

Potassium

Potassium went from app. USD 120 per ton to about USD 500 per ton which corresponds to an increase of roughly 320 %.

Figure 3.10: Evolution of potassium prices (USD per ton)



Source: World Bank (2012), own calculations

4 Scenario calculations cost of crop production

4.1 Introduction

In this chapter typical farms will be calculated by generating virtual profit figures for the period 2000 to 2003 for all major outputs. In order to do so the percentage changes in prices and cost resulting from the analysis in chapter 3 are being used. A respective overview can be found in Table 4.1, it shows that percentage wise the increase in cost was significantly higher than on the revenue side.

Table 4.1: Change in commodity prices 2000-2003 to 2010/11

Commodity	2000/2003 vs. 2010/11 (in %)
Rapeseed	150
Wheat	150
Urea	300
DAP	230
Potassium	320
Crude Oil	230

Source: own calculations based on World Bank, FAPRI

With regards to the diesel/crude oil element in this calculation an important caveat has to be made: In most countries of the EU but also sometimes outside the EU, diesel is heavily taxed. Provided this tax is not defined as a percentage of the value of the diesel but as a fixed amount using the percentage increase of crude oil prices leads to an overestimation of the price increase in diesel. In order words, the recent economic situation of the farms would be portrayed worse than it really is.

There is a second element to the calculation which needs to be looked at rather carefully: The changes in land rents. In reality this increase in cost is of high concern to many growers in the EU because land rents have gone up so much in many places. However, with respect to the question to be answered here this increase in cost has to be excluded from the analysis because land rents are the outcome of the profitability of land use: The higher the profits from land use (excluding land rents) the higher the land rents – and vice versa.

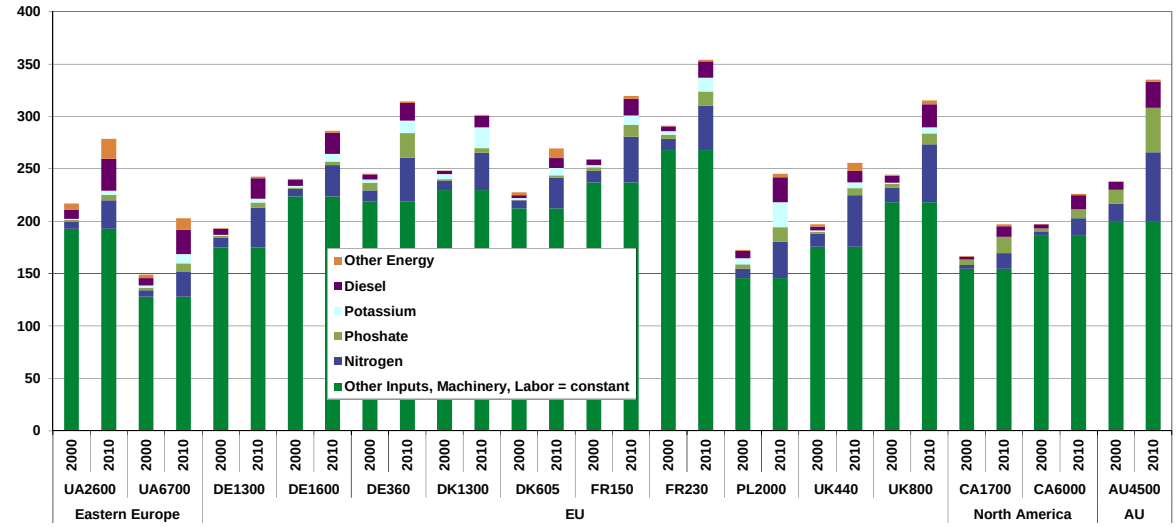
The selection of countries and typical farms is based on the criteria (a) availability of *agri benchmark* data and (b) importance of countries in international trade. That means, when looking at **rapeseed**, Canada and Australia are major players outside the EU while in the EU France, Germany and the UK are very important; Poland and Denmark have been added too. Since previous *agri benchmark* analysis suggested that Eastern Europe is rather competitive in rapeseed production two Ukrainian farms are included as well.

When considering **wheat**, the picture only changes slightly because all the countries mentioned above are also important in wheat production. The only country that has to be added is the USA, hence one typical farm from the USA is included in the analysis.

4.2 Results

In Figure 4.1 the outcome of the calculations for rapeseed is displayed. As expected, total cost went up in all farms but – since the bulk of cost is not driven by fertiliser and energy cost – the increases are only modest.

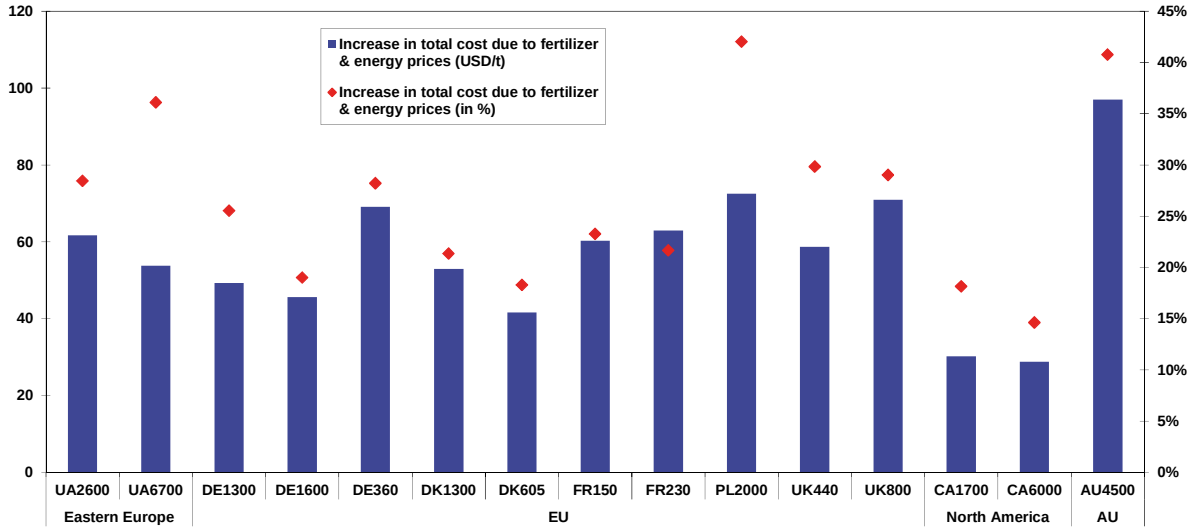
Figure 4.1: Evolution in cost of rapeseed production 2000 vs. 2010 (USD per ton)



Note: Explanation of farm names in the Annex
Source: *agri benchmark* Cash Crop 2012

In order to make it easier to assess and compare the changes, in Figure 4.2 only the changes in cost of production are shown – both in absolute terms as well as in percent.

Figure 4.2: Increase in total cost of rapeseed production 2000 vs. 2010 (USD per ton; in %)

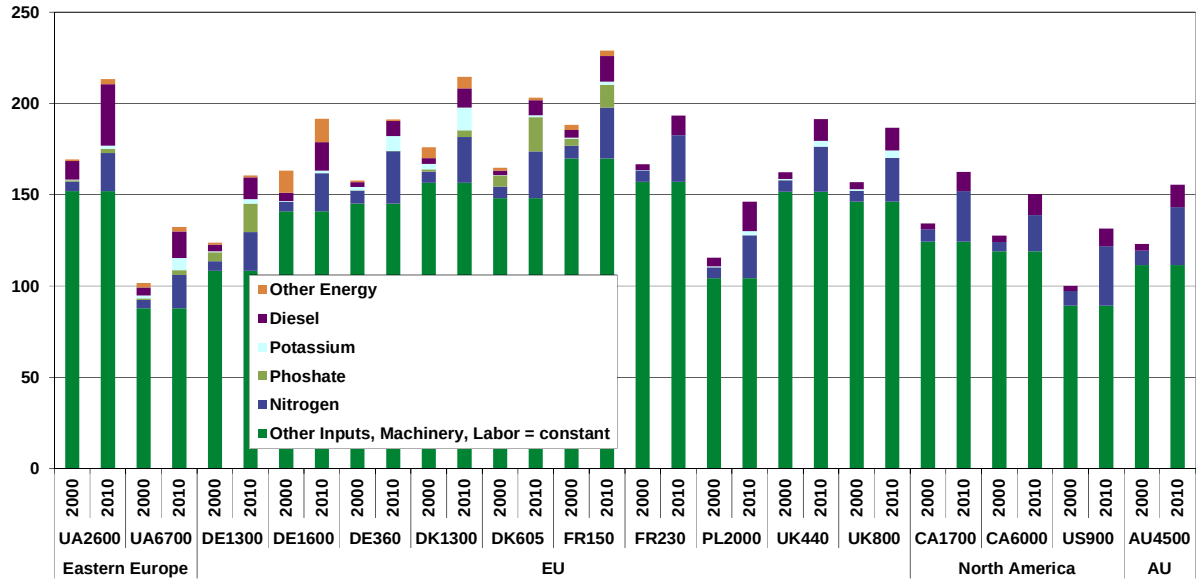


Source: *agri benchmark* Cash Crop 2012

The figure shows that there is a wide variation in cost effects of price increases for fertilizers and energy. This is true not only for absolute changes as well as for change in percent. By far the lowest effect can be seen for the two Canadian farms while the hit for the Australian farm was the strongest. No particular pattern does exist as far the comparison EU vs. non-EU farms is concerned. What is remarkable though is the fact that the results for the two very extensive systems in Canada and Australia are so different.

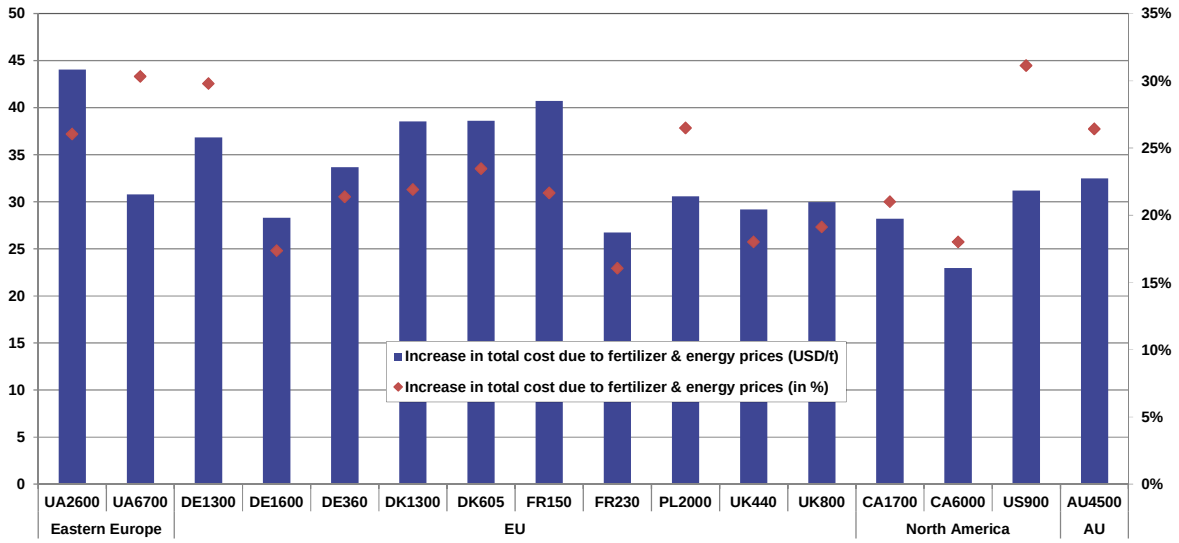
When looking at the impact on wheat production the respective figures are documented in Figures 4.3 and 4.4. As in the case of rapeseed there is a significant increase in cost of production to be considered.

Figure 4.3: Evolution in cost of wheat production 2000 vs. 2010 (USD per ton)



Source: *agri benchmark* Cash Crop 2012

Figure 4.4: Increase in cost of wheat production 2010 vs. 2000 (USD per ton; %)



Source: *agri benchmark* Cash Crop 2012

Considering the changes in cost of production for wheat in absolute and relative terms leads to Figure 4.4.

Similar to the results in rapeseed, the changes in absolute terms look rather uniform with most farms experiencing an increase of about USD 30 to 40 per ton. This figure of course is much lower compared to rapeseed. Except for a few outliers the increase in relative terms is also relatively even with most farms showing an increase in the range of 20 to 25 %.

Contrary to rapeseed there seems to be a slight tendency that typical EU farms have been affected less than their overseas competitors. Only two EU farm belong to the group of six farms which had to face an increase of cost of production by more than 25 %.

4.3 Conclusions

With regard to the aims of this study the following conclusions for the typical farms analysed here can be drawn:

(1) Increasing input cost for fertilisers and energy have had a significant impact on cost of production for both rapeseed and wheat.

(2) When comparing EU farms with non-EU farms no systematic differences could be detected. While in rapeseed no clear tendency can be observed in wheat is seems that typical farms outside the EU have been affected more – at least as far the increase in percent is concerned.

(3) When looking the overall profitability of crop production the conclusion is that due to the relatively small share of fertiliser and energy cost in total cost of production the very strong rise in those cost did not lead to a drop in profitability. The opposite is true: While prices for rapeseed and wheat have gone up by about 150 % the increase in cost caused by higher fertiliser and energy cost only amounted to 20 to 30 % maximum. That means growers margin have gone up significantly.

(4) Given the only limited increase in cost of production for the farms analysed it does not seem very likely that currently high crop prices are driven by an increase in cost of production. Rather it has to be assumed that this increase is caused by a strong increase in global demand and – so far - a lack of response from the supply side. This situation is reflected in rather low stock-to-use ratios for all major commodities.

(5) Given the fact that current high prices create strong incentive for growers around the world to intensify production in the mid-term a strong supply response should be expected. Depending on the evolution of demand such an increase in supply could lead to reduction in prices which could very well be lasting

5 Time series analysis of beef production

The *agri benchmark* Beef and Sheep data set can rely on a 5-6 years time series for the most important European and non-European countries. In the following sections, we analyse the cost developments, the price and exchange rate impacts, important price and cost relations, cost drivers over the years and the resulting profits. Particular attention is paid to the difference between EU and non-EU countries and whether the former experienced any developments that were disadvantageous for them compared with the non-EU countries.

5.1 Cost developments

Figure 5.1 shows the total cost of beef production for selected typical farms from the *agri benchmark* result data base from 2005-2010. Note that not all farms in comparison cover the whole period as some entered the comparison after 2005. The total costs include cash costs (expenses), depreciation and opportunity costs for own land, labour and capital (equity) and reflect the long-term cost situation which is relevant for analysis of competitiveness.

Costs vary considerably within and between countries but the following major findings can be concluded:

- Cost levels in Europe are in a range from 400 to 600 per 100 kg carcass weight (CW), in North and South America and in South African and Australian feedlots are around USD 300 and above USD 500 in Indonesian and Chinese farms. The new investor type farms in Ukraine show the lowest costs in the comparison and point at a certain potential on on-farm competitiveness.
- In the period considered, costs in the European farms basically increased and then decreased again (exchange rate and feed price impact) whereas they mainly increased in the other countries.
- The distance between European farms on the one side and North American and particularly South American farms on the other side has narrowed over the years.

Figure 5.2 shows the relative cost changes in the period considered. The Index=100 year for this analysis in the following figures was moved to 2010 because for some farms data were not available for the entire period 2005-2010. A distinction is made between European and non-European countries.

Non-European countries more volatile

The overall cost changes and increases in non-European countries seem to have been more pronounced than in Europe, especially in the EU-27. Reasons could include that non-European markets, especially in emerging economies, are more dynamic in terms of demand and production, but also overall economic development. Further, they are usually less protected on the product side (which has implications on the ability to buy inputs). There are significant changes in the cow-calf costs in Spain. The reason was a major drought in 2005 which forced farmers to buy feed.

Cost rises in 2008

Data from of the year 2008 suggests that in beef finishing the feed price peaks and the financial crisis had a greater impact on the European countries than on the non-European.

Figure 5.1: Total cost of beef production 2005-2010, selected farms from *agri benchmark* result data base (USD per 100 kg carcass weight)

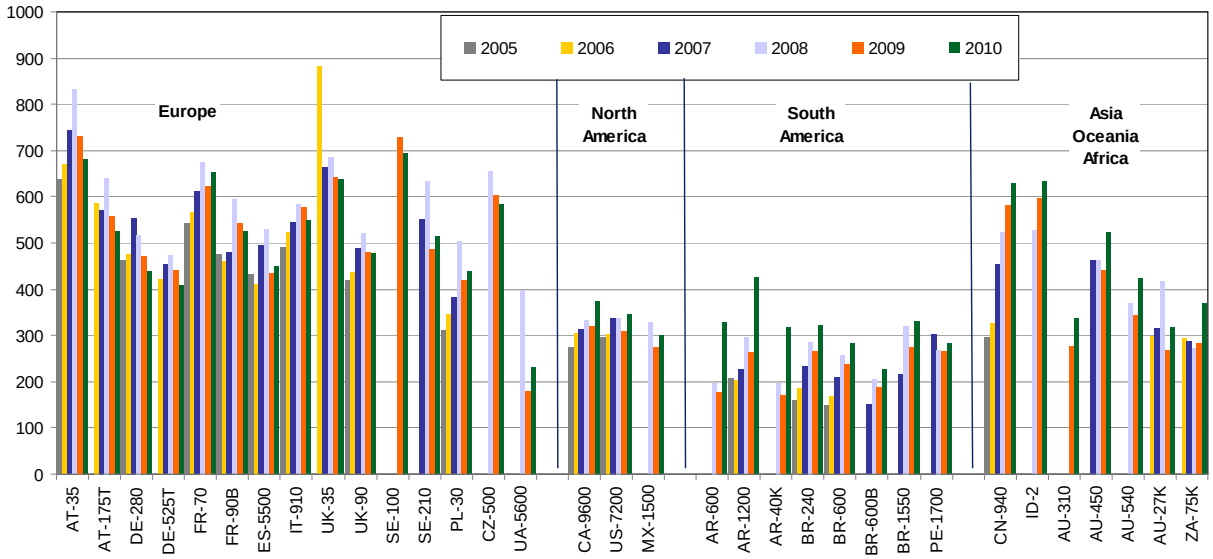
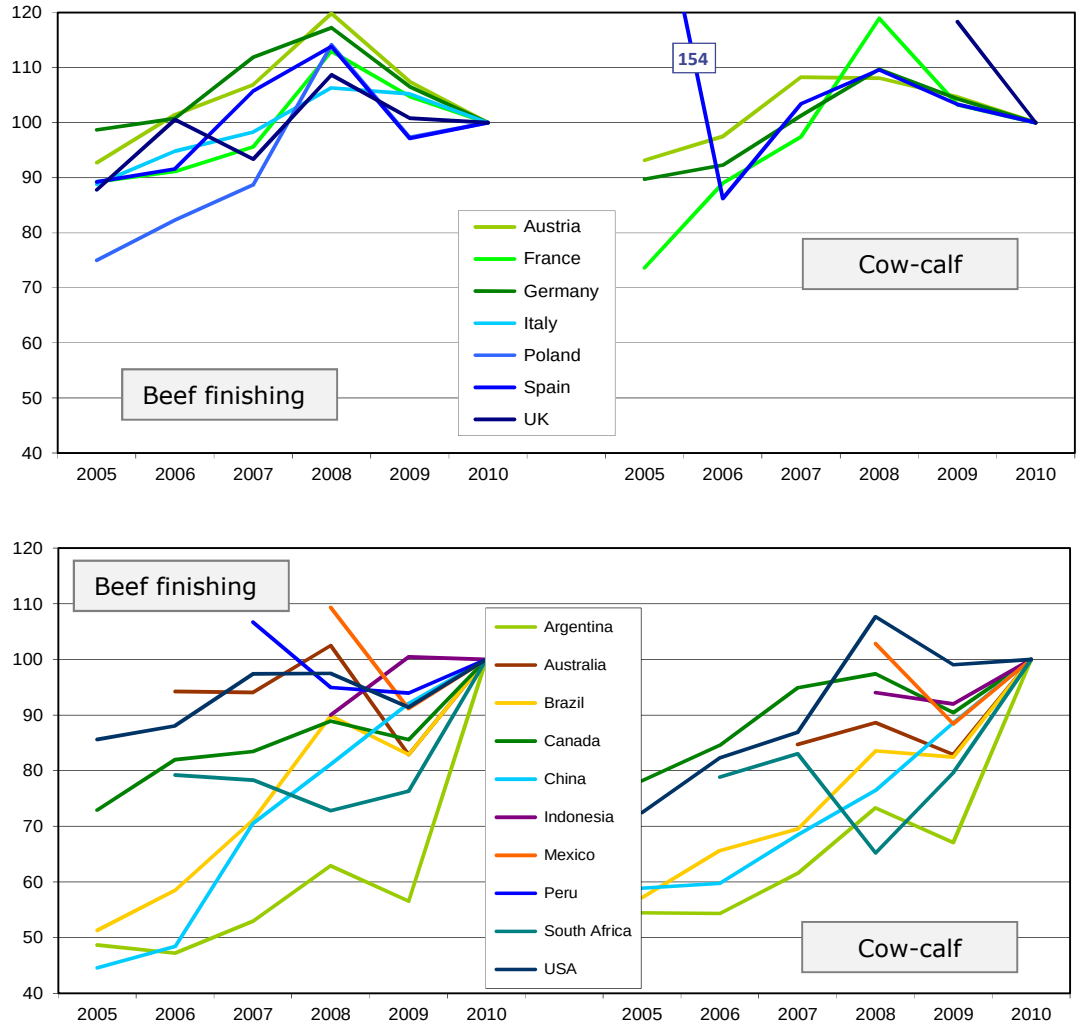


Figure 5.2: Cost developments in European and non-European countries 2005-2010 (Index 2010 = 100)



Note: Explanation of farm names in the Annex

Source: *agri benchmark* 2011, own calculations

An explanation could be that the intensive silage-grains/concentrates systems which prevail in Europe were particularly hit by the high grain prices. Pasture systems prevailing in South America and parts of Australia were hit less because the depend less on purchased inputs. Given their high proportion of purchase feed in total costs, feedlots should be affected in a similar way but in many of these countries livestock prices remained stable or declined, compensating for higher grain prices.

South America / Asia with highest increase

The highest cost increases could be observed in Argentina, Brazil and China. Main drivers were exchange rate increases (mainly Brazil) and domestic price increases for feed, labour and land. As shown above, beef prices in these countries increased even more, resulting in stable to growing profits (Chapter 5.4). In many countries, this trend was however reversed in the year 2011.

The competition with cash crop production and for land in Argentina and China has a negative impact on the expansion opportunities of beef production. On the other hand, Brazil has managed to expand production in the last years mainly via productivity increases. Brazil also demonstrates that the ability to produce and export quantity is important even if the country is no longer the lowest cost producer.

Domestic and exchange rate impact

To make international comparisons, the national currencies must be converted into a single currency. For global comparisons, usually the US-Dollar (USD) is used.

If costs measured in USD change, there can be two reasons: a) an exchange rate impact due to the appreciation or depreciation of the national currencies against the USD and b) a domestic impact, resulting from changes in domestic prices and / or productivity levels. The two effects can compensate or compound each other. It should be mentioned that the two effects do also affect each other via international trade, for example in a country that imports feed such as soybeans. A devaluation of the currency will lead to increases in domestic soybean prices and vice versa. Due to the complexity of these issues, they were not further pursued in this study.

Exchange rate and domestic impacts 2010 vs. 2009

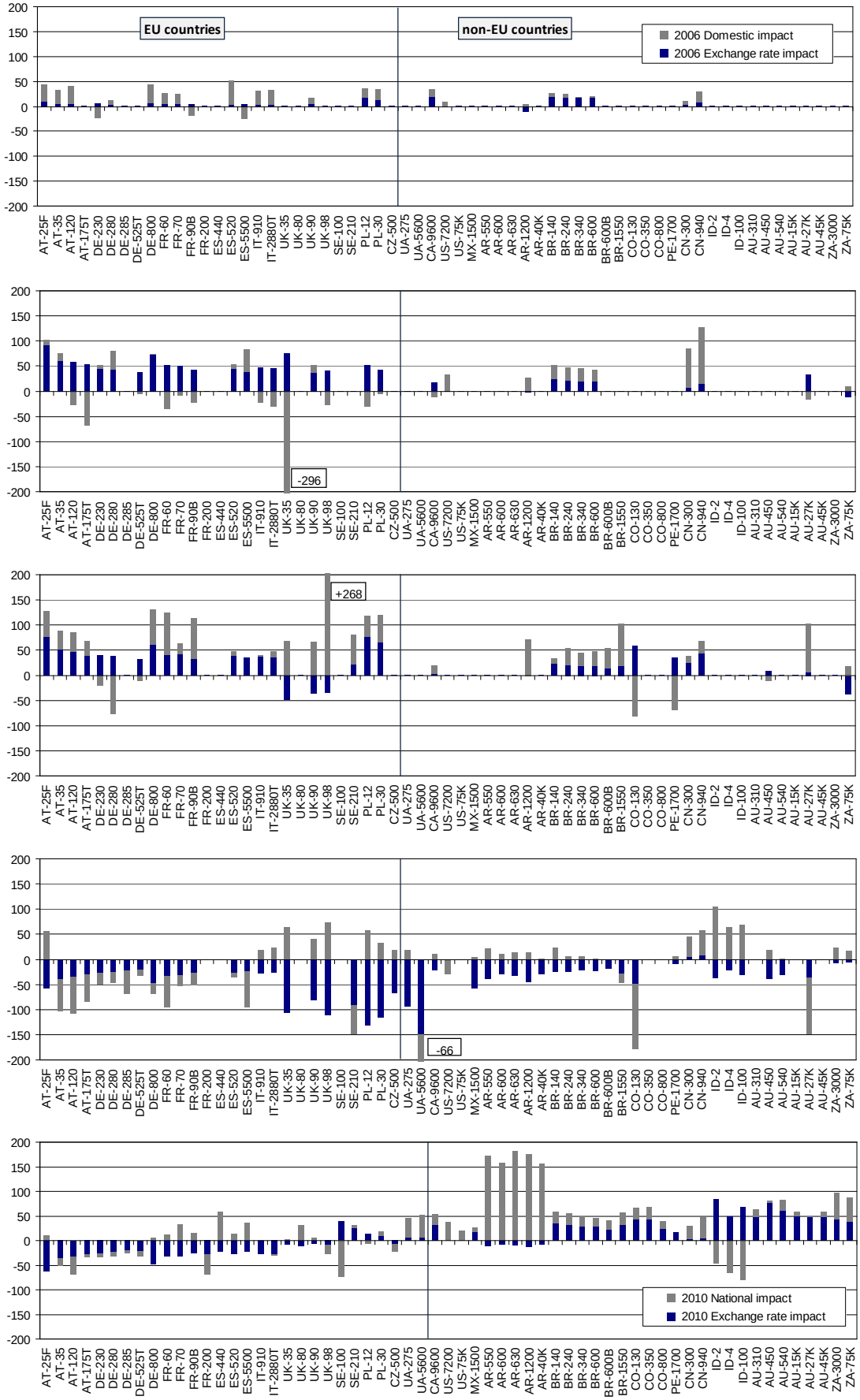
The decomposition in the two effects for the 2010 vs. 2009 comparison shows that in the EURO-zone plus UK, the exchange rate impact was moving costs in USD-terms downwards because the EURO depreciated after years of strength against the USD.

The opposite effect can be observed in Brazil, Colombia, Indonesia, Australia and South Africa where the USD lost further ground against the national currencies. With the exception of Indonesia, the exchange rate impact was added by national cost increases. This is a particular concern for Australia which depends on exports to Japan, South Korea, Indonesia but also the U.S.

The most eye-catching change took place in Argentina where livestock (and beef) prices sky-rocketed after years of failed policy intervention and shortage of cattle (and beef) supplies.

When considering the years back to 2006, it can be concluded that the exchange rate impact is at least not less important than domestic impacts (Figure 5.3).

Figure 5.3: Domestic and exchange rate impact in beef finishing for selected farms 2005-2010 (USD per 100 kg carcass weight)



Source: *agri benchmark* 2011, own calculations

5.2 Price and cost relations

When looking at (or complaining about) price developments for inputs and production factors, it is often ignored that at least in the recent past product prices were also on the rise. Further, in the case of lasting increases of input prices, technologies are developed to reduce costs. Finally, there is also a correlation between certain prices, for example beef and livestock prices, meaning that high beef prices are transmitted into livestock prices and vice versa.

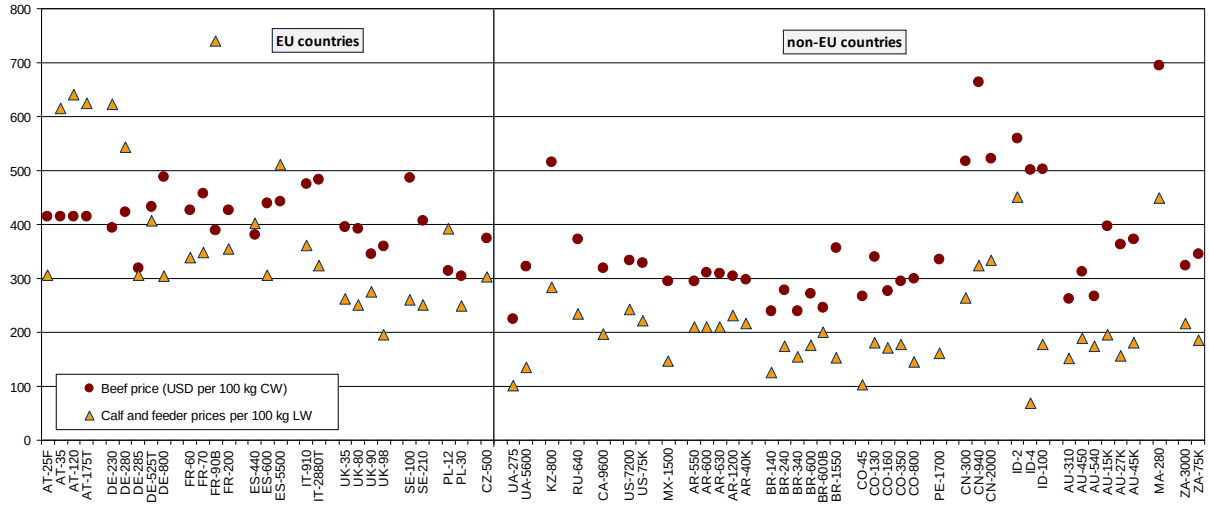
Analysing the ratios between beef prices and the two most important cost components – livestock and feed – can therefore provide an idea about whether the terms of trade of beef production changed for the better or to the worse over time.

Beef and livestock prices show similar pattern in comparison

Prices for beef and livestock show similar variations between the countries (Figure 5.4). Highest beef prices can be observed in the (Western) European countries, with top prices in Italy and Sweden, and Polish prices falling slightly behind the other EU-prices (partially breed specific). China, Kazakhstan as well as Morocco and Indonesia can be considered high price countries as well. Lowest prices are found in Brazil, the Ukraine and parts of Australia (Queensland), at around half of EU-levels. Argentine prices are now on a comparable level with North America. The South African and the Australian feedlots producing for the Japanese market occupy a medium price position.

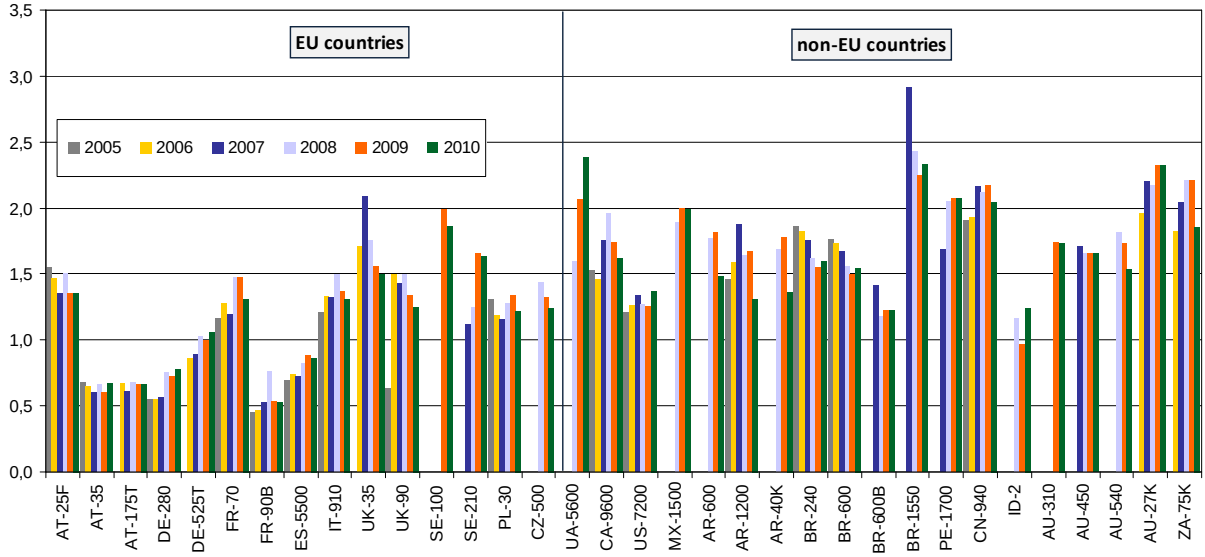
With few exceptions, livestock prices show a very similar pattern to beef prices, supporting the economic perception that beef and livestock prices are closely related. Outstanding exceptions are the farms in Austria and Germany buying Simmental (and Holstein) calves of relatively low weights and age, resulting in high live weight prices.

Figure 5.4: Beef price / livestock price relations in 2010



Source: agri benchmark based on national statistics

Figure 5.5: Development of beef price / livestock price relations 2005-2010



Source: *agri benchmark* based on national statistics

Figure 5.5 shows that in many of the EU-countries the beef price / livestock price ratio (BLPR) improved over time to worsen again in 2009 and 2010. Some of the non-EU countries showed a similar pattern but in others the trend was less homogeneous. There is, however, no indication that the BLPR in the EU-countries developed less favourably than in the non-EU countries.

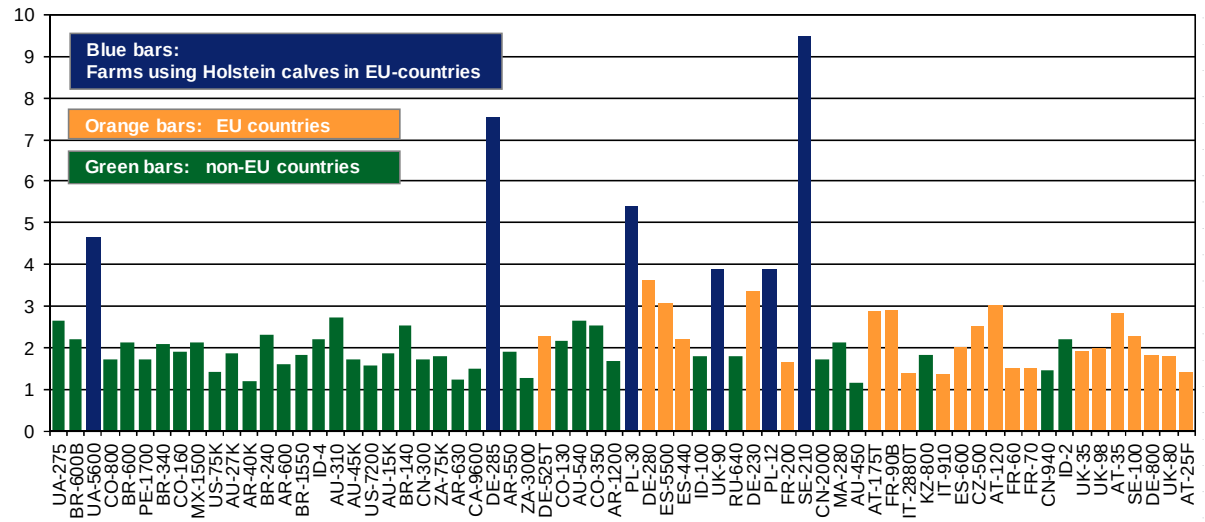
Beef price – purchase cost ratio around 2 and relatively stable

Beef price – livestock price ratios are one way to analyse the relation between the two most important prices in beef production. Another way to assess beef and livestock prices is to compare beef prices and animal purchase costs. The reason is that animals are bought at different ages and kept for different finishing periods before being sold, meaning that the livestock prices have a different proportion in total costs. Comparing the beef price with animal purchase costs reflects these relationships.

The farms were ranked by cost of production to find out whether low cost producers show a different ratio than high cost producers (Figure 5.6). Further, the European and the non-European farms were marked with different colours. The conclusions are:

1. The beef price / purchase price relations are similar between countries (and production systems which is not shown here) in a range of around 2. The exceptions are highlighted with blue bars and represent farms buying Holstein calves. These calves are young, relatively low priced and kept for a relatively long finishing period. As a result, the animal purchase costs are somehow 'diluted', have a small proportion in total costs and eventually have little weight in the price-cost ratio considered here.
2. Further analysis showed that the beef price / purchase cost ratios have not changed significantly over the years considered.

Figure 5.6: Beef price – purchase cost relations in 2010



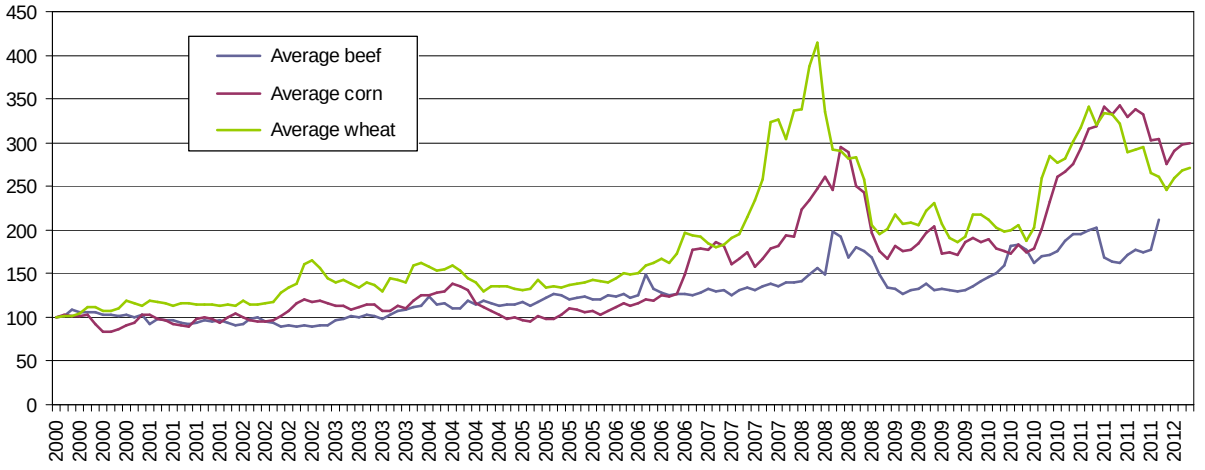
Source: *agri benchmark* 2011, own calculations

Beef price – feed costs ratio worsening

On the basis of the index month January 2000, the international beef prices from above (Figure 3.3) were confronted with the average corn and wheat prices (Figure 5.7).

The corn-beef price ratio evolved rather parallel in the first half of the decade. Starting with 2007, there were a) divergent developments with higher increases in corn and wheat prices and b) higher volatility in corn and wheat prices. As mentioned above, this does not mean that the profitability of beef production has gone down because of the significantly higher weight of the beef price in the calculation when compared with feed prices and costs.

Figure 5.7: Evolution beef vs. corn and grain prices (Index 2002 = 100)



Source: FAOStat (2012), own calculations

Contrary to beef and livestock prices, there is no *direct* link between beef and feed prices and costs. This also means that feed prices can develop irrespective of beef price developments, driven by overall demand for food and feed grains.

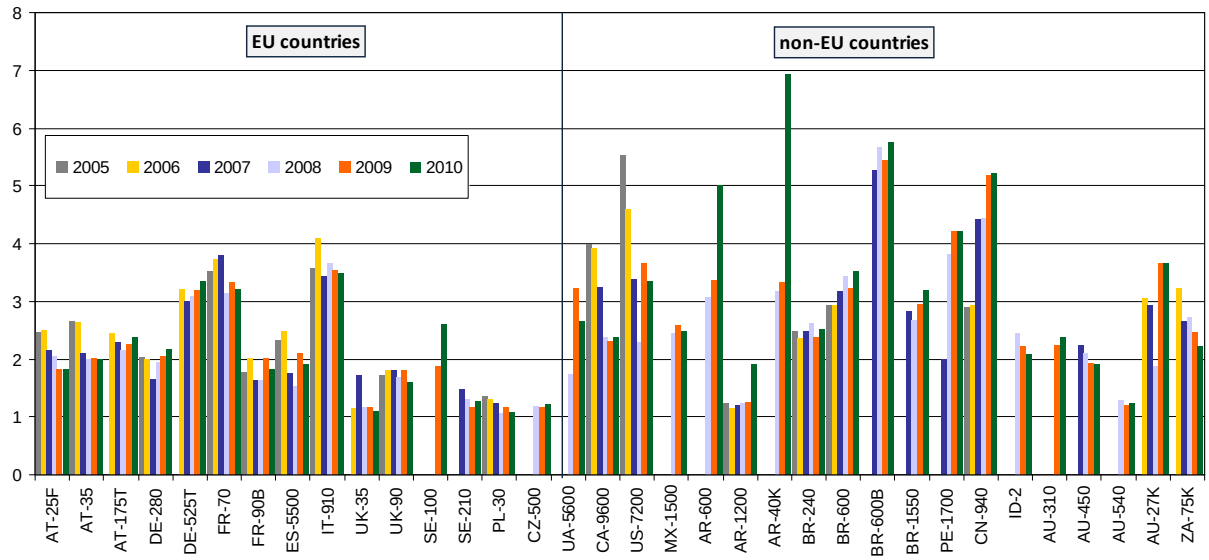
As Figure 5.8 shows, with few exceptions, in the period 2005 to 2010, the beef price – feed cost ratio went down to the disadvantage of beef production. To reflect feed costs of the pasture systems, land prices were included in the ratio.

The exceptions to this development were Argentina, Brazil and China, where beef prices rose even more than feed costs.

It is remarkable that in the high feed price years 2008 and 2009, the ratio in many countries remained unchanged or even improved in favour of the beef price. The main reason is that beef prices in many parts of the world were soaring as well, mainly driven by supply shortages meeting high global demand.

For the upcoming years, however, it is expected that feed (and land) costs rise further, with beef prices remaining rather stable, resulting in diminished returns of beef production. In the medium term, this will result in increasing beef prices.

Figure 5.8: Development of beef price – feed costs relations



Source: *agri benchmark* 2011, own calculations

5.3 Cost drivers

This section looks at the drivers of cost changes in the last years. Animal purchase costs, feed costs and land costs (in some countries) were identified as the most important cost drivers. Specific attention is paid to the impact of cost changes on different production systems.

There is no superior production system

Figure 5.9 shows the absolute cost levels and Figure 5.10 the different cost composition of different production systems.

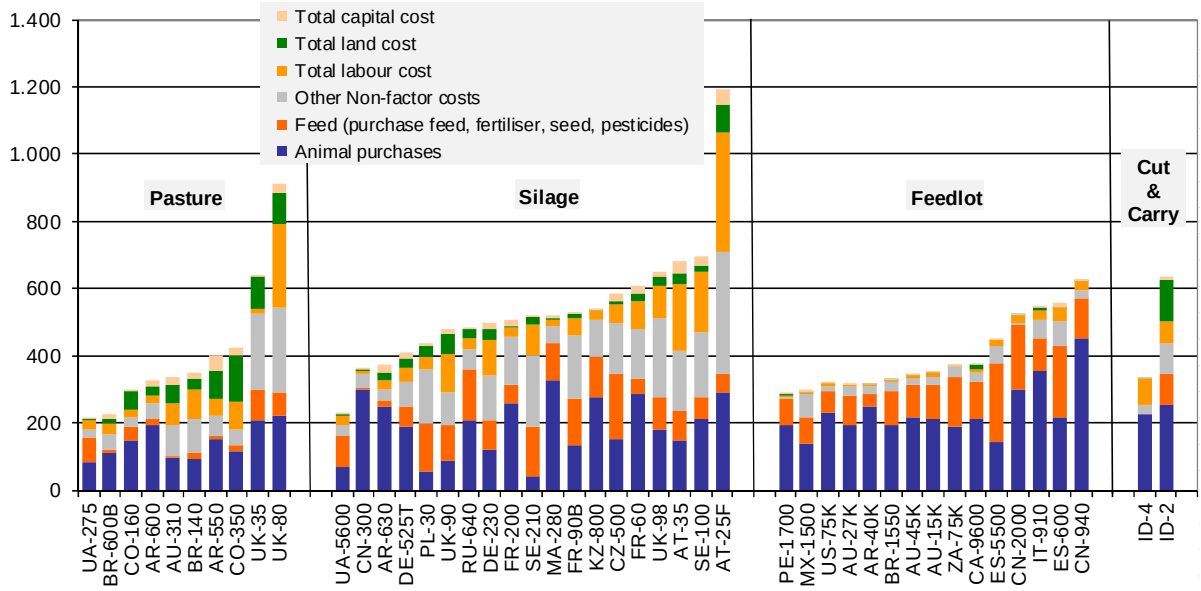
Feedlot and pasture systems seem to have lower costs than silage systems, with cut & carry systems in between them.

It should, however be seen that feedlots only have a short finishing period of 90-150 days with very high daily weight gains. They are succeeding a pasture period of weaners and usually backgrounding on pasture with some supplementary feed, both periods with lower productivity than the final feedlot. In economic

terms, these circumstances should be priced into the livestock purchase price and thus reflected, underlining the high competitiveness of feedlots.

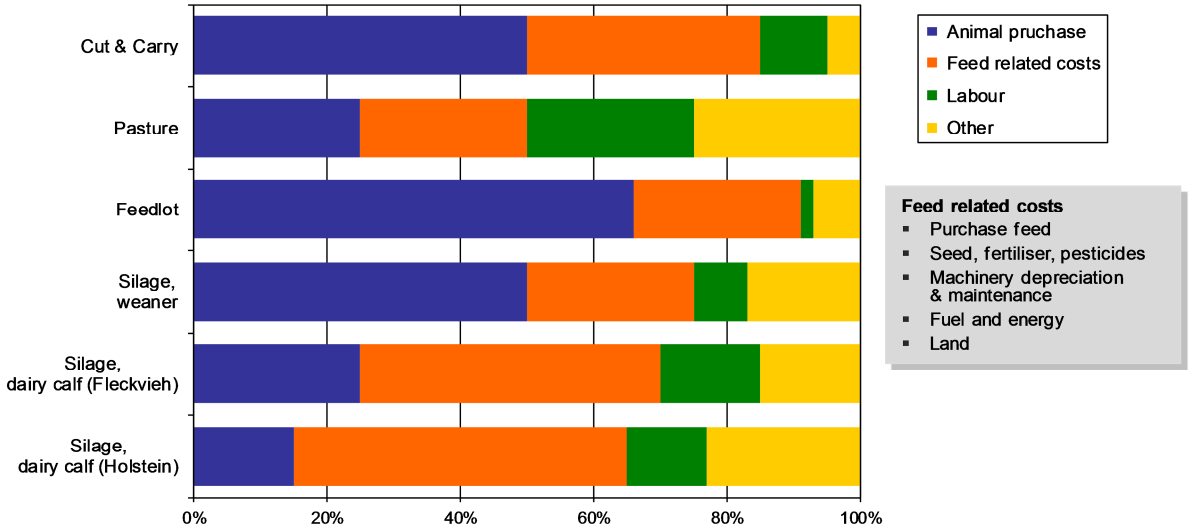
It is, however, not appropriate to argue that a particular production system is superior to all others. The different production systems are basically a result of natural conditions (absolute grasslands, dry locations), price relations (land prices, grain prices), location factors (distance to consumption centres, population density) and market preferences (heavy carcasses, grass-fed vs. grain-fed beef). This means that in many locations there is no realistic choice between different production systems. For example, a pasture system could not exist in a region with high land prices and a large U.S.-type feedlot could not exist in a region with high population density.

Figure 5.9: Total cost of beef production by production system (USD per 100 kg carcass weight)



Source: *agri benchmark* 2011, own calculations

Figure 5.10: Proportion of main cost components in total costs for different production systems (USD per 100 kg carcass weight)



Source: *agri benchmark* 2011, own calculations

Price impacts depend on cost proportions

When looking at the cost composition of the production systems in Figure 5.10, it becomes obvious that in most production systems animal purchase and feed related costs are the most important. As expected, land costs play a particularly important role for pasture systems.

In the context of this study, feed related costs are the most relevant. The following cost items can be considered feed-related and summarise as follows:

Purchase feed, seed fertiliser, pesticides, machinery depreciation and maintenance, fuel and energy, land (to make pasture systems comparable)

The sum of these items for the different production systems is in the following ranges:

Silage, dairy calf (Fleckvieh):	40-45 percent
Silage, dairy calf (Holstein):	45-50 percent
Silage, weaner:	approx. 25 percent
Feedlot:	approx. 25 percent
Extensive pasture:	approx. 25 percent
Cut & Carry:	30-40 percent

This result suggests that with rising grain and energy prices, silage systems based on calves and starters from dairy origin should be those affected most and feedlots and pasture systems least.

Figures 5.11 to 5.13 show the changes of costs from 2007 to 2010.

2008 vs. 2007 with increasing cost

The cost changes between 2008 and 2007 seem to support the suggestion that – with few exceptions – silage systems – which are found to large extent in EU-countries – were hit most by the rises in grain and energy prices. They are followed by feedlots and pasture systems that show some minor movements in land prices, too.

Apart from livestock price variations in both directions (and with many reasons that are not discussed here now), the major cost changes came from feed purchase and feed production inputs on one hand and 'other cost' on the other hand. The latter contain energy-and labour related costs which are relevant for feed production.

The exchange rate impacts increase the amplitude in all countries except the U.S. From 2008 to 2007, the EUR appreciated 7 percent against the USD. It can further be suggested that in the U.S. the use of cheaper dried distillers grains (DDGS) from ethanol production started to kick in.

In general, it should be noted that feedlots have a relatively low flexibility to react to price variations. They usually have to pay for all inputs and production factors and there is little feed buffer. Many (smaller) farms are family owned and can forgo income in low price periods because their family labour is a residual after all other payments.

Figure 5.11: Cost drivers 2008 vs. 2007 (USD per 100 kg carcass weight)

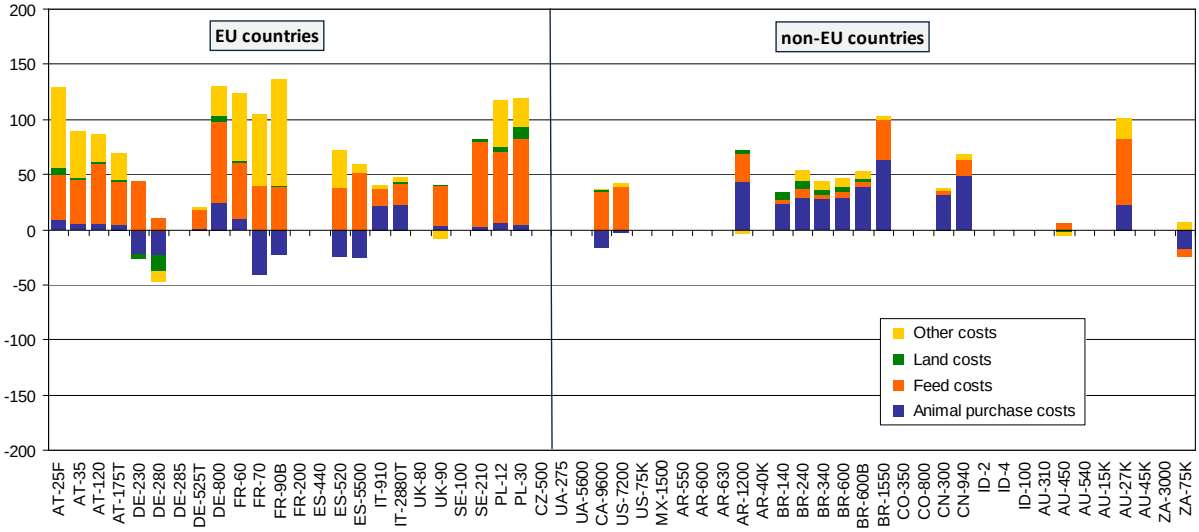


Figure 5.12: Cost drivers 2009 vs. 2008 (USD per 100 kg carcass weight)

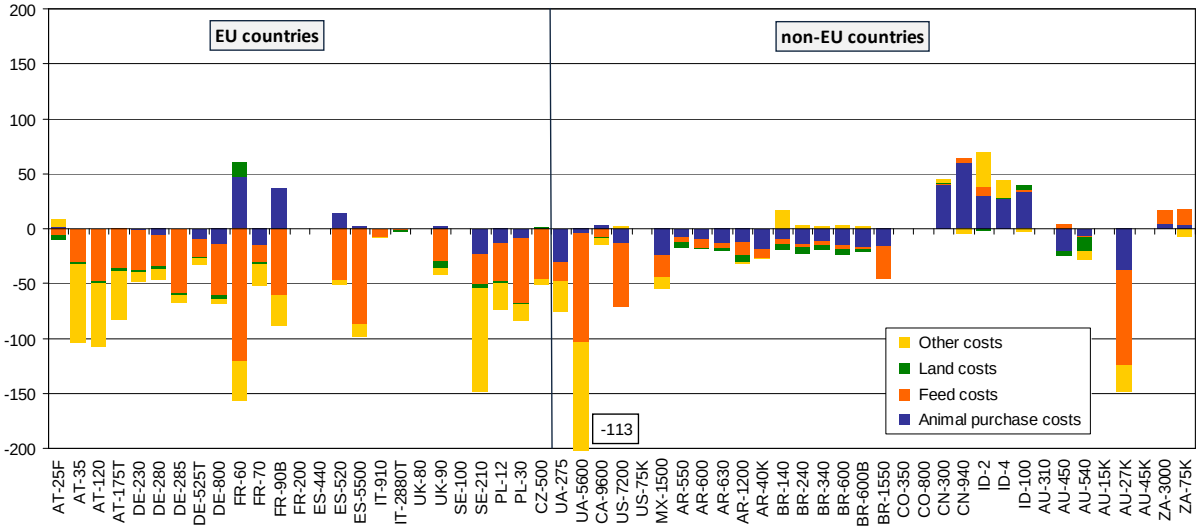
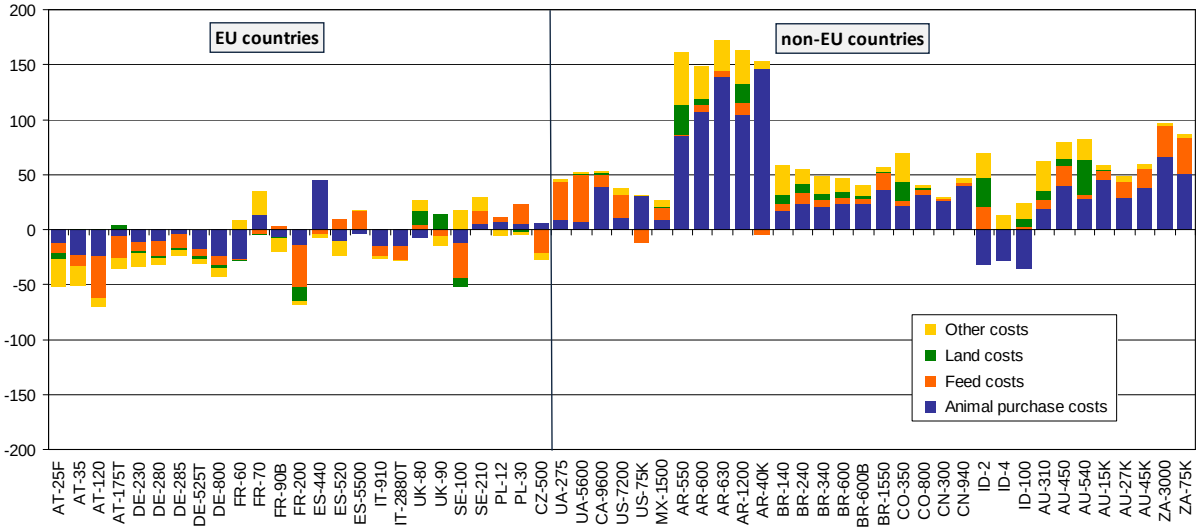


Figure 5.13: Cost drivers 2010 vs. 2009 (USD per 100 kg carcass weight)



Source for all charts: *agri benchmark* 2011, own calculations

2009 vs. 2008 with decreasing costs

In 2009, a great proportion of the cost increases in 2008 were compensated. Feed-related costs were again the main driver and followed the drop in feed prices after the price hikes in 2008. The biggest change took place in the large Ukrainian investor farm. The main reason is that the farm increased cattle numbers production with the same amount of investment and infrastructure it had the year before. This lead to a significant reduction of per unit costs which is typical for growing investor farms in the transition period.

2010 vs. 2009 with inhomogeneous developments

The comparison 2010 vs. 2009 shows significantly different results than the previous years. On the one hand, with few exceptions, costs in the European silage systems went down, the extent again magnified by the exchange rate, this time moving into the other direction. The only eye-catching case is the enormous cost increase of the Argentine farms due to the weaner price increase. On the other hand, costs in the non-European feedlot and pasture systems went up, the pasture system to a similar extent as in the crisis year.

5.4 Profits

Different profit levels

Profits can be measured in different ways. *agri benchmark* defines three different types of profits, depending on the time considered:

Total returns

— cash costs: = Short term profit (1-3 years)

— depreciation = Mid-term profit (3-10 years)

— opportunity costs = Long-term profit (>10 years)

For the time series consideration presented here, the mid-term profit was chosen because some of the farms analysed go back 6 years.

Profit variations are common

Typically, profits show a more or less great variation over time. It is common that year(s) of profits follow year(s) of loss and vice versa. Changes in price relations, yields and productivities are main reasons. The typical farm data shown here would have slightly less variation than individual farm data because a) changes in inventory are not reflected as they are a single-farm specific characteristic and b) the price projections used are regional if not national, thereby levelling out individual farm fluctuations. Nevertheless, as the results show, the variation can be significant.

Like in the cost section in Chapter 5.3, averages of the typical farms were calculated and the result is shown for each country.

European farms with lower profits than non-European farms

The average results in Figure 5.14 and 5.15 show low profitability for beef production in the European farms compared with the non-European farms. The fact that hardly any year shows positive results does not mean that the farms constituting the averages never make a profit. An example is the German top

producer DE-525T which has had a long-term profitability in the last 4 years. Another example are the Ukrainian farms where rising beef prices meet very low livestock prices, resulting in increasing profits over time.

Further, the fact that the beef enterprise is not profitable does not mean that the whole farm operation is unprofitable – decoupled government payments as well as compensation by other enterprises result in positive farm incomes in the vast majority of the farms analysed here. However, from a long-term perspective, this result means that beef production is not viable long-term.

Despite the absence of government payments, the overall profit situation in non-European countries was better than in Europe. China and Indonesia show the highest profits which were driven by rising beef prices. The Brazilian farms also show a stable profitability despite the cost rises reported.

Figure 5.14: Developments of mid-term profits in beef finishing in European countries (USD per 100 kg carcass weight)

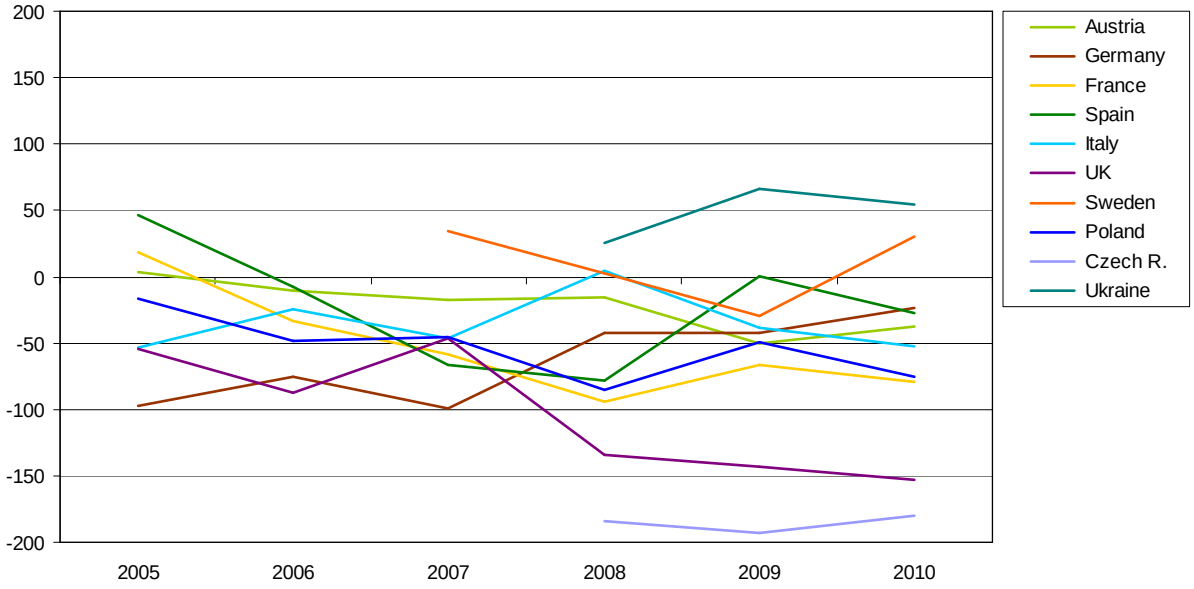
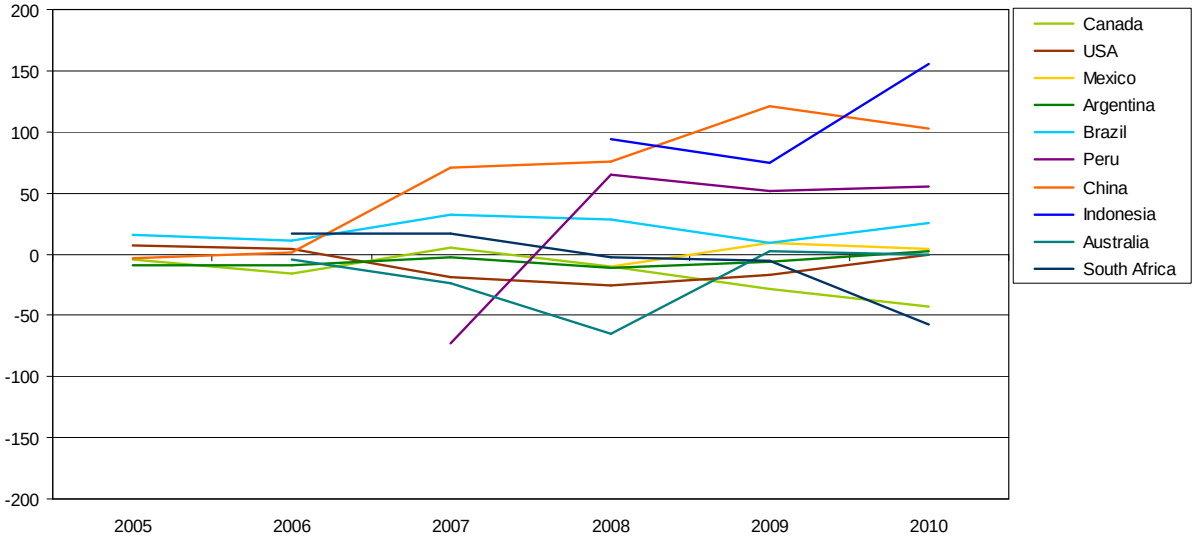


Figure 5.15: Developments of mid-term profits in beef finishing in *non*-European countries (USD per 100 kg carcass weight)



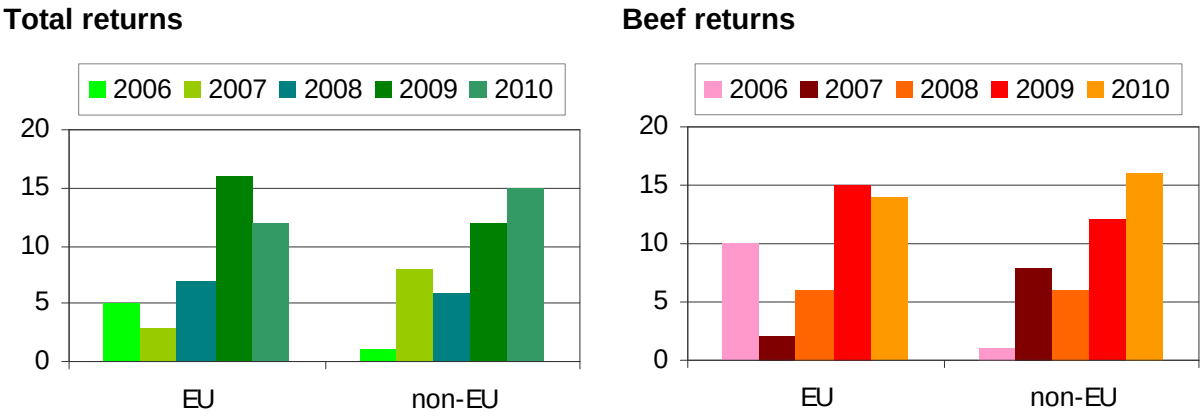
Source for both figures: *agri benchmark* 2011, own calculations

5.5 Summary of returns and costs

The previous chapters have highlighted some relevant return and cost developments in the last years. This step aims to summarise these effects in a cross-country and cross-farm approach.

For this purpose, three indicators were chosen: *Beef returns* (beef prices * quantity produced), *total returns* (beef returns plus government payments) and *total costs*. In a first step, it was analysed in how many cases the return changes were bigger (= more favourable) than the cost changes against the previous year (Figure 5.16). In a second step the extent of these changes to the previous years in absolute and relative terms was analysed (Figure 5.17).

Figure 5.16: Number of cases in which return developments were more favourable than cost developments (based on USD per 100 kg carcass weight)



Source: own calculations based on agri benchmark

The number of cases shown in Figure 5.16 add up to 47 (EU) and 43 (non-EU) for the total returns and 43 (EU) and 42 (non-EU) for the beef returns. The proportion of these cases in the total observations (EU: 107, non-EU 98) are:

- Total returns: EU: 44%, non-EU: 44%
- Beef returns: EU: 40%, non-EU: 43%

The conclusions are:

- In less than half of the cases the changes were in favour of the producers, meaning that over the five years and all farms of their group (EU and non-EU) the (positive) return effects were less than the (negative) cost effects.
- No significant difference between the EU and the non-EU farms can be found. For the beef returns, a slight advantage seems to exist for the EU farms.

In the second step, the extent to which the changes took place, were analysed and are shown in Figure 5.17.

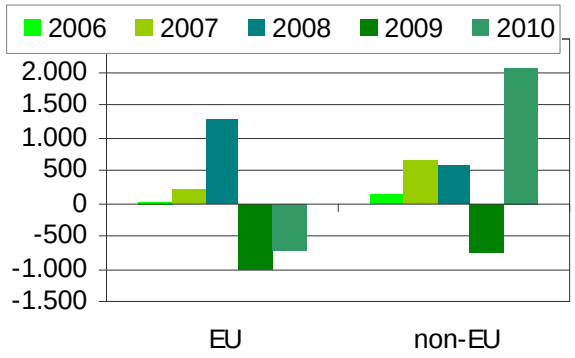
- In absolute terms, return and cost changes show a similar pattern in both the EU and the non-EU farms, indicating a) the correlation between prices and costs and b) the importance of the exchange rate impact.
- For the EU farms, the peaks in 2008 can be explained by a) exchange rate impacts (the EUR was at its peak against the USD) and domestic price hikes, mainly for energy and feed related costs.

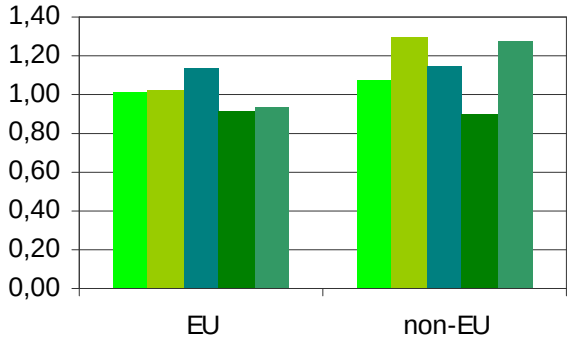
- For the non-EU farms, the peaks in 2010 can be explained by the enormous domestic price increases in Argentina (policy and supply-related) and to a lesser extent in other countries such as Brazil and Australia (mainly exchange rate driven).
- When looking at the relative changes, it seems that price and cost changes in the EU were less pronounced than in non-EU countries

Figure 5.17: Comparing cumulated return and cost changes between EU and non-EU countries 2006-2010 (USD per 100 kg carcass weight)

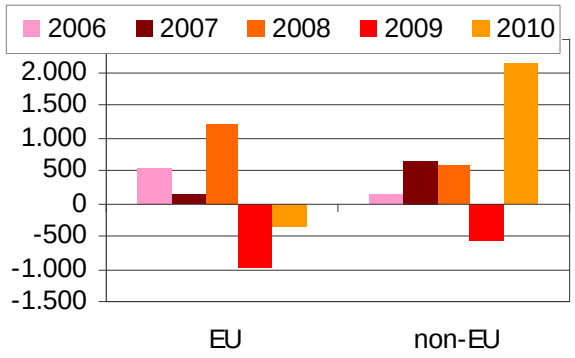
Absolute figures	**Relative figures**

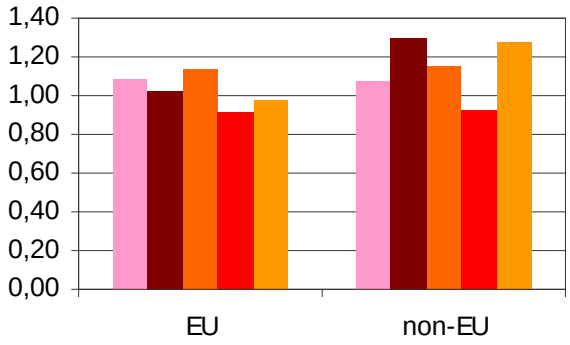
Total returns



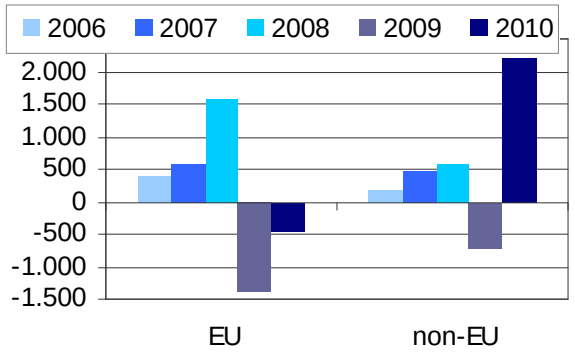


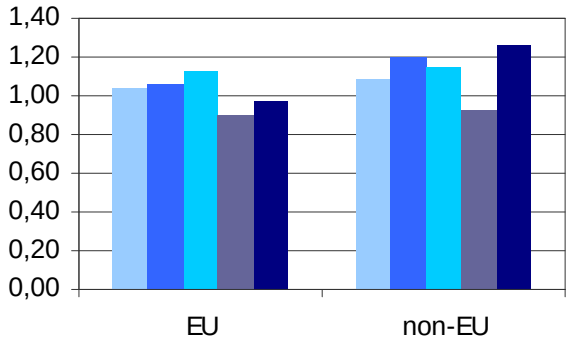
Beef returns





Total cost





Source: own calculations based on agri benchmark

5.6 Conclusions

Comparing the findings of the previous chapters with the initial questions raised in Chapter 2.1, the following can be concluded:

(1) We cannot confirm that the increase in input cost has caused commodity prices to go up. In almost half of the cases the beef price rises were higher than the cost rises. Further, it appears reasonable that in some countries, especially in China, Indonesia and Brazil, increasing demand as a result of positive income developments have a bigger impact on beef prices than rising cost of production. This particularly applies to pasture systems operating with relatively low proportions of purchased inputs such as feed and fertilisers.

(2) Over the five years analysed, the increase in returns has been compensated by increases in cost in roughly half of the cases analysed but not so in the other half of the cases. The hypothesis that increases in returns have been eaten up by increases in costs cannot be confirmed.

(3) The analysis also shows that EU farms were not hit harder by the cost increases than their colleagues in non-EU countries in the 5 years period considered.

(4) The results are nevertheless not as clear as for the Cash Crop analysis. The reasons are:

   a) In cash crop production, the proportion of inputs which experienced significant price increases is relatively low.

   b) Crop prices increased as a result of increased demand for human consumption, feed for livestock and use for biofuels.

   c) The increased crop prices have a more or less high proportion in the total costs of beef production. In the short-term, they are reflected in purchase feed prices and costs, in the mid-term, they are reflected in opportunity costs for on-farm produced feed and land prices.

   d) In the cash crop analysis, more cost items were kept constant over time than in the beef analysis. However, these costs have experienced much lower price increases over the period considered than the analysed input prices. It is therefore not expected that their reflection in the analysis would lead to significantly different findings.

6 References

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7 Annex

Explanation of farm names

Farm names are composed by a two digit country abbreviation (domain name) and a number, indicating the total hectares (in cash crop) and the total number of finished animals sold per year (in beef).

AR Argentina
AT Austria
AU Australia
BR Brazil
CA Canada
CN China
CO Colombia
CZ Czech Republic
DE Germany
DK Denmark
ES Spain
FR France
ID Indonesia
MX Mexico
PE Peru
PL Poland
SE Sweden
UA Ukraine
UK United Kingdom
US USA
ZA South Africa