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Impact of EU Council Directive 99/74/EC 'welfare of laying hens' on the competitiveness of the EU egg industry, update base year 2003

Contents

Preface

Within the European Union conventional cages will be banned by the year 2012. Because of animal welfare concerns, cages for the housing of laying hens will have to be enriched from 2012 (Council Directive 1999/74/EC). Production in enriched cages will increase the production cost of eggs. At the same time the World Trade Organisation (WTO) launched a new round of negotiations to further liberalise trade in agricultural products. A reduction in the basic level of EU import tariffs for eggs and egg products is being discussed in this WTO round.

In this report the Agricultural Economics Research Institute (LEI), an independent research institute within the Wageningen University and Research Center (WUR) in the Netherlands, provides the results of a study on the impact of the EU Directive 1999/74/EC on the EU egg industry. The production costs for eggs and egg products are calculated for several EU and non-EU countries. Based on the data for 2003, a projection is made towards 2012 after implementation of enriched cages in the EU countries. Within several scenarios, the increase in production costs, as a result of the use of enriched cages in 2012, is combined with different levels of import levies. It should be stated that the specific German situation is not taken into account within this report. According to the German order for keeping laying hens (October 2001) conventional cages will be banned from 1 January 2007 and from 2012 enriched cages would be prohibited. This means much stricter rules for German poultry farmers compared to the rest of the EU.

The study is initiated by the EUWEP, (the EU trade association for Egg packers, Traders and Processors) and is funded by the British Egg Industry Council (BEIC), the Asociacion Espanola de Productores de Huevos (ASEPRHU), the Unione Nazionale dell'Avicoltura (UNA) and the Product Boards for Livestock Meat and Eggs (PVE) This report is an update of an earlier study with the same title and published in February 2003.

We believe that this report provides an accurate assessment of the consequences of the EU Directive 1999/74/EC on the EU egg industry in general and especially for EU egg processors.

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Director General LEI B.V.

Summary

The European Union has introduced new animal welfare legislation in the form of Council Directive 1999/74/EC. This will prohibit the use of the conventional cage from 2012, but authorises the use of enriched cages (and non-cage systems). The cost of production will increase in all systems. However, the cost increase will be the lowest in enriched cages. At the same time a new round of World Trade Organisation (WTO) negotiations are underway, aimed at further liberalising trade in agricultural products, with a reduction in the basic level of EU import tariffs for eggs and egg products being discussed.

In this report LEI researched the production cost of table eggs and whole egg powder in the main EU egg producing countries: the Netherlands (NL), France (FR), Germany (DE), Spain (ES), Italy (IT) and the United Kingdom (UK) and the non-EU countries: Poland (PL) (who joined the EU in 2004), Ukraine (UKR), the United States of America (USA), Brazil (BR) and India (IN). In all countries data are collected on prices (feed, young hens), technical results (egg production, feed intake, mortality), investment (poultry house, cages) and other costs (interest rate, labour, manure disposal). For egg processing, data are collected on investment in buildings, equipment and labour cost. The base year for the data was 2003. The total costs were converted to euro's with the average exchange rate in the year 2003.

Based on the 2003 results, we extrapolated the situation towards 2012. For 2012, we took into account the following changes:

- the implementation of enriched cages, being the minimum standard for egg production within the EU in 2012. Based on extensive calculations, it was concluded that the production cost of eggs produced in enriched cages, compared to conventional cages with 550 cm^2 per hen (EU minimum standard from 2003), will increase by almost 10%;
- no changes in feed price for layers. It was assumed that the effects of Agenda 2000 have already been incorporated in the prices of feed in the year 2003. This means that there is no longer a difference in price for feed grains between the EU and the rest of the world;
- a change in import levies for eggs and whole egg powder. A reduction of 36% similar to the change in the Uruguay Round Agreement on Agriculture (as the December 2002 European Commission's WTO negotiating proposal) is assumed;
- lower exchange rate for the currency of the non-EU countries. In the scenarios a 10% lower exchange rate was assumed. A comparison of the exchange rate in 2004 and 2003 (used in the basic scenario) showed a 9% decrease of the rate of the US dollar.

The results for the situation in 2012 are presented in tables 1 and 2. Table 1 provides the production cost of whole egg powder in the EU after implementation of the EU welfare Directive 1999/74/EC compared to the USA, Ukraine, India and Brazil. The column 'total' gives (per country) the production cost including import levy and transport to Germany.

This is the 'best case scenario' with the full import levy and no change in exchange rates for the non-EU currency.

Table 1 Offer price of whole egg powder (in euro cents per kg) in Germany in 2012 with full (2003 level) import levy and no change in exchange rate of currency(2003 level)

	Production cost	Transport	Import levy	Total	Difference (% of EU total)
EU 15	456	3	-	459	-
USA	330	17	137	484	105
Ukraine	320	9	137	466	101
India	276	21	137	434	94
Brazil	263	21	137	421	92

India and Brazil can offer whole egg powder at a lower price than the EU countries. Table 2 gives the 'worst case scenario' with a 36% decrease in import levy and a 10% devaluation of the exchange rates for the non-EU currency.

Table 2 Offer price of whole egg powder (in euro cents per kg) in Germany in 2012 with lower import levy (-36%) and 10% devaluation of the currency exchange rate in non-EU countries

	Production cost	Transport	Import levy	Total	Difference (% of EU total)
EU 15	456	3	-	459	-
USA	297	17	88	402	87
Ukraine	288	9	88	385	84
India	248	21	88	357	78
Brazil	236	21	88	345	75

In this scenario all countries, including the USA and Ukraine, can offer whole egg powder at a lower price than the EU countries.

Competition is not only based on price. Other factors like quality of the product, good distribution/logistics and quick response to changes in the market can be crucial in marketing a product. To obtain an idea of the characteristics of the egg products market, a survey was conducted in order to quantify the most important purchasing factors. On the basis of this qualitative study (Tacken, 2003) it appears that price and microbiological composition are the most important purchasing factors. Both of these factors score 35%. The producer of egg products (traditional versus innovative) scores 20% and less important are the housing system (cage, barn or free range eggs) and country of origin (local, Europe

or world) with 7 and 2% respectively. It can be concluded that, given a certain minimum quality level of the product, the market for egg products can be described as a price market.

In general it can be concluded that:

- compared to the average level within the EU the production costs of whole egg powder in 2003 were lower in Poland (87%), Ukraine (75%), USA (78%), India (65%) and Brazil (62%). For whole egg powder the competition of non-EU countries, especially from Brazil and India, is a real threat. The transport cost of whole egg powder is relatively cheap and the levy on imports is even too low to prevent Brazilian producers of whole egg powder to export their products to the EU market. If there were to be no levies on imports, all suppliers of whole egg powder from the non-EU countries investigated would be very competitive on the EU market, already in 2003. It has to be recognised that, in contrast to shell eggs, there are no disadvantages on declining product quality after long distance transport of whole egg powder;
- in the year 2012 the EU Directive 'welfare of laying hens' will be fully implemented on poultry farms in the European Union. Production of eggs in enriched cages will give the lowest production cost. Compared to the traditional cage the cost for housing, feed and labour will be increased. It can be expected that the design of enriched cages will be further improved to obtain good technical results. Even with good enriched cages the increase in cost will be approximately 10%;
- in 2012 the production cost of shell eggs in the EU is on average, and including cost of transport, 82 eurocent per kilogram. The results of the scenario calculations show that in a competition on the German market for shell eggs, the Ukraine, USA, Brazil and India cannot compete on price. This is a result of high cost for transportation and import levies. However, in scenario 4, with a 36% lower import tariff and a 10% lower exchange rate, Ukraine could compete, and Brazil also becomes a threat;
- in 2012 the production costs of whole egg powder in some non-EU countries are predicted to be lower in comparison to the EU. In a situation where import levies and currency exchange rates remain unchanged Brazil and India will be competitive on the European market. Including transport and import levy the offer price from Brazil and India is respectively 8 and 6% below the EU price. Ukraine remains slightly (1%) more expensive than the EU-countries. With a 36% lower import levy and a 10% devaluation of the dollar exchange rate, also the USA and Ukraine could be competitive. In this 'worst-case scenario' offer prices of whole egg powder in Frankfurt could be approximately 15% (Ukraine, USA) to even 25% (Brazil, India) below the average EU level;
- the market for egg products can be described as a price market. Given a minimum level of quality, manufacturers compete on price. It can be assumed that the quality of American whole egg powder will be equal to European quality. In the year 2012 imports of large volumes of egg powder can be expected from the USA or, depending on the quality, from 'low cost' countries like India and Brazil;
- in the countries outside the EU 15 mentioned in this report there are no animal welfare regulations to protect laying hens. However, in the USA there is a voluntary program to increase the space allowance per hen (towards 432 cm^2 in 2009). Over 80% of the US industry is participating with those guidelines. However, it is unclear if those welfare guidelines will be accepted by egg processors. In Brazil, India and

Ukraine layers are kept in cages with a space allowance of 300 to 400 cm^2 per hen. Calculations of the University of California show that, purely from an economic point of view, 300 to 400 cm^2 per bird gives the highest income for the poultry farmer.

1. Production cost of eggs in 2003 in selected countries

1.1 Production cost of eggs in some EU countries

The production cost of shell eggs produced by hens housed in conventional cages has been researched for the following countries: the Netherlands (NL), France (FR), Spain (ES), Germany (DE), Italy (IT) and the United Kingdom (UK). The results presented in figure 1.1 relate to the year 2003. The figure also provides an insight into the build up of primary production costs. All costs in this report are given in euro's.

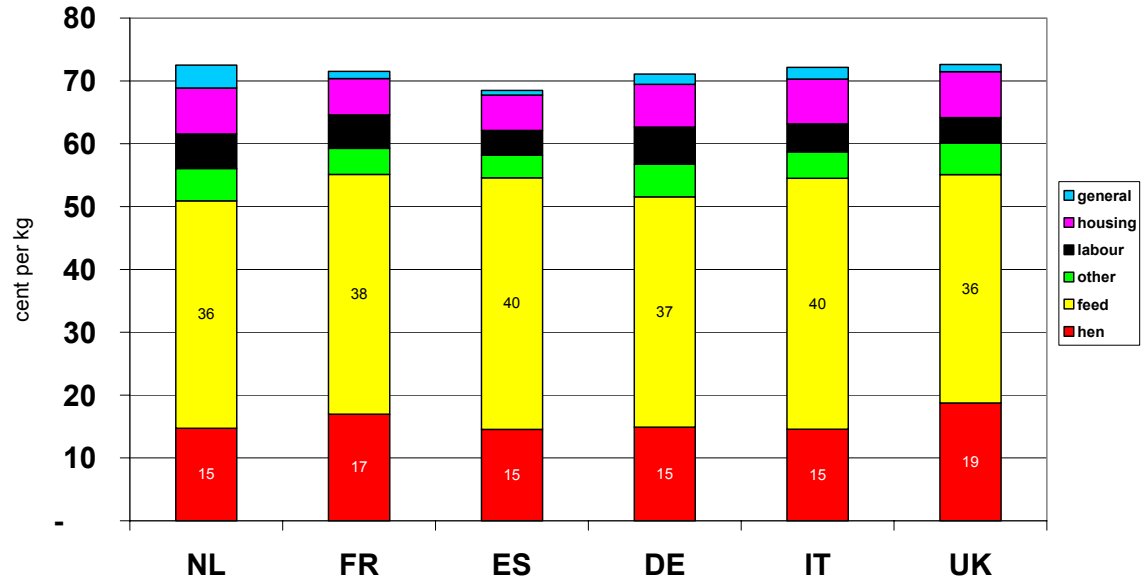

Figure 1.1 Cost of primary production in conventional cages in EU countries (cents per kilogram egg) in 2003

The costs of primary production (in cents per kilogram eggs) are the highest in the United Kingdom (72.6 cent). The cost in the Netherlands (72.5), Italy (72.1), France (71.5) and Germany (71.1) are approximately 1 to 2% lower. In Spain (68.5) the cost of production is at the lowest level of the selected EU countries. In figure 1.1 the hen costs are defined as the hen cost at 20 weeks minus the revenue of the spent hen (see table 1.2).

In table 1.1 the starting points are given which are used for the calculations. Table 1.2 indicates the results.

Table 1.1 Starting points for egg production in some EU countries in 2003

	NL	FR	ES	DE	IT	UK
Feed price (euro/100 kg)	17.7	18.0	18.6	17.2	19.0	17.1
Price per hen at 20 wk (euro)	3.26	3.40	3.15	3.25	3.18	3.78
Laying period (days)	400	355	393	385	389	392
Eggs per hen	334	295	318	325	319	320
Egg weight (g)	62.4	63.3	63.4	62.0	64.0	63.0
Feed conversion	2.04	2.12	2.15	2.13	2.10	2.12
Mortality (%)	6.5	6.5	8.0	6.8	7.1	5.2

Table 1.2 Costs of primary production (in cents per kilogram of egg) in some EU countries in 2003

	NL	FR	ES	DE	IT	UK
Total costs inclusive labour	72.5	71.5	68.5	71.1	72.1	72.6
Total costs exclusive labour	67.0	66.2	64.5	65.2	67.7	68.6
Hen cost at 20 weeks	15.6	18.2	15.6	16.1	15.6	18.8
Feed	36.2	38.2	40.0	36.7	39.9	36.3
Other	5.1	4.1	3.6	5.2	4.2	5.0
Labour	5.5	5.3	4.0	5.9	4.4	4.1
Housing	7.3	5.8	5.6	6.8	7.1	7.3
General	1.1	1.1	0.9	1.2	1.1	1.2
Manure disposal	2.5	-	-0.2	0.5	0.8	-
Revenue spent hen	-0.9	-1.2	-1.1	-1.2	-1.0	-

The differences in costs for the primary production are mainly caused by differences in feed costs, the price of young hens, housing costs and manure disposal costs. Within the EU countries the prices of feed in the UK and Germany are the lowest and the prices in Spain and Italy are the highest. Despite the relatively expensive feed, young hens are relatively cheap in Spain and Italy. While Dutch farms have good technical results, the production cost in a EU context is relatively high. This is caused by higher housing costs, but also particularly by high manure disposal costs.

1.2 Production cost of eggs in some non-EU countries

The production cost of consumption eggs has been researched for the following non-EU countries: Poland (PL; EU-member since 2004), Ukraine (UKR), the United States of America (USA), Brazil (BR) and India (IN). The results presented in figure 1.2 relate to the year 2003. The figure also provides an insight into the build up of primary production costs, and includes a comparison with the average EU level.

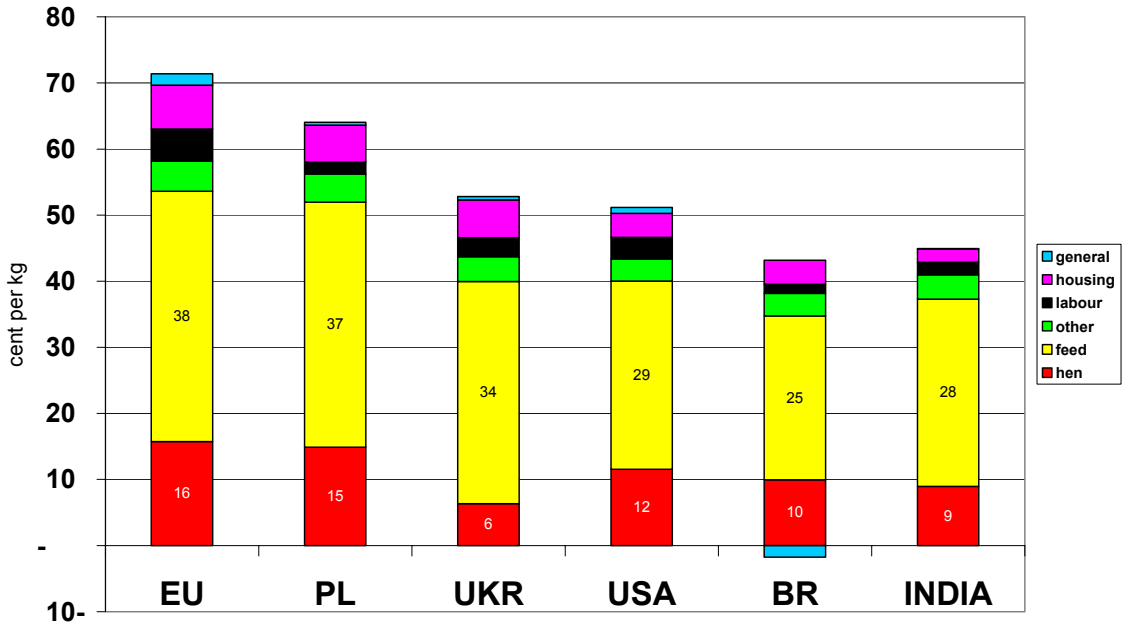

Figure 1.2 Cost of primary production in conventional cages in EU and non-EU countries (cents per kilogram egg) in 2003

The costs of primary production in Poland are 10% lower than in the EU. In Ukraine and the USA the costs are 26 and 28% lower than the EU-level. The production costs are very low in Brazil and India. In fact the costs are respectively 42 and 37% lower than the average cost of primary production in the main EU countries. In figure 1.2 the hen costs are defined as the hen cost at 20 weeks minus the revenue of the spent hen (see table 1.4). General costs are the actual general costs plus the manure disposal costs, or minus the revenue of manure.

Table 1.3 gives an overview of the starting points used for the calculation and table 1.4 indicates the results.

Table 1.3 Starting points for egg production in some non-EU countries in 2003

	EU	PL	UKR	USA	BR	IN
Feed price (euro/100 kg)	18.0	16.9	14.0	13.6	11.5	12.9
Price per hen at 20 wks (euro)	3.34	3.10	2.75	2.29	2.28	2.10
Laying period (days)	386	395	395	400	395	392
Eggs per hen	319	310	307	324	316	315
Egg weight (g)	63.0	62.5	62.5	61.3	62.0	56.0
Feed conversion	2.11	2.20	2.40	2.09	2.15	2.19
Mortality (%)	6.7	8.0	10.0	7.5	8.0	7.5

Table 1.4 Costs of primary production (in cents per kilogram of egg) in conventional cages in some non-EU countries

	EU	PL	UKR	USA	BR	IN
Total costs inclusive labour	71.4	64.1	52.8	51.2	41.4	44.9
Total costs exclusive labour	66.5	62.2	49.9	47.9	40.0	43.0
Hen cost at 20 weeks	16.7	16.0	14.3	11.5	11.6	11.9
Feed	37.9	37.1	33.6	28.5	24.8	28.3
Other	4.5	4.2	3.7	3.3	3.4	3.7
Labour	4.9	1.8	2.9	3.3	1.4	1.9
Housing	6.7	5.6	5.7	3.6	3.6	1.9
General	1.1	0.7	0.5	0.9	0.6	0.7
Manure disposal	0.6	-0.3	-	-	-2.4	-0.6
Revenue spent hen	-0.9	-1.1	-8.0	-	-1.7	-2.9

The differences in costs for the primary production are mainly caused by differences in the costs of feed, young hens, labour and housing. For Brazil, the revenues for manure disposal are also relevant. In the Ukraine the extra value of the spent hens means a greater than 7 cents reduction of the net production costs, compared to the EU.

1.3 Processing cost of whole egg powder in some EU countries

Besides the cost of primary production, the processing costs also play an important role in the international comparison of competitiveness. Figure 1.3 provides detailed information about the cost of production of whole egg powder, in terms of cents per kg (in going) shell egg. The processing costs amount to approximately 30% of the cost of primary production. It is clear that the level of labour costs mainly determines the differences in processing costs between the selected EU countries. The difference between the cost levels of the three most expensive countries (Netherlands, Germany and France) and the cheapest countries (Spain) is around 10%.

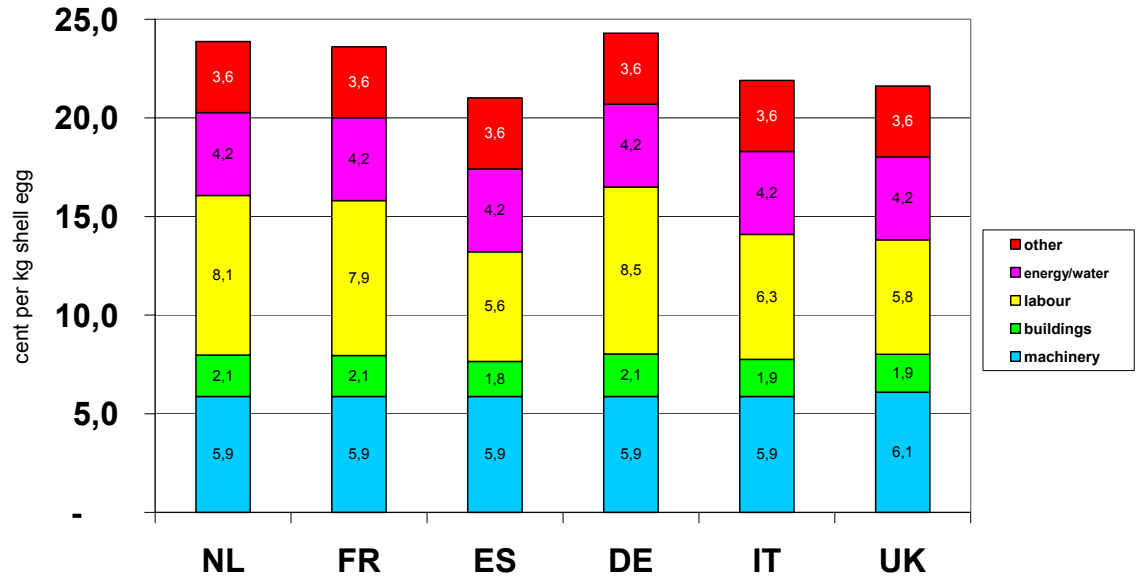

Figure 1.3 Cost of processing in EU countries in cents per kilogram of shell egg in 2003

1.4 Processing cost of whole egg powder in some non-EU countries

With regard to the processing costs in the non-EU countries, figure 1.4 shows that Ukraine, Brazil and India are 21 to 30% cheaper than the average EU level, mainly because of very low wages. The total processing costs in the USA are only 4% lower than in the EU.

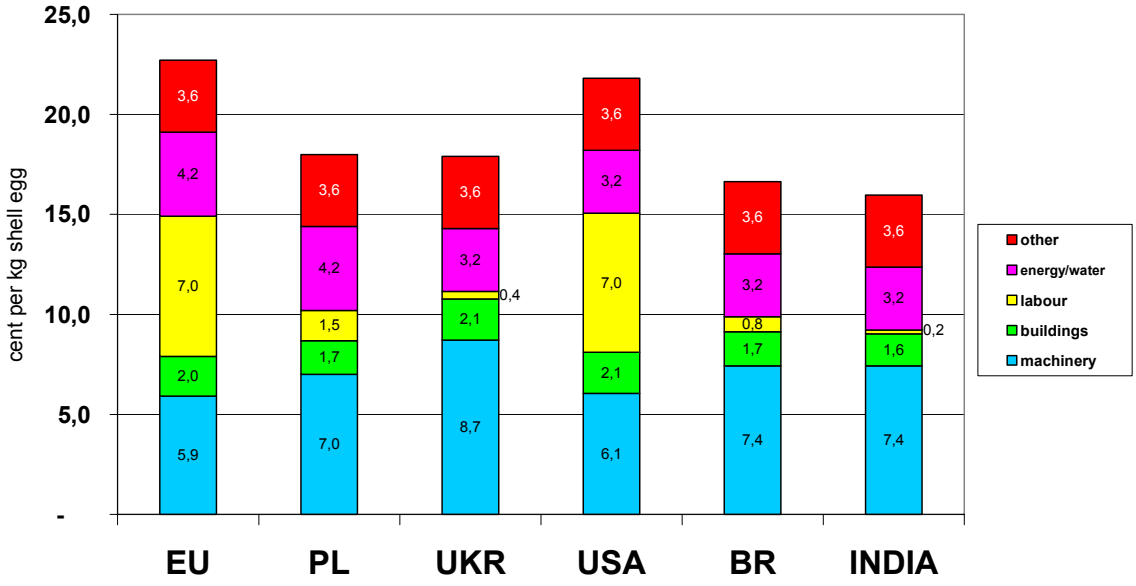

Figure 1.4 Cost of processing in EU (average) and non-EU countries in cents per kilogram shell egg in 2003

1.5 Total cost of production and transport of shell eggs

In order to form an idea of the transport costs from the major production area of a country to an EU market region, in this case Frankfurt am Main in Germany, the transport costs have been added to the production costs on the basis of a full load of shell eggs. For that purpose an offer price in Frankfurt am Main has been calculated. The results clearly indicate that it is not possible for the egg producers in the selected non-EU countries to compete in the supply of shell eggs in Germany in 2003. The horizontal line indicates the EU level of total costs, including the 4 cent/kg cost of transport to Frankfurt. Poland and the Ukraine could have been a threat for the EU egg producers, but the current 30.4 cents/kg levy on imports is quite an adequate barrier to prevent non-EU countries from exporting their shell eggs to the EU market. Figure 1.5 also shows that imports from American, Indian and Brazilian producers will be competitive in a situation without import levies. However, a serious problem will be the quality of the eggs after being transported long distances.

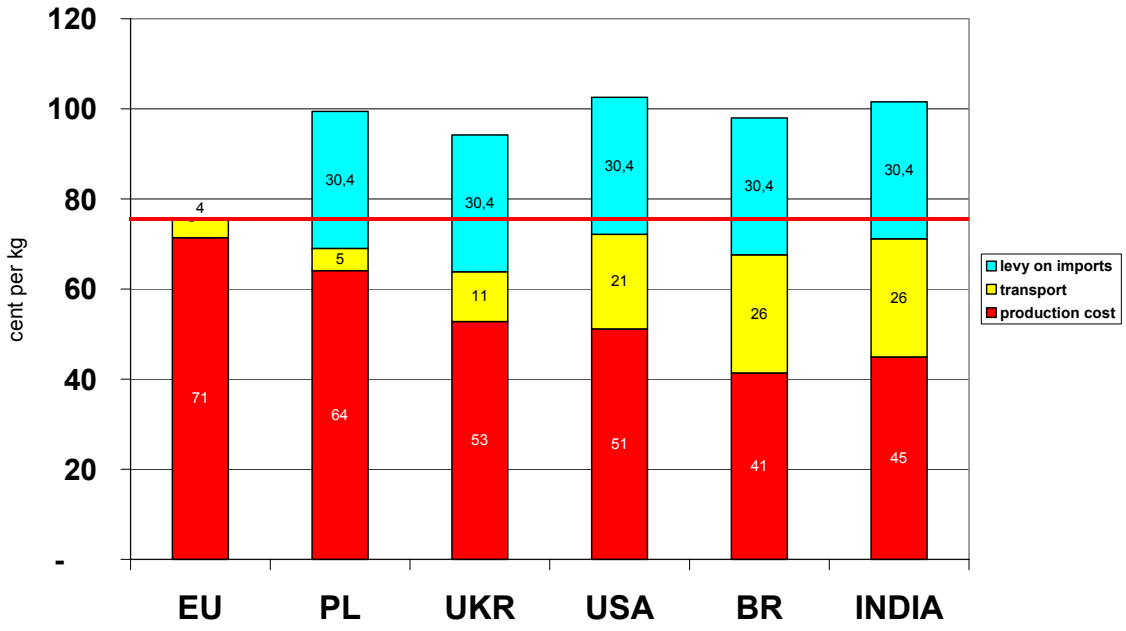

Figure 1.5 Offer price of shell eggs in Germany from EU (average) and non-EU countries in cents per kilogram shell egg in 2003

1.6 Total cost of production and transport of whole egg powder

For whole egg powder the calculated offer price in Frankfurt am Main in 2003 is shown in figure 1.6.

Figure 1.6 shows that for whole egg powder the competition of non-EU countries, especially from Brazil and India, is a real threat. The levy on imports is even too low to prevent Brazilian producers of whole egg powder from exporting their products to the EU market. If there were to be no levies on imports, all suppliers of whole egg powder from the non-EU countries investigated would be very competitive on the EU market, already in 2003. It has to be recognised that, in contrast to shell eggs, there are no disadvantages on declining product quality after long distance transport of whole egg powder.

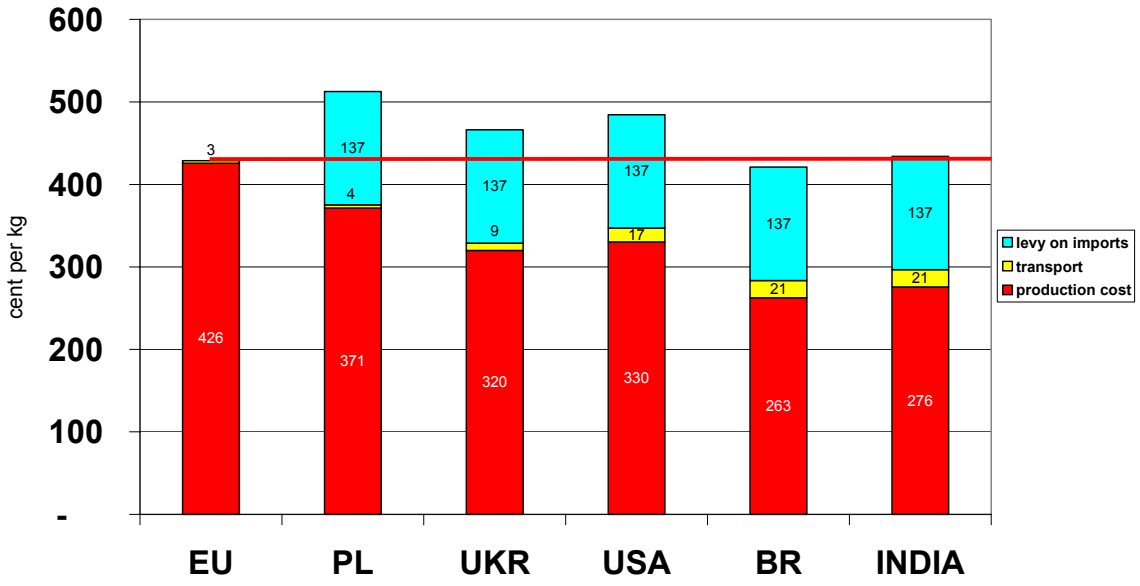

Figure 1.6 Offer price of whole egg powder in Germany from EU (average) and non-EU countries (cents per kilogram)in 2003

2. Production cost of eggs in 2012

2.1 Increase in production cost after implementation of EU Directive 99/74/EC

In June 1999 the European Agricultural Council decided that, after a transition period, laying hens would be housed exclusively in so-called enriched cages or in alternative (non-cage) systems. The enriched cage gives each hen 750 cm^2 surface area, increased height, a perch, a nest box and litter. The alternative system described in the EU Directive most resembles the aviary system, as has been known for many years in the Netherlands. Each hen has 1,100 cm^2 living space, (part of) the surface area of the pen is covered with litter and in the pen there are enough nest boxes and perches for the animals. In 2012 two different housing systems can be distinguished:

- *enriched cages*. In comparison to conventional battery cages the group size is enlarged. The cage is complete with a nest box, perch and litter according to EU standards;
- *aviary systems*. This system is based on floor accommodation (comparable to barn housing) whereby via levels the hens can also use the vertical space in the house. An amendment to the EU egg marketing regulations allows eggs from an aviary system to be marketed as barn eggs.

The welfare Directive required that from 1st January 2003 the stocking density in conventional cages is increased from 450 cm^2 to 550 cm^2 per hen. As a result for 4 different situations the production cost of eggs will be calculated: a conventional cage with 450 cm^2 per hen (situation 2001), a conventional cage with 550 cm^2 per hen (situation 2003), the enriched cage and the alternative system (aviary).

2.1.1 Starting points

The production costs of eggs have been calculated for both systems mentioned. It is clear that with the enriched cages there is little practical experience. This means that the calculations are indicative. While current research is demonstrating promising results, there are still uncertainties particularly in the field of technical results (egg production, quality of eggs, mortality of hens) and the labour requirements. The main assumptions for labour and investments for various housing systems are in table 2.1.

Table 2.1 Main assumptions for labour and investments in the various housing systems for laying hens (based on the situation in the Netherlands, prices including Value Added Tax)

	Cage (450 cm^2)	Cage (550 cm^2)	Enriched cage	Aviary
Labour:				
- number of hens per worker	50,000	50,000	45,000	35,000
Buildings:				
- density (hen per m^2)	30	24	17	18
- surface area per house (gross m^2)	1,890	2,312	3,017	2,014
Investment:				
- housing (Euro per hen housed)	7.75	9.48	13.75	11.77
Inventory (Euro per hen housed)	7.50	9.38	12.59	10.45
- other inventory (Euro per hen housed)	3.18	3.64	4.55	4.55

The figures in table 2.1 show that increasing the space allowance per bird will lower the bird density per m^2 of poultry house. As a result the investment for housing and equipment will increase. For the enriched cage and the aviary, the labour needs and investments for house and equipment per place per hen are increasing. The basic assumptions for the technical results are in table 2.2. The most important point of difference from the conventional cage is the higher feed consumption; this is caused by lower density on the one hand and higher level of movement of the hens on the other.

Table 2.2 Main assumptions for the production results in the various housing systems for laying hens

	Cage (450 cm^2)	Cage (550 cm^2)	Enriched cage	Aviary
Laying period (days)	400	400	400	385
No. of eggs per hen housed	334	334	334	316
Mortality (%)	6.50	6.50	6.50	9.00
Feed consumption/hen/day (gram)	109	110	115	121

2.1.2 Production costs

On the basis of the accepted debit terms the costs for house and equipment are calculated for all housing systems. All variable costs are also calculated for each system (electricity, litter etcetera). The complete results are in figure 2.1 and table 2.2.

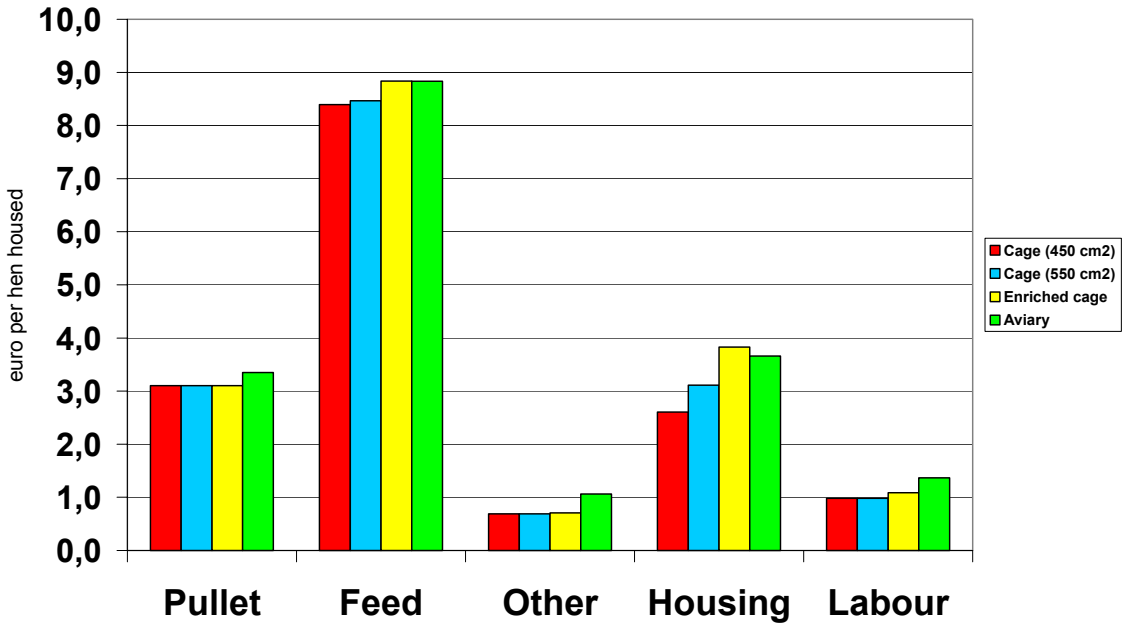

Figure 2.1 Break up of the production cost for various housing systems for laying hens (in cent per hen housed

In the enriched cage, the production costs in relation to the situation in 2001 (conventional cage accommodation with 450 cm^2 per hen) are 13.7% higher. In the aviary system this is +22.3%. The increase compared to the situation in 2003 (conventional cage accommodation with 550 cm^2 per hen) are 9.6% for enriched cages and 17.9% for the aviary

Table 2.3 Production cost (in euro) for various housing systems for laying hens (based on the situation in the Netherlands),(prices including Value Added Tax)

	Cage (450 cm^2)	Cage (550 cm^2)	Enriched cage	Aviary
Cost (in euro) per hen housed:				
Pullet (17 weeks)	3.10	3.10	3.10	3.35
Feed	8.39	8.47	8.84	8.83
Variable costs	0.69	0.69	0.71	1.06
Housing	2.31	2.81	3.82	3.24
Labour	0.98	0.98	1.09	1.37
General costs	0.30	0.30	0.33	0.42
Revenue spent hen	0.29	0.29	0.29	0.34
Total cost	15.48	16.06	17.59	17.94
Total cost per egg (eurocent)	4.63	4.81	5.27	5.68
Total cost per kg (euro)	0.74	0.77	0.84	0.91
Increase, % (base 450cm2)		3.7	13.7	22.3
Increase, % (base 550cm2)			9.6	17.9

system. The conclusion is that after implementation of EU Directive 99/74/EC the housing system with enriched cages produces eggs at the lowest cost. The production costs in aviaries are 0.4 cents per egg higher compared to the enriched cages. This means that from the market a bonus must be achieved to keep the income for the poultry farmer at a constant level.

2.2 Impact of EU reform on the feed price

The market and price policy of the EU is an important factor in the development of the layer sector due to the fact that the price of grain was kept at a significantly higher level than the world market. At the same moment grain substitutes could be imported without virtually any import restrictions. As a result, the areas near seaports in particular could obtain relatively cheap feed. The costs of animal feed largely determine the location of the intensive livestock farming. This section attempts to demonstrate the extent to which recent changes in the European grain policy have had an effect on the costs of feed for poultry in the EU countries in the present situation and with respect to the year 2012.

Historical data show that prices of grains and alternative feed raw materials did decrease during the last 15 years. This decrease started prior to the time when the intervention price for grains was reduced within the framework of the 'MacSharry' reforms. It is evident that more recently the proposals of the European Commission to reduce the prices of grain - initially within the framework of the so-called 'MacSharry' reforms and later within the framework of Agenda 2000 - are effective. Within Agenda 2000 the intervention price for feed grain was reduced in the marketing year 2000/2001 by a total of 15% in two equal stages.

The calculations of the production costs of the various countries are based on the feed prices of laying mash in those countries during the calendar year 2003. It is assumed that the effects of Agenda 2000 have already been incorporated in the prices of feed in the year 2003. In concrete terms, this means that there is no longer a difference in price for feed grains between the EU and the rest of the world.

2.3 WTO effects on EU import tariffs

In the scenarios for the year 2012 the impact of a further decrease in import levies is calculated. A 36% reduction on import levy is based on the EU proposal of Commissioner Fischler (December 16, 2002). This reduction is similar to the reduction on import levies on egg and egg products from the WTO Uruguay Round.

2.4 Change in exchange rates

Figure 2.2 shows the development of the exchange rates of the US Dollar, Brazilian Real and Indian Rupee to the Euro from 1999 to 2004. A comparison of the exchange rates in

2004 and 2003 shows a 9% decrease of the rate of the US dollar to the euro, and also the exchange rates of the Real and the Rupee have slightly decreased.

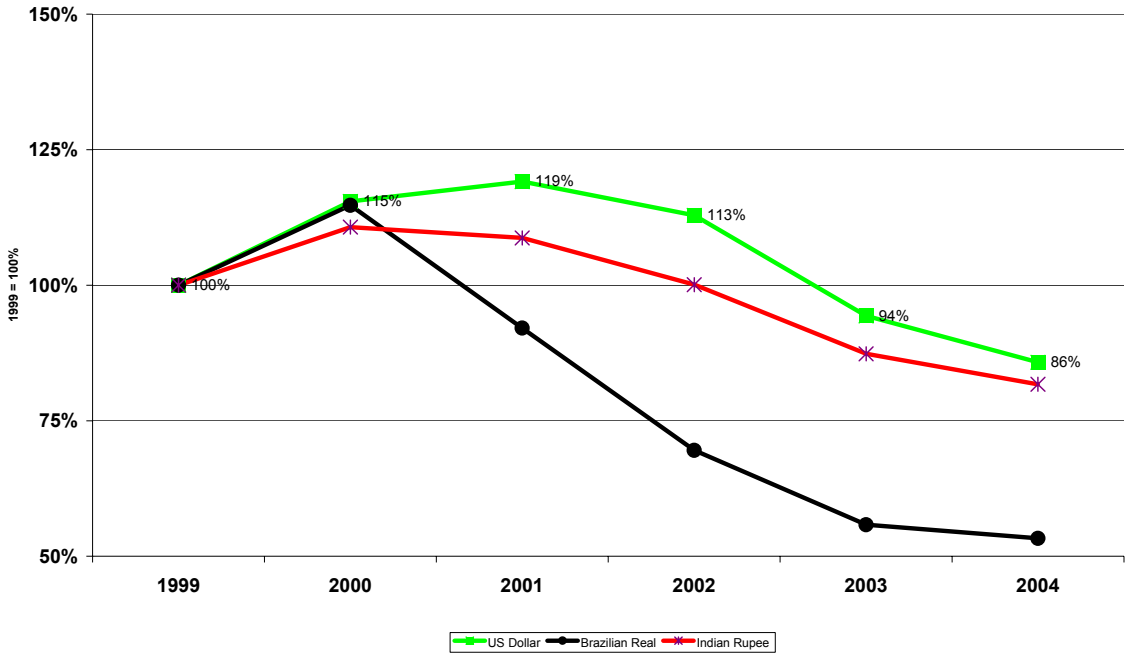

Figure 2.2 Development of exchange rates of US Dollar, Real and Rupee 1999-2004 (1999=100%) in relation to the euro

In the scenarios for 2012 a further decrease in exchange rates is calculated. From the situation in 2003 a further decrease in exchange rate is one of the possibilities. Considering last year's decrease of the US Dollar-rate a 10% lower exchange rate for the currencies of the non-EU-countries in 2012 seems a reasonable assumption.

Within the change in exchange rate there is no correction made for a change in costs of imports (e.g. feed ingredients or equipment).

3. Results of different scenarios towards 2012

To show the possible impact of the EU welfare Directive 99/74/EC on EU egg producers and egg processors, several scenarios for the situation in the year 2012 have been developed. Besides the increase in cost due to the implementation of the EU welfare Directive, there are two other determining factors that are crucial:

1. the possible changes in the levy on egg (product) imports, according to new WTO-agreements;
2. changes in exchange rates of US Dollar, Brazilian Real, Ukraine Hryvnia and Indian Rupee.

It is assumed that the effects of Agenda 2000 have already been incorporated in the prices of feed in the year 2003. This means that there is no longer a difference in price for feed grains between the EU and the rest of the world.

In this chapter four different scenarios have been examined: at first a basic scenario (see paragraphs 2.1 and 2.2), at second a scenario based on a 36% lower import tariff (see paragraph 2.3), at third a scenario assuming 10% lower exchange rates of four relevant currencies (see paragraph 2.4) and finally a scenario with a combination of these factors: lower levies on imports and also lower exchange rates. The four scenarios have been examined for shell eggs (paragraph 3.1) and likewise for whole egg powder (paragraph 3.2).

In the figures for the year 2012 the EU level is an average of the initial EU countries. This average is excluding Poland which joined the EU in May 2004.

3.1 Shell eggs

3.1.1 Scenario 1 - Basic situation

In this basic scenario the situation is comparable to the year 2003, with the exception of an increase of the production costs in the EU as a result of the EU welfare Directive. In fact this first scenario is a 'best-case scenario'.

Figure 3.1 shows that in 2012 Ukraine can be the cheapest supplier of shell eggs in Frankfurt. The total costs of production and transport are more than 20% below the average EU level (the horizontal line). Due to the levy on imports the non-EU countries will not be real competitors on the EU market.

3.1.2 Scenario 2 - Lower EU import tariff

In the second scenario, on top of the basic scenario the impact of a 36% lower levy on imports into the EU has been examined.

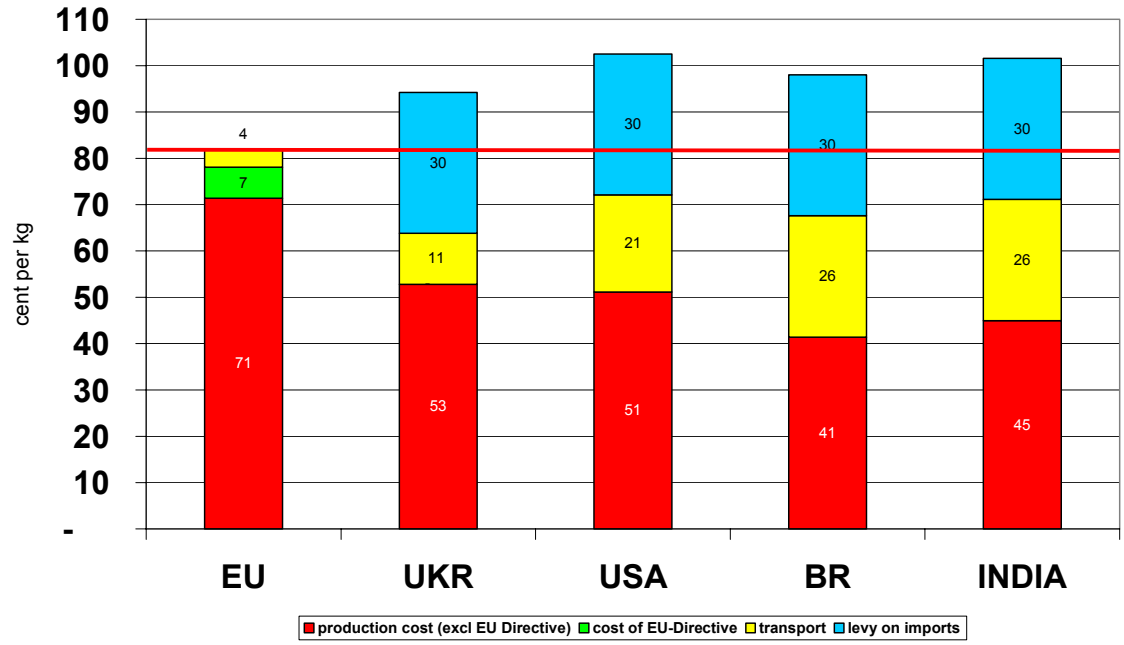

Figure 3.1 *Offer price of shell eggs in Germany from EU average (horizontal line) and non-EU countries in cents per kilogramme egg (scenario 1)in 2012*

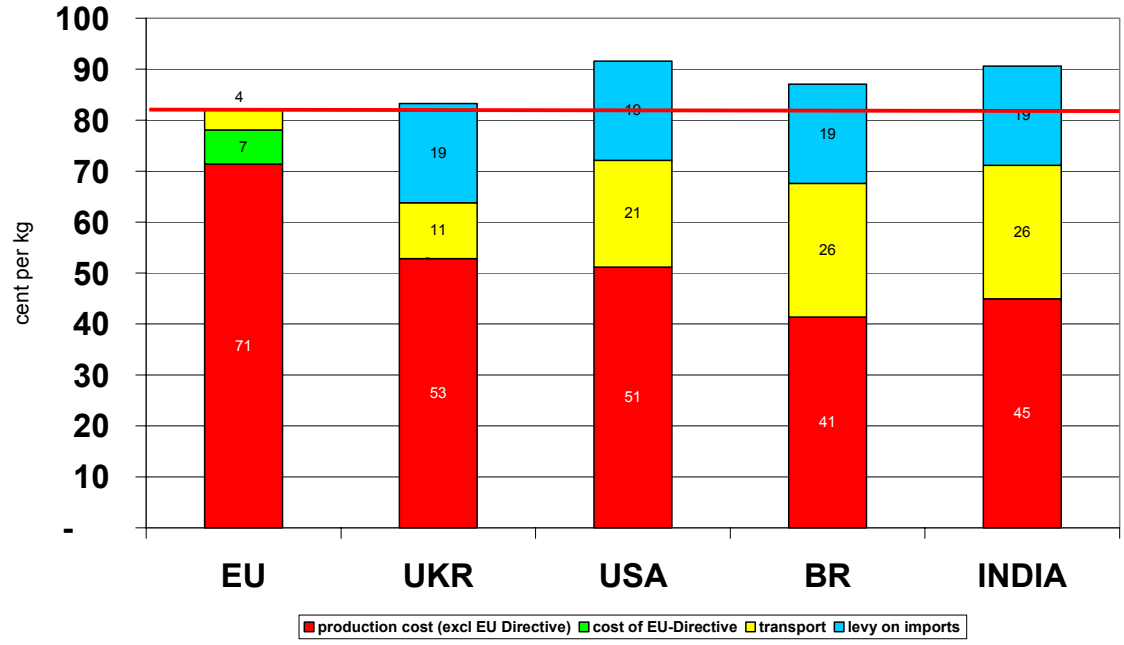

Figure 3.2 *Offer price of shell eggs in Germany from EU average (horizontal line) and non-EU countries in cents per kilogram egg (scenario 2, 36% lower import tariff) in 2012*

As figure 3.2 shows, also in the second scenario Ukraine will be the most competitive supplier of shell eggs in Frankfurt in 2012. The result of the lowering of the levy on imports is that Ukraine can almost compete on the EU market. Other non-EU countries will not be competitive on the EU market.

3.1.3 Scenario 3 - Change in exchange rates

This third scenario evaluates the consequences of 10% lower exchange rates of the currencies of all non-EU countries.

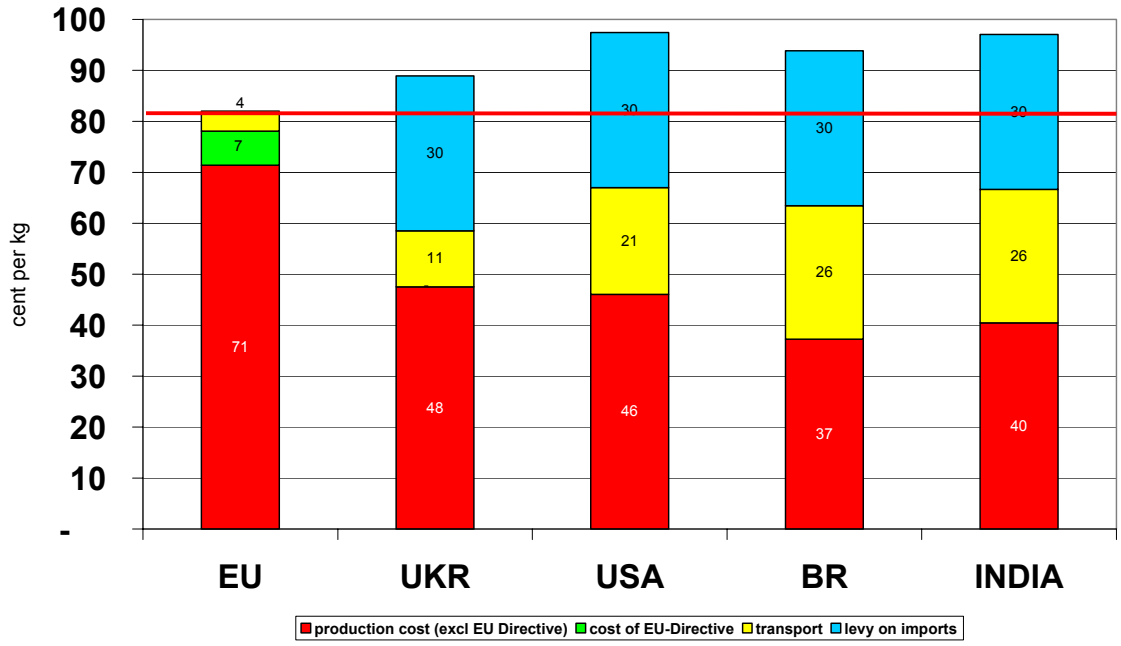

Figure 3.3 Offer price of shell eggs in Germany from EU average (horizontal line) and non-EU countries in cents per kilogram egg (scenario 3, 10% lower exchange rates)in 2012

Lower exchange rates in this third scenario have less impact than the lower import tariffs of scenario 2. Figure 3.3 shows that in the case of 10% lower exchange rates in 2012 the non-EU countries will still be no real competition on the EU market.

3.1.4 Scenario 4 - Combination

The last scenario is a combination of the previous scenarios: cost increase due to EU Directive 99/74/EC (scenario 1 - 'basic'), 36% lower import tariffs (scenario 2) and also 10% lower exchange rates of all non-EU currencies (scenario 3). In fact this fourth scenario is a 'worst-case scenario'.

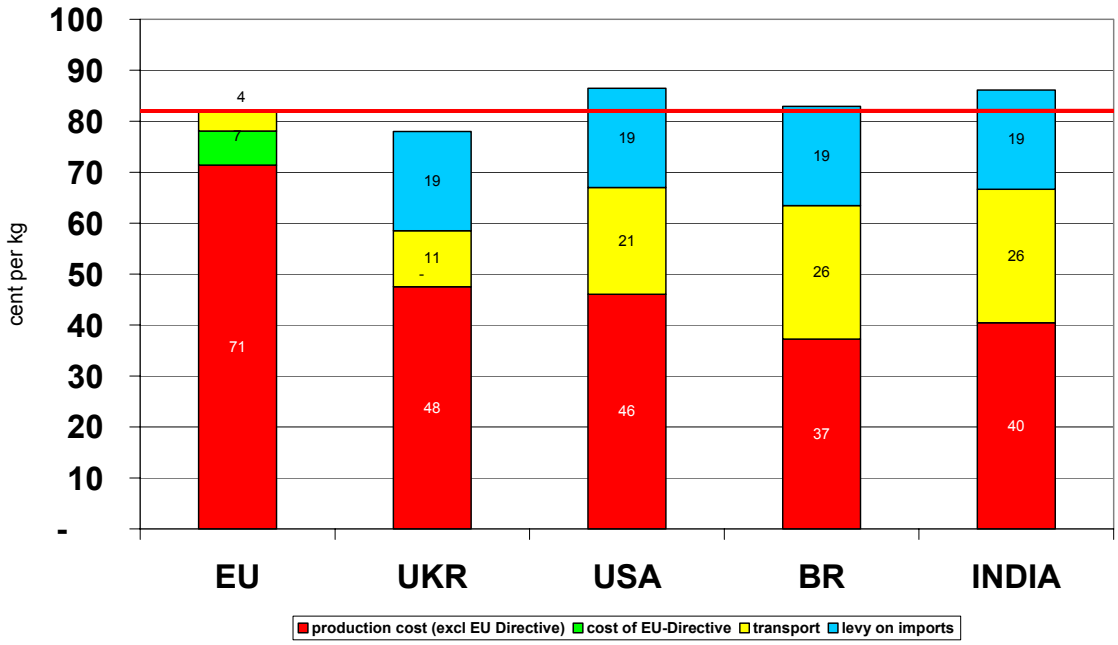

Figure 3.4 Offer price of shell eggs in Germany from EU average (horizontal line) and non-EU countries in cents per kilogram egg (scenario 4, 36% lower import tariff and 10% lower exchange rate) in 2012

The consequences of the combination of a 36% lower levy on imports and 10% lower exchange rates are indicated in figure 3.4. In this 'worst-case scenario' the Ukraine obtains a very competitive position on the EU market of shell eggs, and Brazil also becomes a serious threat. The remaining levy on imports will make imports from the USA and India unlikely.

3.2 Whole egg powder

Egg powder is more suitable for long distance transport than shell eggs because there is no decrease in product quality after months of storage. Another advantage of egg powder is the relatively low cost of transport as the product is dried.

3.2.1 Scenario 1 - Basic situation

In this 'best-case scenario' the situation is comparable to the year 2003, apart from the increase of the production costs caused by the EU Directive 99/74/EC.

Figure 3.5 shows that in 2012 Brazil can be the cheapest supplier of whole egg powder in Frankfurt, directly followed by India. The total costs of production, transport and levies for India and Brazil are 6 to 8% below the average EU 15 level. Ukraine remains slightly (1%) more expensive than the EU-countries. In this 'best-case scenario' imports from the USA will be no real threat.

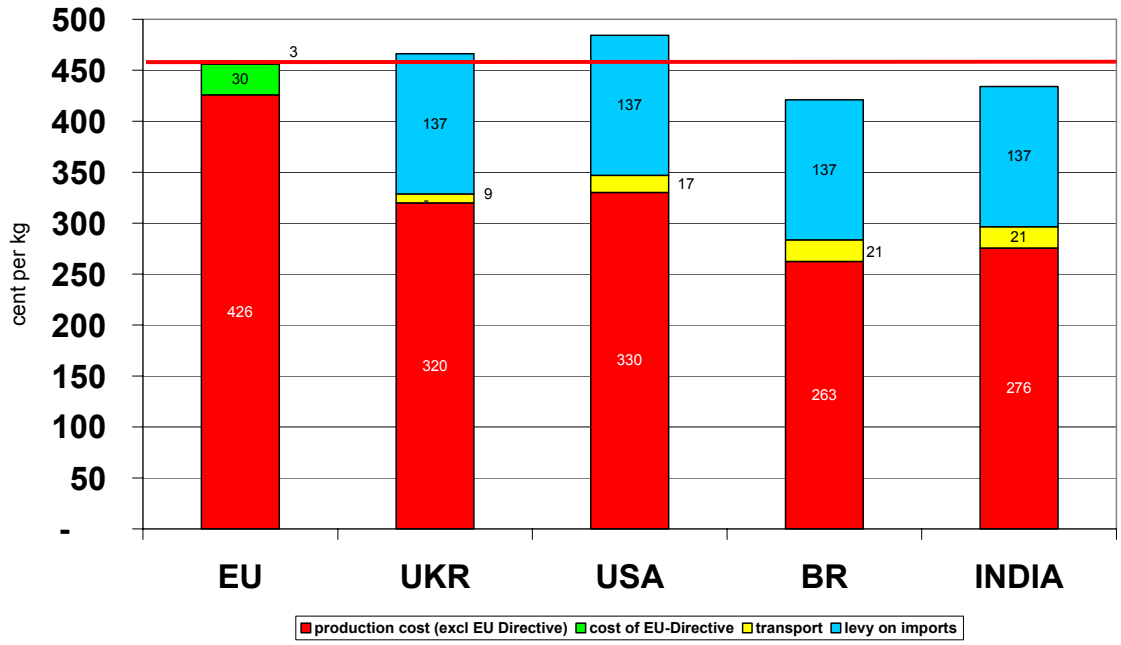

Figure 3.5 Offer price of whole egg powder in Germany from EU average (horizontal line) and non-EU countries in cents per kilogram (scenario 1)in 2012

3.2.2 Scenario 2 - Lower EU import tariff

In the second scenario, on top of the basic scenario the impact of a 36% lower import levy on imports into the EU has been examined. Figure 3.6 shows that a 36% lower import tariff will mean that in 2012 all the non-EU-countries can be relatively cheap suppliers of egg powder in Frankfurt. The total costs of production, transport and import levies will be 5% (USA) to almost 20% (Brazil) below the average EU level.

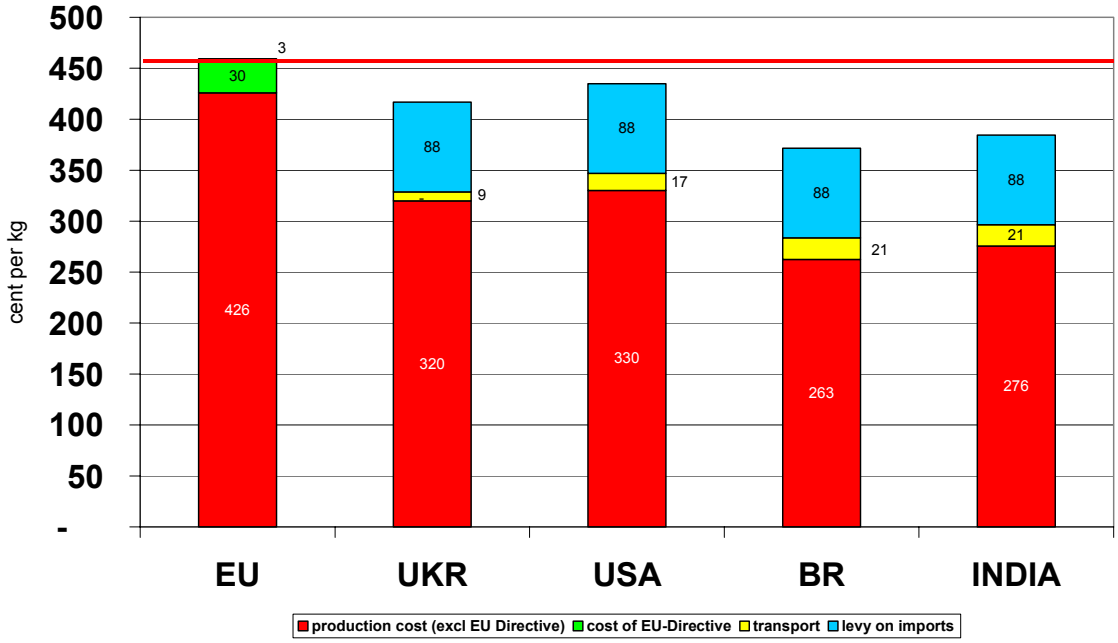

Figure 3.6 Offer price of whole egg powder in Germany from EU average (horizontal line) and non-EU countries in cents per kilogram (scenario 2, 36% lower import tariff)

3.2.3 Scenario 3 - Change in exchange rates

This third scenario evaluates the consequences of 10% lower exchange rates of all non-EU currencies, on top of the basic scenario. In figure 3.7 the impact of lower exchange rates is shown. Also in this scenario in 2012 all non-EU countries can be relatively cheap suppliers of whole egg powder in Frankfurt. The total costs of production, transport and levies will be up to 14% (Brazil) below the average EU level, which means that this scenario has less impact than the previous scenario with the lower import tariff.

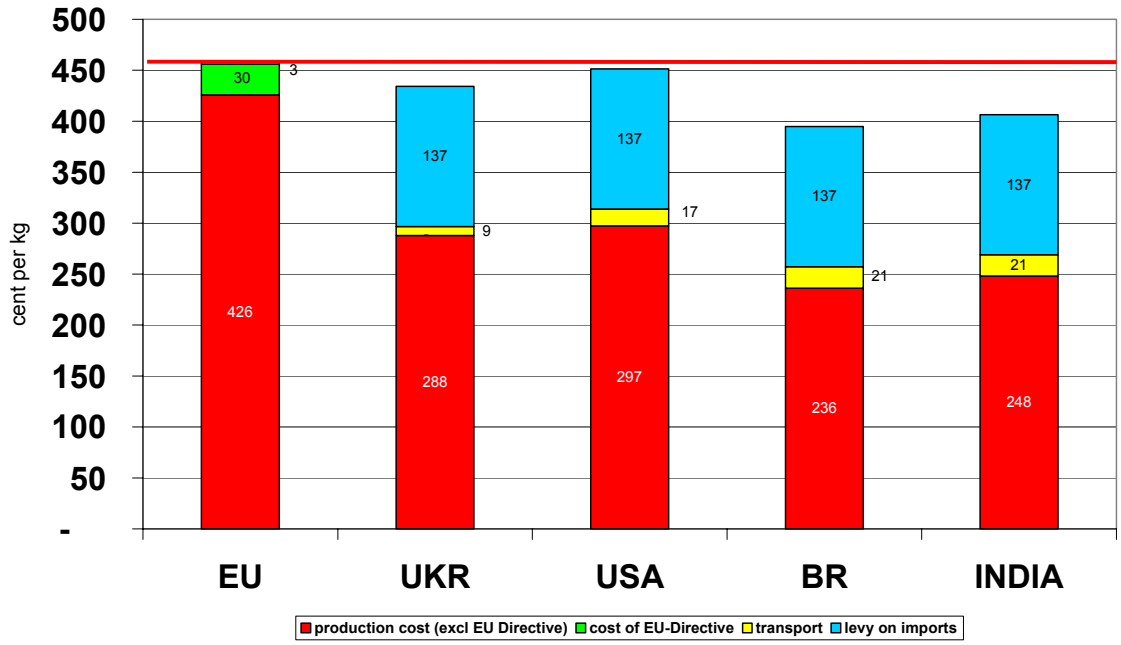

Figure 3.7 Offer price of whole egg powder in Germany from EU average (horizontal line) and non-EU countries in cents per kilogramme (scenario 3, 10% lower exchange rate) in 2012

3.2.4 Scenario 4 - Combination

This 'worst-case scenario' is a combination of the previous scenarios: cost increase due to the welfare Directive (scenario 1 - 'basic'), 36% lower import tariffs (scenario 2) and also 10% lower exchange rates of all non-EU currencies (scenario 3). The consequences of the combination of a 36% lower levy on imports and 10% lower exchange rates are illustrated in figure 3.8. In this 'worst-case scenario' all non-EU countries will be very cheap suppliers of whole egg powder to the EU market. Offer prices in Frankfurt could be approximately 15% (Ukraine, USA) to even 25% (Brazil, India) below the average EU level.

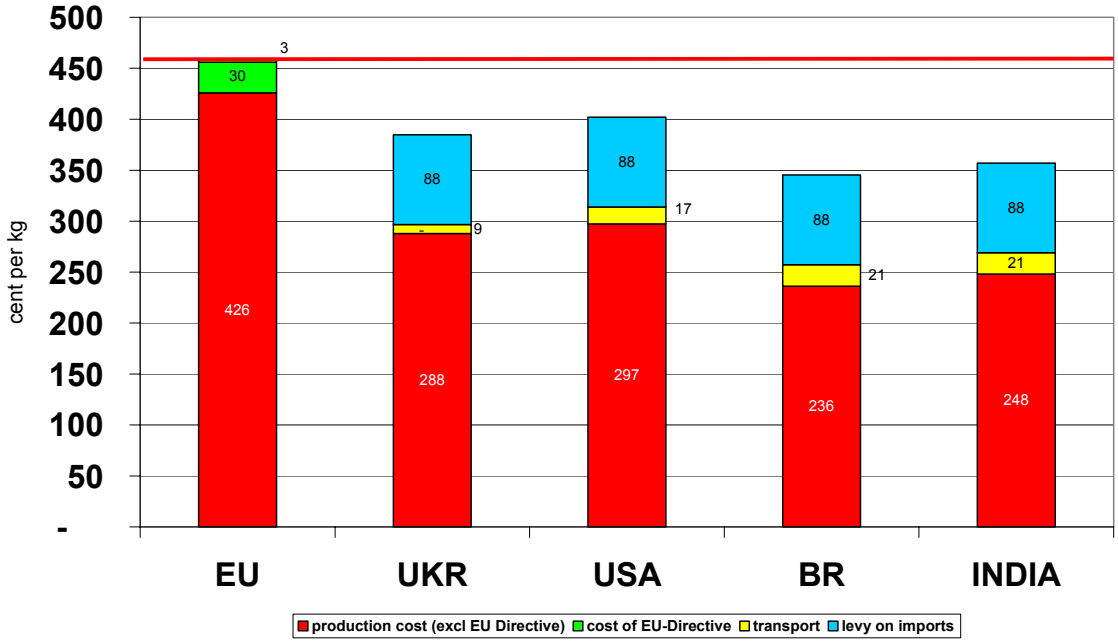

Figure 3.8 *Offer price of whole egg powder in Germany from EU average ((horizontal line) and non-EU countries in cents per kilogramme (scenario 4, 36% lower import levy and 10% lower exchange rate) in 2012*

4. Welfare of layers in some non EU countries

4.1 Introduction

In this chapter some background information is provided on the economics of bird density. Also some information is provided on the production volume, housing methods and animal welfare situation in some third countries. This information is additional to the data from chapter 1 on the production results, the prices and production cost. A description is given for India, United States, Ukraine and Brazil.

4.2 Economics of bird density

In many countries farmers have to question what bird density of hens provides the highest income per poultry house. In countries without any regulations on space allowance of laying hens, farmers make those kind of calculations. However, there are not many research based calculations on this topic. Don Bell, poultry specialist at the University of California, published some work based on the situation in the United States (Bell, 2000). Data from trials with birds in an environment controlled poultry house show that an increased space allowance from 295 cm^2 to 344 and 413 cm^2 per hen gave a higher egg production per hen and a lower rate of mortality. However, at the same time increased space allowance resulted in a higher feed intake per day per hen and a lower egg weight. The profit per hen was highest at 344 cm^2. In this situation the farmers obtain the maximum return on their investment. Don Bell states that prices of feed and eggs influence the results of the calculations. In a situation with high costs for feed, a lower density gives the highest economic result. In a situation with high egg prices, a higher density is optimal.

In 1999 a survey on the average space allowance in the USA was published. The results show that 16.6% of the farm sites had a space allowance of less than 310 cm^2, 45.1% of the farm sites gave the birds 310 to 348 cm^2, 16.7% of the farm sites gave the birds 348 to 386 cm^2 and 21.6% of the farm sites gave the birds more than 387 cm^2 per hen. The overall average was 345 cm^2 per hen. The data show that in a situation without any welfare regulations farmers will allow the hen 300 to 400 cm^2.

For the European situation some work has been published by Van Horne (1991). In 1991 the minimum space per bird was already 450 cm^2. He stated that an increase in space allowance will affect the cost in three ways: 1) higher housing cost, 2) higher feed intake per hen (as a results of a lower temperature in the poultry house) and 3) through an effect on the zootechnical results. Experiments in the Netherlands have shown that increasing space per bird had no significant influence on egg production and egg weight. However, mortality was lower. In these experiments the space allowance was 450 cm^2 and higher.

4.3 Welfare in selected countries

4.3.1 India

India is the world's 6th largest producer of eggs. According to the 2004 census the number of pullets was 25 million and the number of layers (older than 18 weeks) was 102 million. The egg production in 2004 is estimated to be around 43 billions pieces. India is exporting shell eggs and dried egg products. There are a number of egg powder plants which have been developed for export. The export of dried egg products increased during 2003 to 6,500 tonnes compared with 5,000 tonnes during 2002.

There are 20,000 farms around the country. The farm size varies from 5,000 birds per farm to a maximum of 500,000 birds. Most of the farms keep the laying hens until 76 weeks and forced molting is not practiced in India. Although western breeds are used in India the local breed BV-300 has a high market share. This breed is completely acclimatized to Indian agro climatic and feed conditions resulting in high egg production.

All commercial layer farms have open sided houses where birds are housed in 3 to 4 rows and three tier conventional cages. The new poultry houses in India have a length of 106 metres by 13.4 metres which can house 20,000 hens. The standard cage size for 3 birds is 37.5 cm by 30 cm. The space allowance is 375 cm^2 per bird (NECC, 2002).

4.3.2 Ukraine

The Ukraine is one of the new eastern neighbours of the EU25. During the time of the USSR the Ukraine was fulfilling more than 25% of the Soviet Union's grain and meat requirements. The major portion of these products was produced by the huge sovkozes and kolkozes. After the Ukraine became independent in 1991 the principles of the free market economy were introduced. Since the poultry sector was privatized in 1998, it has shown remarkable progress.

Although all major poultry breeds can be found in the country, bird performance often lags behind the capabilities. It is expected that with better management, improved feed quality and modern health service, the production figures will improve to western level. In that situation the Ukraine can be a competitive producer of shell eggs and egg products on the markets in the neighbouring EU countries. However, the Ukraine is especially focusing on the export of egg products.

In the Ukraine there are a lot of old buildings available which are, after renovation, suitable for keeping layers. On those farms often second hand cages from EU countries are installed. The process of renewing equipment goes gradually as financing is difficult and interest rates are extremely high. In general, the cages are 3 tiers high with an open manure pit. There are no governmental regulations on a minimum space allowance. It is estimated that on the farms the hens have between 300 and 400 cm^2 per bird. In modern equipment the space allowance is lower than in the old locally produced cages. Some farms with imported equipment put 7 or 8 hens in 50 cm by 50 cm cage, which is respectively 357 and 312 cm^2 per hen. The stocking density also depends on the expected price level. When egg prices are expected to be high farmers tend to put an extra hen in a cage.

4.3.3 USA

The USA is, after China and the EU, the third largest producer of eggs. According to 2004 census data the number of pullets was 69.3 million and the number of layers (older than 18 weeks) was 234.9 million. The USA is a large exporter of eggs and egg products. In 2003 7,000 metric tonnes of egg products were exported, of which approximately 10% were as dried product.

Egg production in the USA is concentrated in the North-East and South-East of the country. In the commercial egg industry numerous independent producers are marketing on a local basis, applying price competition as a major component of their marketing strategy. It is estimated that the top 10 egg producers, with each more than 5 million layers, represent 44% of the industry. These companies have the 'economics of scale' and have a high efficiency in production, marketing and distribution (Shane, 2003).

Of all commercial hens, 98% are kept in cages and 2% on floor systems (IEC, 2004). Over 80% of the US industry is participating within the Animal Welfare guidelines. This voluntarily program of the United Egg Producers (UEP) gives the birds more space in the cage. The space per bird will increase from 342 cm^2 in 2002 to 432 cm^2 in January 2009 for white layers. Participating producers will be audited yearly through an independent certification program. The welfare guidelines include, besides the increased cage space per hen, also standards for molting procedures, standards for beak trimming, as well as proper handling and transportation.

4.3.4 Brazil

Brazil is the 8th largest egg producer in the world. In the year 2003, total production was 14.4 billion pieces. Census data for 2003 show that the number of pullets was 14.4 million and the number of layers (18 weeks and older) was 56.3 million. Of this number, 10.8 million hens are older than 20 months, which shows that molting is common practice in Brazil. Export of eggs and egg products is currently very small, particularly compared to broilermeat exports.

90-95% of layers in Brazil are housed in cages, with the rest of the hens kept in floor systems in small flocks for local consumption. Commercial farms have a good productivity. Pullets are reared in light controlled houses. Layers are commonly housed in open houses with curtain sides and tunnel ventilation. In warm areas padcooling is practiced. Brazilian egg producers have an abundant access to high quality domestic grain and soya beans. This gives low cost for pullet and layer feed. In general western breeds are used. Standard Brazilian stocking density was reported to be 330cm^2 (Madeley, 2001), although in hot areas with simple housing the density can be lower (400 to 430 cm^2 per hen). Also other sources report a general density between 330 and 400 cm^2 per hen. Specialists believe that the Brazilian egg industry has the potential to grow substantially. Similar to the broilermeat industry the egg sector is willing and capable of meeting the highest demands of customers in the EU or Japan.

5. Conclusions and discussion

Production cost in 2003 within the EU

Between the six main egg producing countries, the production cost of shell eggs in 2003 ranged from 72.6 in the UK to 68.5 eurocent per kg of eggs in Spain. The average for those six countries is 71.4 eurocent per kg. Compared to the 2001 figures (Van Horne and Bondt, 2003) in all countries, except the UK, there is an increase in production cost. The main reason for this is the increased EU minimum space allowance of 550 cm2 per hen. The lower production cost for the UK, as calculated in euros, was influenced by a change in exchange rate of the pound. The processing cost for whole egg powder also differs within the EU countries from 24.3 in Germany to 21.0 eurocent per kg shell eggs (input) in Spain.

Production cost in 2003 in non-EU countries

Compared to the average level within the EU, the production costs for shell eggs in 2003 were lower in Poland (90%), USA (72%), Ukraine (74%), India (63%) and Brazil (58%). As a result of cost of transportation and import levies, there are barely any imports from those countries to the EU. For whole egg powder the mentioned non-EU countries are even more competitive. Compared to the average level within the EU, the production costs of whole egg powder in 2003 were lower in Poland (87%), USA (78%), Ukraine (75%), Brazil (62%) and India (65%). Although the cost of transportation of powder is relatively low, current import levies protect the EU from large amounts of imports from the mentioned countries. However, the offer price of whole egg powder from Brazil is calculated to be below the EU 15 average.

EU Directive 99/74/EC

In the year 2012 the EU Directive 'welfare of laying hens' will be fully implemented on EU egg laying farms. Production of eggs in enriched cages will give the lowest production cost. Compared to the conventional cage the cost for housing, feed and labour will be increased. It can be expected that the design of enriched cages will be further improved to obtain good technical results. With good enriched cages the increase in cost will be 13 to 14% compared to 450 cm^2 per hen in the conventional cage and 10% compared to the new EU minimum space allowance of 550 cm^2 implemented in 2003.

Impact of Agenda 2000

In the past the EU market and price policy had a great impact on the price of poultry feed. Grain prices were kept on a higher level than the world market price. As a result of the 'MacSharry' reforms and more recently Agenda 2000 intervention prices of grain are re-

duced. In the comparison for the different countries feed prices paid by farmers were collected for the year 2003. It is estimated that from 2003 towards 2012 there will be no additional differences in feed prices for layers between the EU and the rest of world.

Scenarios 2012

In 2012 the production cost of shell eggs in the EU is on average, and including cost of transport, 82 eurocent per kilogram. The results of the scenario calculations show that in a competition on the German market for shell eggs, Ukraine, USA, Brazil and India cannot compete on price. This is a result of high cost for transportation and import levies. In scenario 4, with a 36% lower import tariff and a 10% lower exchange rate, Ukraine could compete. For whole egg powder the results are different. In all scenarios, India and especially Brazil can compete on the German market. In the scenarios with lower import tariff also the Ukraine and the USA are competitive. In the basic scenario the exchange rate of the year 2003 was used. In 2004 the average exchange rate of the dollar to the euro was 10% lower. In other words: scenario 3 is for the USA and EU competition close to the current situation. In a scientific article by Wolfram et al. (2002) and in a report published by the Eurogroup (2001) it was also concluded that the competitiveness of the EU egg industry is weak after implementing higher welfare standards in the EU.

Welfare legislation in non-EU countries

In the countries outside the EU 15 mentioned in this report there is no legislation on welfare to protect the laying hens. In the USA there is a voluntary program to increase the space allowance per hen towards 432 cm^2 in 2009. However, it is discussed (Babcock et al., 2002) whether those welfare guidelines will be accepted by breakers (production for the egg processing industry). In the year 1999 most hens in the USA were kept in six-bird conventional cages with 342 cm^2 per hen. In Brazil, India and Ukraine layers are kept in conventional cages with a space allowance of 300 to 400 cm^2 per hen. Between countries, regions and farms the density can change due to expected market prices (high density when high egg prices are expected), climate (lower density in hot areas) and housing systems (open or climate controlled houses). American literature shows that purely from an economic point of view 300 to 400 cm^2 per hen gives the highest income for the poultry farmer (Bell, 2000).

Purchasing factors of egg products

On the basis of a qualitative study, in which buyers of egg products were questioned, it appears that price and microbiological and chemical composition are the most important purchasing factors (Tacken, 2003). The egg products market is a market in which the supply exceeds the demand and manufacturers of egg products compete with each other at price levels to the advantage of the client. The country of origin of egg products and eggs plays a minor role, but the professionalism of the egg products manufacturer is more important. In this respect it is relatively difficult to introduce an innovative product into the egg products market. Non-cage eggs are only interesting for buyers if they can be incorpo-

rated in their end product. At the moment the demand for processed products with non cage eggs (such as barn and free-range) is still negligible. While the market for organic processed products is growing, it is still typified as a niche market.

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Wolffram, R, J. Simons, A. Giebel and R. Bongaerts, *Impact of stricter legal standards in the EU for keeping laying hens in battery cages*. World's Poultry Science Journal. Vol. 58. September 2002.

The basic data for calculating the production cost were obtained from several organisations, institutes, farms and companies in the countries. The main sources per country to be mentioned:

Netherlands	Agricultural Economics Research Institute (LEI)
France	Institut Technique de l'Aviculture (ITAVI)
Spain	Asociacion Espanola de Productores de Huevos (ASEPHRU)
	Study tour LEI
Germany	Agricultural Economics Research Institute (LEI)
	Institute of Spatial Analysis and Planning in Areas of Intensive Agriculture (ISPA), University of Vechta
Italy	Centro Ricerche Produzioni Animali (CRPA)
	Unione Nazionale dell'Avicoltura (UNA)
UK	British Egg Industry Council (BEIC)
	National Farmers Union (NFU)
Poland	Study tour 2002
Ukraine	Sunside poultry consultancy
	Other sources
USA	University of California (Don Bell)
	Economic Research Service (ERS)
Brazil	Centre for advanced studies on applied economics (CEPEA)
	Study tour LEI 2004
India	National Egg Co-ordination Committee (NECC)
	Hendrix Poultry Breeders