



Economics of slow growing broilers

Memo Eurogroup for Animals

Peter van Horne and Luuk Vissers, peter.vanhorne@wur.nl and luuk.vissers@wur.nl
Wageningen University & Research. Wageningen, the Netherlands 21 December 2022

Table of contents

1. Introduction.....	1
2. Production costs of broilers - The Netherlands.....	2
3. Production costs of broilers – selected EU countries.....	4
4. Slaughter costs – selected EU countries.....	4
5. Conclusions.....	6
6. References.....	7
7. Annex.....	7

1. Introduction

Since 2018, more than 200 food companies across Europe committed to the European Chicken Commitment (ECC). These companies will raise their animal welfare standards to the requirements of the ECC by 2026. The Eurogroup for Animals commissioned a project to Wageningen University & Research to obtain insight in the costs of transitioning to broiler production systems that comply with these requirements in various EU member states.

Wageningen Economic Research, part of Wageningen University & Research, has a lot of experience in projects evaluating the economics of slow growing broilers. In the past years, various reports have been published by Wageningen Economic Research, in which the costs of broilers production systems were analysed. In report 2018-116 “Competitiveness of the EU poultry meat sector”, the production costs of conventional broilers were calculated for nine EU countries. In report 2020-027 “Economics of broiler production systems in the Netherlands” the production costs of conventional broilers were compared with different concepts with slow growing broilers. In this memo we make a combination of both reports by comparing the production costs of conventional and ECC broiler production systems for six EU countries. The costs are expressed in euro or eurocents.

The project includes the following tasks:

- Provide a build-up of the production costs (feed costs, other variable costs, housing costs etc.) for conventional broiler production systems and the ECC system without and with thinning.
- Calculate production costs of conventional broiler production systems and estimate the slaughter costs in selected EU countries for 2021.

- Calculate production costs of broilers reared in the ECC system and estimate the slaughter costs in selected EU countries for 2021.

The following six EU countries will be included in the study: the Netherlands, Poland, Germany, Italy, Spain and France.

2. Production costs of broilers – The Netherlands

2.1 Description of systems and data

In 2021, around 40 to 45% of the broilers in the Netherlands were slow growing broilers. Dutch farmers and also partners in the production chain (hatcheries, parent stock farms, feed mills and slaughterhouses) have a lot of experience with slow growing broilers. Therefore, we start with a comparison of the production costs of conventional (fast growing) broilers and slow growing broilers in the Netherlands. We compare conventional broilers (Ross308) with slow growing broilers that comply with the requirements of the European Chicken Commitment (ECC). The full standard is described in the Guidance notes for ECC (2022). The main criteria of the ECC are:

- Maximum stocking density of 30 kg/m² in the poultry house. Thinning is discouraged.
- Adopt breeds with higher welfare outcome. (e.g. Hubbard Redbro meets the criteria)
- Enrichment, including natural light, perches and two pecking substrates per 1,000 birds.
- Slaughterhouse: Use controlled atmospheric stunning using inert gas or multi-phase system ('CAS stunning').

Calculations are made for a farm with three poultry houses. The poultry houses have a floor surface of 4,400 m² in total. We assume that the floor surface is fixed (Van Horne, 2020). By changing to the ECC standard with a lower density this farm will keep a lower number of broilers. Table 1 gives the main assumptions made for the conventional broiler and ECC broiler without and with thinning. The final live weight is 2,500 grams with a feed conversion of 1.57 for conventional broilers and 1.73 for the Hubbard Redbro. In the conventional situation the density is 20.5 birds per m² (max 42 kg per m² and thinning) and for ECC without thinning this is 12.3 birds per m² and with thinning 14.5 birds per m². One full time worker will manage the farm with 90,000 conventional broilers (with thinning) or 54,158 ECC broilers without thinning (Van Horne, 2018).

Table 1. Performance data broilers conventional and ECC without and with thinning. Netherlands situation in 2021.

	Conventional	ECC no thinning	ECC thinning
Broiler type	Ross 308	Hubbard Redbro	Hubbard Redbro
Growing period, average (days)	40.2	46.0	46.9
Average live weight (gram)	2,500	2,500	2,500
Mortality (%)	3.5	2.7	2.7
Feed conversion	1.57	1.73	1.73
Density (birds/m ²)	20.5	12.3	14.5
Empty period (days)	7.0	7.0	7.0
Cycles per year	7.7	6.9	6.8
Broilers housed per farm	90,000	54,158	63,659

Prices and other costs in the Netherlands are collected for the year 2021. This information is given in table A.1 in annex 1. The table shows that the day-old chick price of the slow growing broiler (Hubbard Redbro) is slightly higher than the day-old chick price of the conventional broiler. The feed price in the ECC system is slightly lower than the conventional system. As a result of the lower density in ECC the costs of heating per broiler are higher. All these estimates are based on the experience in the

Netherlands in recent years. Data on broiler production are published in the book KWIN-Veehouderij 2022-2023 (Vermeij, 2022) and the website Agrimatie (2022).

To calculate the total production costs we also have to include the fixed costs: housing (including equipment), labour and general costs. The poultry house is depreciated in 25 years and the equipment in 12.5 years. For more information about the method and assumptions we refer to WUR report 2020-027 (van Horne, 2020).

2.2 Results

We calculated the total production costs of conventional and ECC broilers without and with thinning based on the Netherlands situation and prices in 2021. Table 2 gives the results.

Table 2. Production costs at farm level and cost components of conventional broilers and ECC broilers without and with thinning in the Netherlands (situation in 2021).

	Conventional	ECC no thinning	ECC thinning
Feed costs	56.5	60.6	60.6
Day-old-chick costs	13.7	14.4	14.4
Other variable costs	8.4	10.9	10.4
Housing costs	8.2	16.2	14.0
Labour costs	4.1	7.5	6.5
General costs	1.5	2.7	2.3
Total costs (cents per kg live weight)	92.4	112.3	108.2
Increase in costs		19.9	15.8
Increase in costs (%)		22%	17%

The total costs of conventional broilers (with thinning) are 92.4 cent per kg live weight. The total costs for ECC broilers without and with thinning are 112.3 and 108.2 cent per kg live weight, respectively.

Figure 1 gives the breakdown of the cost components.

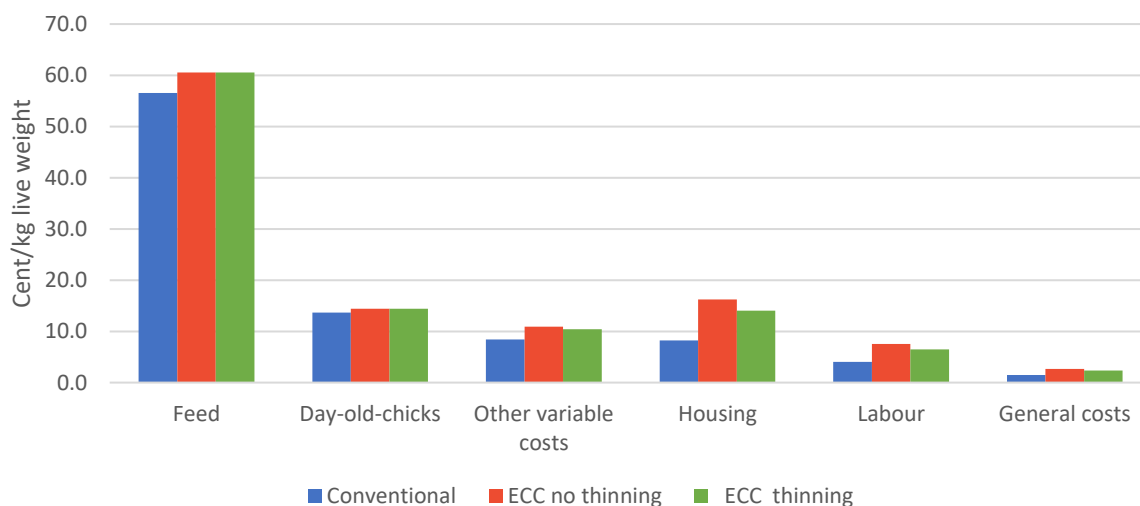


Figure 1. Breakdown of cost components at farm level of conventional and ECC broiler production in the Netherlands.

Figure 1 illustrates that the ECC has higher costs mainly (in this order) for housing, feed, labour and other variable costs. Other variable costs include electricity, heating, water, animal health, litter, catching and a few other (small) cost items. ECC with thinning has a higher density on day 1 and as a result the costs for housing and labour are lower compared to ECC without thinning.

3. Production costs of broilers – selected EU countries

Following the same method as was done for the Netherlands, we calculated the production costs for conventional broilers in five other countries: Germany, France, Italy, Spain and Poland. The basic data on performance and prices in these countries are adapted from Van Horne (2018). We updated the data for the situation in 2021 (Van Horne, 2022). For all countries we estimated the results for ECC (without thinning) based on the Hubbard Redbro.

The basic assumptions on performance and the results are presented in table A2.1 and table A2.2 of Annex 2. The production costs (in cent per kg live weight) of the conventional broiler and ECC without thinning are given in figure 2.

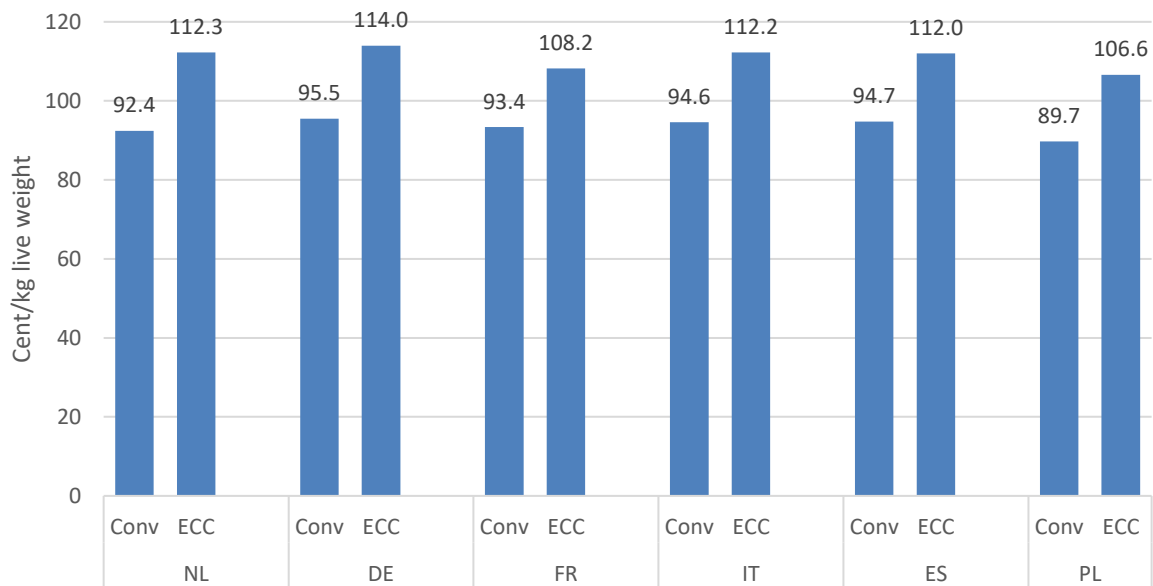


Figure 2. Production costs (cent per kg live weight) of conventional broilers and ECC (without thinning) in the Netherlands (NL), Germany (DE), France (FR), Italy (IT), Spain (ES) and Poland (PL).

The previous paragraph showed that in the Netherlands the production costs of the ECC broiler (without thinning) are 19.9 cent higher (or 22% higher) than conventional broilers. Because of differences in production performance and prices the results in the other countries are not exactly the same as in the Netherlands:

- *Germany*: the maximum density in conventional broiler farming is 39 kg/m². This results in a smaller difference in production costs compared to the Netherlands: 18.5 cent or 19%.
- *France*: the average live weight of a broilers is 2.0 kg. Because of this lower final weight the difference in production costs of the ECC and conventional broiler is smaller: 14.8 cent or 16%.
- *Italy*: the performance (in terms of growth rate and feed conversion) is slightly less than in the Netherlands and Germany. The difference in production costs is 17.6 cent or 19%.
- *Spain*: The average live weight is 2.6 kg. The difference in production costs is 17.3 cent or 18%.
- *Poland*: In Poland the investment in a poultry house and the costs of labour are lower than in the other countries. With a lower density in ECC the difference in production costs with conventional is smaller: 16.9 cent. However, in terms of percentage the difference is similar to the other countries +19%.

4. Slaughter costs – selected EU countries

Van Horne (2018) gives the costs of slaughter of conventional broilers in nine EU countries. This information was updated for the year 2021 which gives an indication of the slaughter costs in the Netherlands, Germany, France, Italy, Spain and Poland (van Horne, 2022). For all countries the

slaughter yield is 73%. With this slaughter yield we can convert the production costs of a live bird into costs per kg carcass weight. Table A3.1 gives an overview of the results. The slaughter costs of a conventional broiler in the Netherlands are 40 cent per kg carcass weight. The total costs are $92.4 / 0.73 + 40 = 166.5$ cent per kg carcass weight. Table A4.1 shows that, as a result of lower labour costs, the costs of slaughter are lower in Italy, Spain and especially Poland.

For slaughter of ECC broilers we have make two adjustments.

- Additional costs of CAS stunning.
- Adjustment of the slaughter yield.

Extra costs of CAS stunning

The costs of CAS stunning are difficult to calculate. The gas stunning equipment requires more space and modifications to the slaughter line are needed. The situation is different in every slaughterhouse. There is only one document giving information on the costs of CAS stunning compared to the water bath method (Sanco, 2012). We decided to take this report as a baseline and make some adjustment for the investment and prices of input. Because prices of water, electricity and labour are different in the six countries we calculated the total costs of CAS stunning and the water bath (WB) method in each country. In annex 3, table A3.1 and table A3.2 give an overview of the assumptions and the differences in slaughter costs, due to the stunning method, between the EU countries. Because there are just minor differences between the countries, we decided to estimate the additional costs of CAS stunning to be 2 cent per bird or 1.2 cent per kg carcass weight. In annex 3 we give more information on the calculations and we discuss some advantages and disadvantages of CAS stunning.

Lower slaughter yield

Slow growing birds have a lower carcass yield and a lower percentage of breast meat. We have to take this into account when calculating the costs of slaughter. The carcass yield of the Hubbard Redbro is close to the yield of the conventional Ross308 broiler. The difference could be 0.7% (Mostert, 2022). To include the lower breast meat yield in the calculations we assume a difference in carcass yield of 1.5%. Table A4.1 in annex 4 gives all the details and the results. Figure 3 gives an overview of the total costs after slaughter for all six countries. These results just give an indication of the costs. Each slaughterhouse has a different situation and the market position (percentage sales to high end market) can be very different.

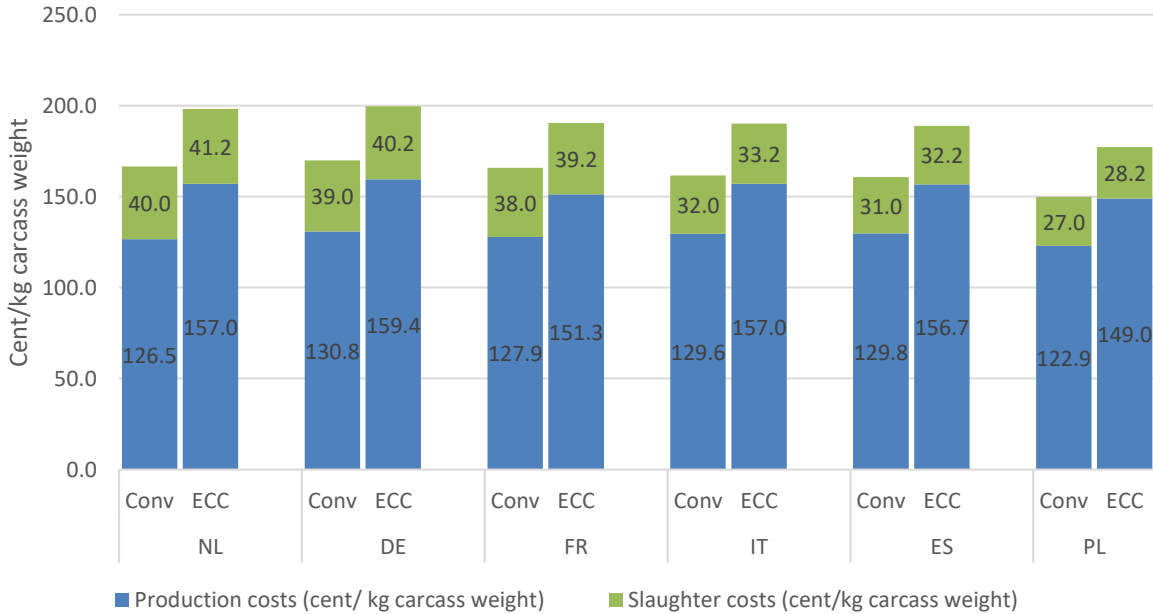


Figure 3. Estimate of the total costs after slaughter of conventional and ECC broiler in six countries.

When comparing the ECC broiler with the conventional broiler, total costs after slaughter increase on average by 28 cent per kg carcass weight (see Table A4.1). This is an increase of 18%. Between the countries there is a range in increase from 25 cent (15%) in France to 32 cent (19%) in the Netherlands. This range can be explained by the differences in production costs at farm level.

5. Conclusions

- In the Dutch situation (with prices of 2021), shifting from the conventional system towards the ECC systems without thinning results in an increase of the production costs by 19.9 cent per kg live weight (+22%). The ECC system has higher costs for housing, feed, labour and other variable costs (energy).
- Similar calculations were made for Germany, France, Italy, Spain and Poland. The increase in costs for the ECC system compared to the conventional broiler system is slightly smaller in these countries, except for France. In these countries (except France), the production costs increase by 16.9 to 18.5 cent per kg live weight (+18% to +19%). The density in the conventional systems is lower in Germany (national regulations) and in Spain (warm climate) and Poland has the advantage of lower costs of housing and labour. In France the difference in costs is smaller (14.8 cent or 16%) as a result of the shorter growing period and the lower final live weight.
- For slaughter of ECC birds we added the extra costs of CAS stunning and a 1.5% lower slaughter yield. The impact of both factors on the total costs after slaughter are difficult to calculate. The situation between countries and slaughterhouse can be very different. The additional costs of CAS stunning are estimated to be around 2 cent per bird, which is 1.2 cent per kg carcass weight. Recent developments give new options for gas stunning, specifically for small slaughterhouses. Companies are also looking for gas stunning methods using a lower volume of CO₂ gas.
- When comparing the ECC broiler with the conventional broiler, total costs after slaughter increase on average by 28 cent per kg carcass weight. This is an increase of 18%. Between the countries the increase varies from 25 cent (15%) in France to 32 cent (19%) in the Netherlands.
- All calculations in the memo are made for the situation in 2021 with average prices of the year 2021. In 2022 the prices of broiler feed and energy increased, which will have an impact on the production costs of the conventional and the ECC broiler system. The energy crisis also has an impact on the costs of slaughter. This is especially valid for the CAS stunning with high prices for CO₂ gas, with large differences between the EU countries.

References

- Agrimatie, 2022. Prices of agri- and horticulture. Wageningen Economic Research. Obtained from www.agrimatie.nl
- ECC, 2022. Guidance notes for ECC. Document of Eurogroup for animals. Brussels, October 2022.
- Horne, P.L.M van, 2018. *Competitiveness of the EU poultry meat*. International comparison of production costs, base year 2017. Report 2018-116. Wageningen Economic Research. Wageningen, December 2018.
- Horne, P.L.M van, 2020. Economics of broiler production systems in the Netherlands. Greenwell project. Report 2020-027. Wageningen Economic Research. Wageningen, April 2020.
- Horne, P.L.M, 2022. *Competitiveness of the EU poultry meat*. International comparison of production costs, base year 2021. Update 2021 data. Wageningen Economic Research. Not published.
- Mostert, P., et al., 2022. Environmental impact of broiler production systems in the Netherlands. Report 1397. Wageningen Livestock Research. Wageningen, December 2022.
- Sanco, 2012. Study on various methods of stunning for poultry. Final report submitted by Food Chain Evaluation Consortium (FCEC). Brussels, 11 December 2012.
- Vermeij, 2022. KWIN Veehouderij 2022/2023. Kwantitatieve Informatie Veehouderij. Wageningen Livestock Research. Wageningen, August 2022.

Annex

Annex 1 Prices and assumptions for the Netherlands

Table A1.1. Prices and economic assumptions of broilers conventional and ECC without and with thinning, Netherlands situation in 2021.

	Conventional	ECC No thinning	ECC Thinning
Day-old chick (cent per bird)	33.00	35.00	35.00
Feed price (cent/kg)	36.00	35.00	35.00
Animal health (cent/bird)	5.50	5.00	5.00
Heating (cent/bird)	4.50	7.56	6.43
Catching (cent/bird)	4.50	5.00	5.00
Electricity (cent/bird)	2.50	3.26	3.28
Litter (cent/bird)	1.00	1.66	1.41
Enrichment perch (euro/m ²)	n.a.	2.00	2.00
Enrichment straw bales (cent/bird)	n.a.	1.00	1.00

Annex 2 EU countries assumptions and results at farm level

Table A2.1. Basis assumptions for conventional and ECC broilers (without thinning) at farm level in six EU countries.

	NL		DE		FR		IT		ES		PL	
	Conv	ECC	Conv	ECC	Conv	ECC	Conv	ECC	Conv	ECC	Conv	ECC
Average growing period (days)	40.2	46.0	40.2	46.0	33.0	39.2	41.2	47.2	43.2	49.1	41.0	47.2
Average live weight (grams)	2,500	2,500	2,500	2,500	2,000	2,000	2,500	2,500	2,600	2,600	2,500	2,500
Mortality (%)	3.5	2.7	4.0	2.7	4.0	2.5	4.0	2.7	4.5	2.7	4.0	2.7
Feed conversion (g/g)	1.57	1.73	1.57	1.73	1.50	1.61	1.61	1.77	1.65	1.81	1.61	1.77
Density (birds/m ²)	20.5	12.3	19.0	12.3	21.0	15.0	20.0	12.3	20.0	11.5	20.0	12.3
Empty period (days)	7	7	8	8	14	14	10	10	10	10	10	10
Cycles per year (#)	7.7	6.9	7.6	6.8	7.8	6.9	7.1	6.4	6.9	6.2	7.2	6.4
Broilers/farm	90,000	54,158	90,000	58,434	90,000	64,286	90,000	55,512	90,000	57,500	90,000	54,158

Table A2.2. Production costs (in cent/kg live weight) of conventional and ECC broilers at farm level in six EU countries.

	NL		DE		FR		IT		ES		PL	
	Conv	ECC	Conv	ECC	Conv	ECC	Conv	ECC	Conv	ECC	Conv	ECC
Feed	56.5	60.6	58.1	62.3	52.5	54.7	61.2	65.5	61.1	65.2	58.0	62.0
Day-old-chicks	13.7	14.4	14.2	14.8	16.1	16.9	14.2	14.8	13.7	14.2	14.2	14.8
Other variable costs	8.4	10.9	8.3	10.4	9.1	11.1	7.2	9.3	6.6	8.7	7.2	9.6
Housing	8.2	16.2	9.3	16.9	9.7	16.1	8.3	15.9	9.5	17.5	8.0	15.8
Labour	4.1	7.5	4.2	7.1	4.6	7.1	2.6	4.6	2.6	4.4	1.3	2.4
General costs	1.5	2.7	1.5	2.5	1.4	2.1	1.2	2.1	1.2	2.0	1.1	2.0
Total	92.4	112.3	95.5	114.0	93.4	108.2	94.6	112.2	94.7	112.0	89.7	106.6
Increase (cent per kg LW)		19.9		18.5		14.8		17.6		17.3		16.9
Increase (%)		22%		19%		16%		19%		18%		19%

Annex 3 Stunning method

There is no recent literature available on the costs of different methods of stunning in a poultry slaughterhouse. DG Sanco published a report of the Food Chain Evaluation Consortium (FCEC) with a detailed evaluation of different stunning systems. Table A3.1 gives the basic assumptions.

Table A3.1. Basic assumption for the cost of stunning with Water Bath and CAS stunning for a slaughterhouse with a line speed of 12,000 birds per hour.

Cost item	Water Bath	CAS stunning
Installation (euro)	53,750	385,375
Maintenance (%)	3.45	6.90
Labour (hour/day)	97	90
Water (m ³ per day)	9	3.5
Electricity (kWh per day)	5.2	127
Gas (tonnes per day)		3.1
Other labour (hours per day)	3	5

Source: Sanco, 2012. Installation investment increased by 25% to correct for the 2021 level.

With the assumption of table A3.1, we calculated for all six countries the costs of water bath and CAS stunning. For every country we estimated the cost for water, electricity and labour. The investment in installation is similar for all countries and this investment is depreciated in 10 years. Labour can be decomposed into two elements: 1) labour for reception and hanging and 2) other labour. We have no information on the price of CO₂ gas. In the calculation we use a price of 600 euro per tonnes for all countries (in the 2012 report the price was 300 euro per tonnes). Table A3.2 gives the results.

Table A3.2. Total costs of water bath (WB) and CAS stunning in six EU countries (cent per bird).

	NL		DE		FR		IT		ES		PL	
	WB	CAS	WB	CAS	WB	CAS	WB	CAS	WB	CAS	WB	CAS
Installation	0.022	0.161	0.022	0.161	0.022	0.161	0.022	0.161	0.022	0.161	0.022	0.161
Maintenance	0.008	0.111	0.008	0.111	0.008	0.111	0.008	0.111	0.008	0.111	0.008	0.111
Labour	2.943	2.731	2.943	2.731	2.639	2.448	1.725	1.601	1.725	1.601	0.913	0.847
Water	0.023	0.023	0.023	0.023	0.019	0.019	0.014	0.014	0.019	0.019	0.014	0.014
Electricity	0.001	0.022	0.001	0.033	0.001	0.021	0.001	0.030	0.001	0.022	0.001	0.022
Gas	0.000	1.938	0.000	1.938	0.000	1.938	0.000	1.938	0.000	1.938	0.000	1.938
Other labour	0.091	0.152	0.091	0.152	0.082	0.136	0.053	0.089	0.053	0.089	0.028	0.047
Total	3.088	5.137	3.089	5.148	2.770	4.833	1.824	3.943	1.828	3.940	0.987	3.140
Difference		2.049		2.059		2.063		2.119		2.111		2.153

The difference in total costs for water bath and CAS stunning is on average 2.1 cents per bird. The difference between the countries is very small. The calculations are based on many assumptions and estimates. For this reason, we decided to take 2.1 cents per bird being the additional costs for CAS stunning compared to the traditional water bath method. With an average carcass weight of 1.8 kg the additional costs are 1.2 cent per kg carcass weight.

Discussion

In the FCEC report (Sanco, 2012) many remarks are made on the advantages and disadvantages of the different stunning methods. The following remarks are most relevant:

- CAS stunning requires more space than waterbath systems and therefore requires modifications to the slaughter line and the building. This will increase the costs and can be a barrier to invest.
- In the basic model we calculated the costs of a slaughterhouse with a line speed of 12,000 birds per hour. In the report it is illustrated that the costs of CAS stunning are higher in small or medium scale slaughterhouse with a capacity of 6,000 or 3,000 birds per hour.
- An important driver in the choice for CAS stunning is better product quality. Quality advantages for specific end-markets (especially fresh breast fillet) often result in higher revenue. In this situation the net costs of CAS stunning are reduced.
- In countries with a focus on animal welfare and a specific market of breast fillet CAS stunning is already used in a many slaughterhouses. This is especially the case in Germany and the Netherlands.

Annex 4

Table A4.1. Total costs after slaughter of conventional and ECC broilers in six countries (LW = live weight, CW = carcass weight).

	NL		DE		FR		IT		ES		PL	
	Conv	ECC	Conv	ECC	Conv	ECC	Conv	ECC	Conv	ECC	Conv	ECC
Production costs (cent/kg LW)	92.4	112.3	95.5	114.0	93.4	108.2	94.6	112.2	94.7	112.0	89.7	106.6
Slaughter yield (%)	73.0	71.5	73.0	71.5	73.0	71.5	73.0	71.5	73.0	71.5	73.0	71.5
Production costs (cent/kg CW)	126.5	157.0	130.8	159.4	127.9	151.3	129.6	157.0	129.8	156.7	122.9	149.0
Slaughter costs (cent/kg CW)	40.0	41.2	39.0	40.2	38.0	39.2	32.0	33.2	31.0	32.2	27.0	28.2
Total costs (cent/kg CW)	166.5	198.2	169.8	199.6	165.9	190.5	161.6	190.2	160.8	188.9	149.9	177.2
Difference (cent/kg CW)		31.7		29.8		24.6		28.6		28.1		27.4
Difference (%)		19%		18%		15%		18%		17%		18%

More information

Peter van Horne

T +31 317 484 645

E peter.vanhorne@wur.nl

www.wur.eu/economic-research

2022-12
