



DIPARTIMENTO DI ECONOMIA E INGEGNERIA AGRARIE  
ALMA MATER STUDIORUM – UNIVERSITÀ DI BOLOGNA

**STUDY ON THE SOCIO-ECONOMIC IMPLICATIONS OF DIFFERENT ASPECTS OF  
FARMING WEANERS AND PIGS KEPT FOR FATTENING**

**Final Version**

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*Project team*

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Prof. Maurizio Aragrande	<i>Project leader</i>	DEIAgra – University of Bologna
Dr. Mauro Bruni	<i>Project manager</i>	Areté s.r.l. – Bologna
Dr. Alberico Loi		Areté s.r.l. – Bologna
Prof. Leonardo Nanni Costa		University of Bologna
Dr. Cesare Zanasi		University of Bologna
Dr. Enrica Gentile		DEIAgra – University of Bologna
Prof. Rita Robles Robles		University of Leon
Dr. Andrea Gallina		Roskilde University

## Table of contents

<b>Table of contents.....</b>	<b>2</b>
<b>Acronym List .....</b>	<b>5</b>
<b>Foreword .....</b>	<b>7</b>
<b>Introductory section.....</b>	<b>9</b>
<b>1 Context, objectives and scope of the study.....</b>	<b>10</b>
1.1 Context of the study.....	10
1.2 Objectives of the study .....	11
1.3 Scope of the study .....	12
<b>2 Methodology of the study .....</b>	<b>14</b>
2.1 General understanding of the study .....	14
2.2 Theoretical background .....	15
2.2.1 The economic background.....	15
2.2.2 The animal science background .....	16
2.2.3 The scenario and impact evaluation .....	17
<b>Section A - Description .....</b>	<b>19</b>
<b>A.1 Pig rearing in the European Union structure, rearing systems, regional peculiarities .....</b>	<b>20</b>
A.1.1 Structure of the pig sector in the European Union .....	20
A.1.1.1 Production capacity of the sector.....	20
A.1.2 Pig rearing system typologies in the European Union .....	33
A.1.2.1 Relevant rearing systems typologies .....	33
Weaners .....	33
Growing and finishing pigs .....	35
A.1.2.2 Distribution of relevant rearing system typologies in the EU .....	40
A.1.3 Summary.....	42
<b>A.2 Production costs.....</b>	<b>44</b>
A.2.1 Production costs in selected Member States.....	44
A.2.1.1 Cost differentials among countries .....	46
A.2.1.4 Explicit cost of production (cash costs of production) .....	48
A.2.2 Summary.....	51
<b>A.3 Pigmeat selling prices and pigmeat Quality Assurance System ....</b>	<b>52</b>
A.3.1 Pigmeat retail prices in the EU Member States .....	52
A.3.1.1 Pigmeat selling prices .....	52
A.3.1.2 The effect of quality assurance systems on pigmeat retail prices.....	54
A.3.2 Summary.....	62
<b>A.4 Third countries exporting pigmeat to the EU .....</b>	<b>63</b>
A.4.1 Pigmeat trade flows between the relevant third countries and the EU .....	65
A.4.2 The pigmeat sector in the relevant third countries: structure, production costs and pigmeat prices .....	67
A.4.3 Summary.....	68
<b>A.5 Competition faced by EU pigmeat in the main foreign markets ...</b>	<b>69</b>
A.5.1 Main foreign markets for EU pigmeat exports .....	69

A.5.2 EU pigmeat exports vs. relevant third country exports in the main foreign markets .....	73
A.5.3 Summary .....	75
<b>Section B – Scenarios for future development.....</b>	<b>76</b>
<b>B.1 The structural evolution in the EU pig sector and the dynamics of the relevant factors .....</b>	<b>77</b>
B.1.1 Structural evolution in the EU pig sector.....	77
B.1.1.2 Number of holdings and their distribution among size classes .....	78
B.1.1.3 Pigmeat production dynamic .....	84
B.1.2 The dynamics of the relevant factors .....	85
B.1.2.1 Production costs .....	85
B.1.2.2 Cereal prices .....	87
B.1.2.3 Agricultural wages .....	89
B.1.2.4 Pigmeat prices .....	90
B.1.3 Summary .....	91
<b>B.2 Production costs in the main relevant rearing system typologies and in different combinations of space allowance and floor type .....</b>	<b>92</b>
B.2.1 Estimation of production costs in the main relevant rearing system typologies.....	92
B.2.1.1 Methodology for the estimation of production costs .....	92
B.2.1.2 Results of the estimation of production costs .....	92
B.2.1.3 Summary .....	97
<b>B.3 Assessment of the impacts resulting from different scenarios .....</b>	<b>98</b>
B.3.1 Relationship between space allowance and production cost in the different RSTs (space allowance and RSTs).....	98
B.3.1.1 Methodology .....	98
B.3.1.2 Selected allowance and RST combinations (microeconomic level).....	98
B.3.1.3 Production costs variation in relation to space variation .....	99
B.3.2 From farm to sector impact.....	105
B.3.2.1 Assessment of the impacts .....	110
<b>Section C – Analysis and policy recommendations.....</b>	<b>122</b>
<b>C.1 Comparative analysis between factors deriving from animal welfare requirements on space allowances and floor types and other factors affecting production costs .....</b>	<b>123</b>
C.1.1 Comparative analysis: increase of cost due to the animal welfare requirements vs increase of cereals price and labour price .....	124
C.1.2 Summay .....	135
<b>C.2 Conclusions and policy recommendations .....</b>	<b>136</b>
Figure 23: Comparison of the complexity among scenarios .....	141
<b>Annex I to Chapter B.3 Assessment of the impacts resulting from different scenarios .....</b>	<b>152</b>
<b>Annex II to Chapter B.3 Assessment of the impacts resulting from different scenarios .....</b>	<b>157</b>
<b>Annex III to Chapter C.2 Conclusions and policy recommendations .....</b>	<b>161</b>
<b>Annex IV - Bibliography .....</b>	<b>166</b>

## Acronym List

<b>A</b>
<b>APL</b> = Australian Pork Limited
<b>B</b>
<b>BPEX</b> = British Pig Executive <b>BSE</b> = Bovine Spongiform Encephalopathy
<b>C</b>
<b>CAP</b> = Common Agricultural Policy <b>CEEC</b> = Central and Eastern European Countries <b>CIF</b> = Cost Insurance and Freight <b>CMO</b> = Common Market Organization <b>CN</b> = Combined Nomenclature <b>COMEXT</b> = Intra-and extra-EU Trade Statistics <b>CPI</b> = Canada Pork International <b>CW</b> = Carcass Weight – Slaughter weight
<b>D</b>
<b>DEFRA</b> = Department for Environment, Food and Rural Affairs <b>DEIAGRA</b> = Department of agricultural economics and engineering
<b>E</b>
<b>EAGGF</b> = European Agricultural Guidance and Guarantee Fund <b>EFSA</b> = European Food Safety Authority
<b>F</b>
<b>FADN</b> = Farm Accountancy Data Network <b>FAO</b> = Food and Agriculture Organization <b>FAWC</b> = Farm Animal Welfare Council <b>FCR</b> = Feed Conversion Ratio <b>FFI</b> = Farm Family Income <b>FNVA</b> = Farm Net Value Added
<b>G</b>
<b>GATT</b> = General Agreement on Trade and Tariffs <b>GFI</b> = Gross Farm Income
<b>H</b>
<b>HS</b> = Harmonized Commodity Description and Coding System or Harmonized System
<b>I</b>
<b>ISO</b> = International Standard Organization

<b>M</b>
<b>MAFF</b> = codes of recommendations <b>MLC</b> = Meat and Livestock Commission
<b>N</b>
<b>NGO</b> = Non-Governmental Organizations <b>NMS</b> = New Member States accession to EU
<b>Q</b>
<b>QAS</b> = Quality Assurance Systems
<b>R</b>
<b>RSPCA</b> = Royal Society body for Animal Welfare <b>RST</b> = Rearing System Typologies <b>RTC</b> = Relevant Third Countries
<b>S</b>
<b>SVS</b> = State Veterinary Service
<b>T</b>
<b>TF</b> = Types of farming <b>TOR</b> = Terms Of Reference
<b>U</b>
<b>USDA</b> = United States Department of Agriculture
<b>W</b>
<b>WCO</b> = World Customs Organizaion <b>WTO</b> = World Trade Organization <b>WTP</b> = Willingness to Pay

## **Foreword**

This report is made of four sections (introductory section; sections A, B and C).

Section A is dedicated to the study of the current situation of the pig sector in the EU and in the six relevant Third Countries, as far as the pig fattening activities are concerned. The information and the data collected in this chapter are essential to perform the assessment of the impacts resulting from different combinations of space allowance and floor type (section B) and the comparative analysis between factors deriving from animal welfare requirements on space allowances and floor types and other factors affecting production costs (section C), that is cereals price and labour price.

Introductory section features objectives and methodology of the study.

Section A is made of five chapters. § A.1 features a description of the pig sector in the EU, analyzing its structure (pigmeat production and consumption) and defining representative rearing system typologies, characterized by different combinations of space per pig and floor type.

In § A.2 production cost data are reported; a comparison among the different production costs in selected Member States is carried out, revealing very important differences, whose explication has being investigated.

The next chapter (§ A.3) features pig selling prices.

In § A.4 the pig sector of six relevant Third countries exporting pigmeat to the EU, i.e. USA, Canada, Brazil, Chile, China, Australia, is studied; data and information concerning pigmeat trade flows, structure of the sector, rearing systems and production costs are reported.

Finally, the last chapter, § A.5, describes competition faced by EU pigmeat, in the main export markets.

Section B is made of three chapters. In § B.1, the structural evolution of the EU pig sector and the dynamics of the relevant factors behind it are outlined.

In § B.2 the production costs associated with each relevant rearing system typology (RST) are estimated, for a number of Member States. In § B.3 an assessment of the impacts on the aspects of the EU pig sector under study (pigmeat production costs and gross margins; pig sector structure, employment; pigmeat supply; domestic market equilibrium and competitiveness of EU pigmeat in world markets) resulting from different combinations of space allowance and floor type is carried out, with reference to five scenarios, each featuring a different combination of space allowance and floor type. This assessment is based on the data and information reported in § B.1 and § B.2 of the present report.

Section C features a comparative analysis between factors deriving from animal welfare requirements on space allowances and floor types and other factors affecting production costs, namely the price of cereals and the level of agricultural wages. Section C also features the conclusions and policy recommendations.

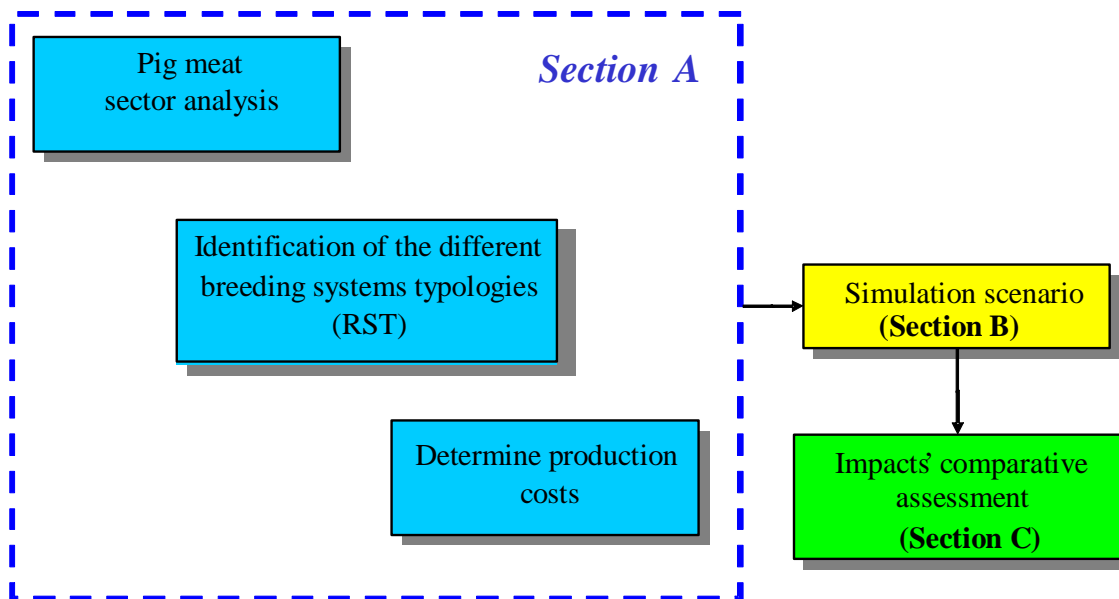


Figure 1: Organisation of the study

## **Introductory section**

# 1 Context, objectives and scope of the study

## 1.1 Context of the study

Article 6 of Directive 91/630/EEC<sup>1</sup> laying down minimum standards for the protection of pigs invites the Commission to submit to the Council a report drawn up on the bases of an opinion of the Scientific Committee on Animal Health and Animal Welfare (responsibilities now assumed by the European Food Safety Authority - EFSA) on the protection of pigs and possibilities to reduce the need to resort to surgical castration. If need be, the report shall be accompanied by legislative proposals on the effects of different space allowances and floor types on the welfare of weaners and fattening pigs. Space allowances for weaners and fattening pigs have an important influence on their ability to satisfy their need to perform natural behaviour and thus on their welfare. Since the adoption of Directive 91/630/EEC new scientific data and experience has become available suggesting that a revision of the current requirements is indicated.

During the negotiations of the revision of Directive 91/630/EEC in 2001 the socio-economic impacts of increasing space allowances and of improving floor types were of major concern for the Member States. As a matter of fact, it is clear that the determination of stricter requirements on space allowances and floor types implies the reorganization of the EU pig-farms that do not satisfy such requirements with, thus, additional costs for the farmers involved. This may considerably affect the competitiveness of the pig sector of the EU member states with respect to third countries. Therefore, it seems necessary to carry out an evaluation of the effects that the application of new requirements on space allowances and floor types for EU pig-farms may have on the current state of the competition between EU supply systems and third countries supply systems as well as of the various socio-economic implications that a change in such state may have (fig. 2).

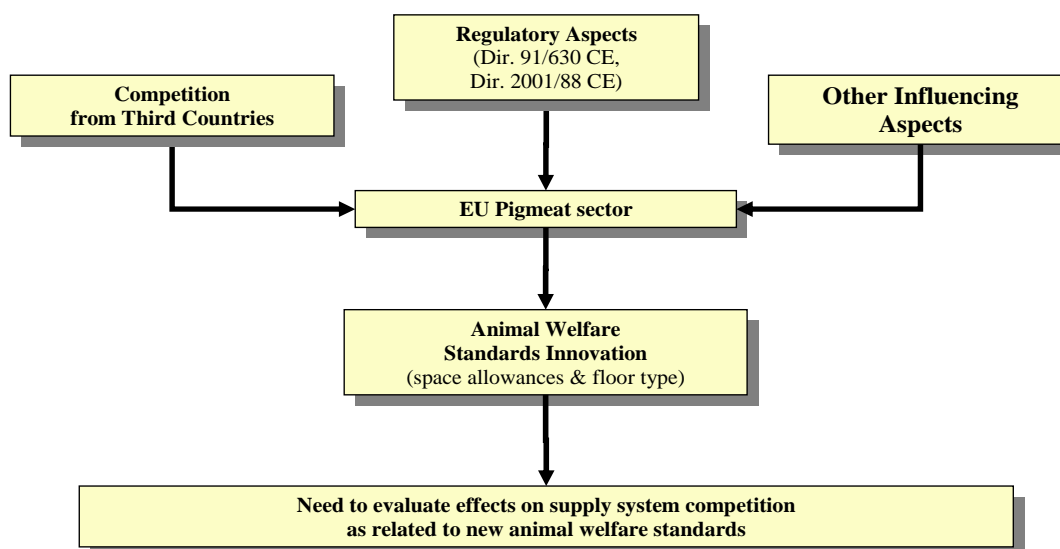


Figure 2: Context of the study

<sup>1</sup> OJ L 340, 11-12-1991, p. 33. Directive as last amended by Directive 2001/88/EC (OJ L 316, 1-12-2001, p. 36).

## **1.2 Objectives of the study**

The study aims at evaluating the socio-economic impacts linked to the possible introduction of new standards on animal welfare (with regard to space allowances and different floor types) in EU pig-farms as amendment to the current provisions on the matter contained in the Directive 91/630/EEC (as amended and integrated by Directive 2001/88/EC). The study is focused on the changes in production costs for the producers in the EU; as far as the international competitiveness of EU pig production is concerned, the situation in selected third countries representing the main trading partners is also evaluated.

For this purpose, the following tasks are carried out:

1. An analysis of the current situation as to:
  - a) structure of the EU pig sector, production systems currently used in member states, production costs;
  - b) retail prices of pigmeat and incomes of pigmeat farmers;
  - c) the elements stated under points a) and b) for some important third countries producing and exporting pigmeat to EU. According to the data and bibliography available on the matter, such countries are:
    - USA;
    - Australia;
    - Chile;which account for a considerable share of the current total imports of pigmeat by the EU;
    - China;
    - Canada;
    - Brazil;which are great pigmeat producers at the world level and are, thus, to be considered as important competitors of EU pigmeat producers.
2. Definition and analysis of scenarios aimed at evaluating the relevance of the impacts on the different aspects under point 1:
  - introduction of new standards on animal welfare in EU pig-farms (in relation to the change in the requirements on space allowances and floor types);
  - effect of other factors;and identification of possible solutions to minimize any negative impacts.

In order to carry out the tasks under point 2, the study requires the creation of 6 reference scenarios based on the experiences acquired on alternative farming systems. Such scenarios are identified through different combinations between requirements on space allowances and requirements on floor types and are used to evaluate the comparative impact of:

- a) The introduction of new standards on animal welfare in EU pig-farms, and
  - b) The effect of other relevant factors,
- on the different aspects of the EU pig sector under point 1.

Ways to minimise possible negative implications for the farm income (in particular the potential influence of quality assurance systems in promoting a premium product) are explored. Furthermore, the effect of different transitional periods for potential legislative measures is evaluated.

The objectives of the study are summarised in figure 3.

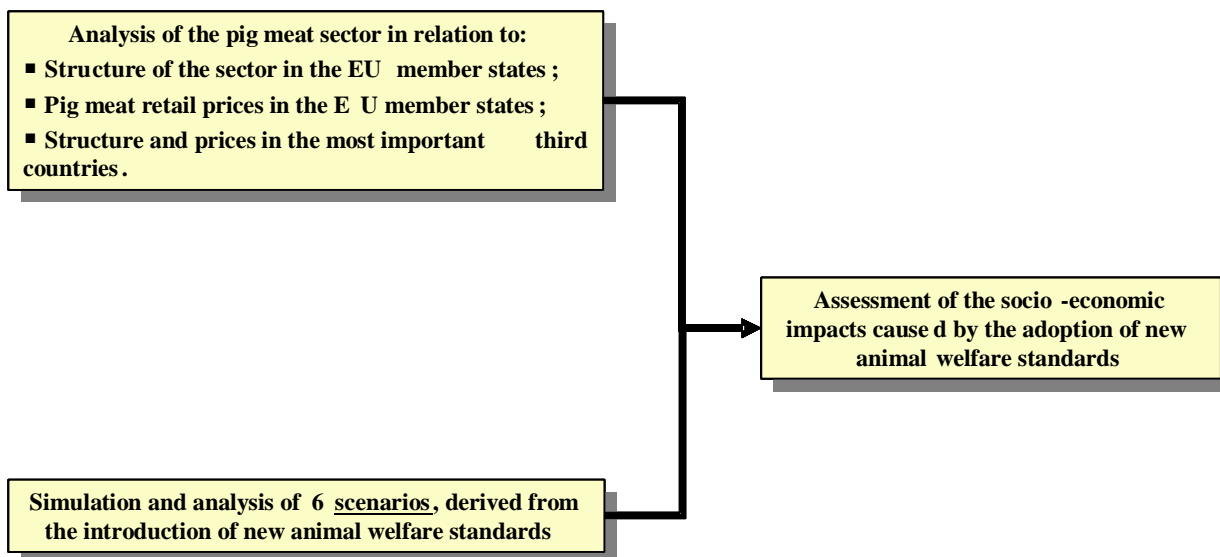


Figure 3: Objectives of the study

### 1.3 Scope of the study

The geographical coverage of the study is as follows:

- Analysis of the present situation: EU, main extra-EU competitors (USA, Australia, Chile; China, Canada, Brazil);
- Scenario analysis: EU.

The products covered by the study are the following:

- Live animals (farming weaners and pigs kept for fattening);
- Pigmeat.

With regard to the supply chain levels (figure 4) covered in the study, the focus is kept on the pigs fattening activity and the related operators. The scenario analysis (impact of different space availability / floor type combinations) concerns weaning and pig fattening activity.

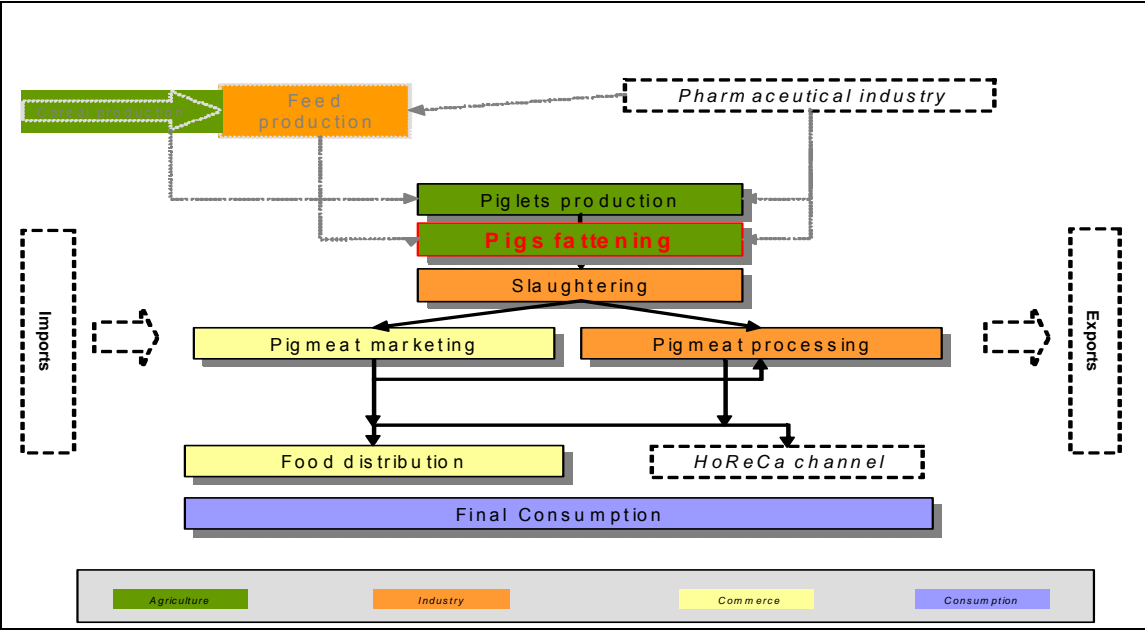


Figure 4: The pigmeat supply chain

## 2 Methodology of the study

### 2.1 General understanding of the study

According to the Tender Specifications, the study is divided in three sections (A, B, C), each one dealing with specific tasks to comply with.

Section A is dedicated to the study of the current situation of the pig sector in the EU and in the six relevant Third Countries, as far as the pig fattening activities are concerned. The information and the data collected in this chapter are essential to perform the assessment of the impacts resulting from different combinations of space allowance and floor type (section B) and the comparative analysis between factors deriving from animal welfare requirements on space allowances and floor types and other factors affecting production costs (section C), that is cereals price and labour price.

For the best understanding of the methodology, the requirements indicated in the Term Of Reference (TOR) is translated into a framework of relationships among the different phases of the study (that we will call the rationale of the study).

Figure 5 describes the general rationale of the study, outlining its relevant parts and the functional relationships among them, as also described in the next lines.

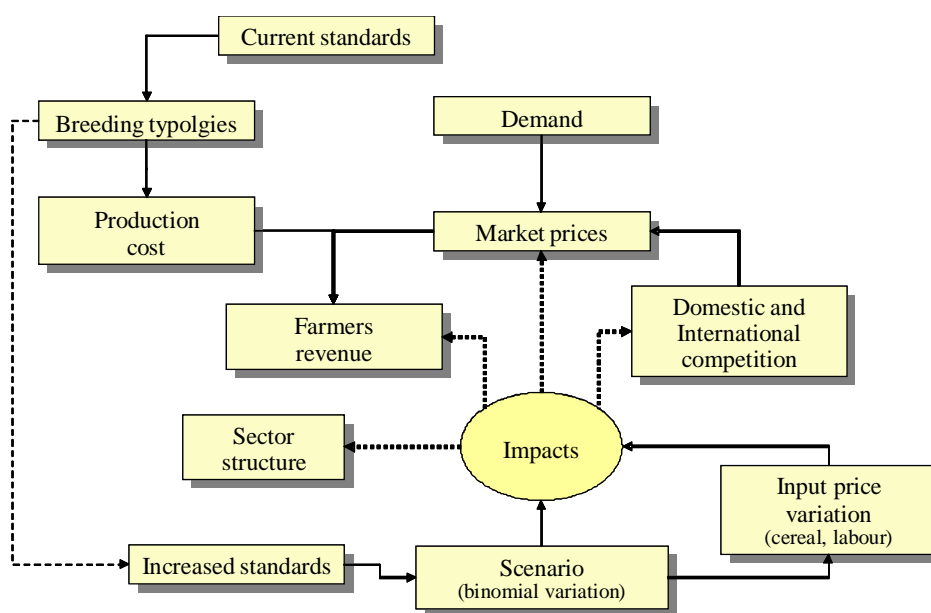


Figure 5: Rationale of the study (overview)

Directive 91/630/EEC sets the *current standards* of animal welfare in pig fattening, including space allowance and floor type. The existing *rearing typologies* are analysed and put in relation with the related *production costs*, specially in view of space allowance and floor type. Production cost together with market price determines the *farmers revenue*, where market price is also determined by the *domestic and*

*international competition* (according to rules set by the world agreements on commerce and by CAP regulation). On the demand side, trends in pigmeat consumption determine the total demand for pigmeat, influenced by economic and social factors (such as individual revenue, ethical belief, quality standards, etc.). Finally, demand trends together with the competitive environment (in the domestic and international markets) determine the market equilibrium, revealed by the trend of *market price* of pigmeat.

An extended adoption of increased standards of animal welfare in the EU would produce some *impacts* at farm level, mainly due to a change of the production costs. The variation of production cost would impact in turn some of the variables included in the scheme above, namely: the level of farmers' revenue, the structure of the sector, the market equilibrium, the international competitiveness.

Such impacts can be analysed through a *scenario* approach, that is in fact a simulation of the likely situations that would occur if enhanced animal welfare standards (in terms of space allowance and type of floor) are applied. A comparative reference for these scenario is the equivalent effect on production costs of an *input price variation* (feed and labour).

## **2.2 Theoretical background**

Reference theories adopted in the study, as a background for the scientific methodology, refer to the areas of *economics* and *animal production science*. The pivotal linkage between the animal welfare techniques (that is the animal production or technical area) and the impact analysis is the breakdown of the production cost, by way of technical parameters concerning pig rearing.

### **2.2.1 The economic background**

Farm analysis concepts and tools are at the core of the study, by way of the production theory and production cost analysis. In the same field (that is the *microeconomic approach*), market equilibrium and consumer behaviour are concerned. At aggregate level, the sector approach supplies the basic concepts for the structural analysis. The qualitative analysis of the scenario result (specially concerning socio-economic and aggregate effects as well as the analysis of the relationships along the supply chain) takes advantage of the *supply chain* and *system approach*. The consequences of the enhancement of animal welfare standards on international competition is mainly based on the classical analysis of the trade flows, and on the theoretical background of the *comparative advantage*.

Details about basic assumptions and methodological tools, specially concerning farm and sector analysis, are described in Table 1.

**Table 1: The economic background. Task assignement and basic assumptions**

Type of approach	Task	Basic assumptions
<i>Microeconomic approach</i>	Production cost analysis	Cost production analysis is based on functional classification of the inputs. The distinction between fix and variable costs is relevant to understand the effects of space allowance and floor modification on farm equilibrium.
	Farm revenue assessment	The gross margin (gross income less variable costs) is adopted as indicator of farmer's revenue
	Analysis of farmers behaviour facing innovation	Farmers are price takers, apply economic rationality and seek economic sustainability of innovation. They apply scale economies to counterbalance cost variation.
	Analysis of consumer behaviour facing pig meat quality attributes	Pigmeat demand is determined by economic factors (price of the pigmeat and of potentially substituting goods, and consumer's revenue) and social and cultural factors (willingness to pay for quality). Animal welfare is a quality credence attribute that must be proved to the consumer by a credible <i>quality certification system</i> .
	Market analysis (domestic)	Market price is the indicator of the market equilibrium. In the EU pig sector, market equilibrium is mainly influenced by demand and supply confrontation. Sector and trade policies (CAP and WTO) influence market equilibrium by way of market regulation and related agreements.
<i>Sector approach</i>	Structure and rearing system typologies analysis (dynamics, distribution)	The structure of a sector is defined by the use of producing factors. Number and size of producing units, geographic location, endowment of other producing factors describe some relevant aspects of the producing technics and their dynamics over time. The average size of the farms is a relevant indicator of the sector dynamics in the pig meat sector. Rearing system typologies are producing techniques relevant to analyse the structure of the sector.
<i>International competition</i>	Analysis of the EU position in the world market	Trade flows are mainly explained by comparative advantages among countries. Production cost is the main indicator and factor to define the competitive position in the world market. General quality level also contribute to explain international trade.

### 2.2.2 The animal science background

Application of animal welfare standards concerning space allowance and floor type modifies the rearing environment of the stables. The physiology and the behaviour of

the pigs are influenced. Both aspects (modification of the structure of the stable and of the pig's physiology and behaviour) determines a different use (quantity and quality) of the inputs.

This change is described in fact by technical parameters concerning the effect of animal welfare standards on the most important living functions of the pigs (conversion index, behavioural syndromes, physical injuries, mortality, contamination). These parameters translate into a modification of input use and fattening efficiency (feed use, positive or negative effects on fattening performance, use of chemicals and medicines, loss of animals).

On the other side, space allowance and floor type directly influence the value of the stable and of other materials (use of land, cost of the structure and related amortization, use of labour, straw, machinery, etc.). In economic terms, all of these modifications determine variations in fixed and variable costs and in rearing efficiency that influence both production cost and productivity. The whole process is described in Figure 6.

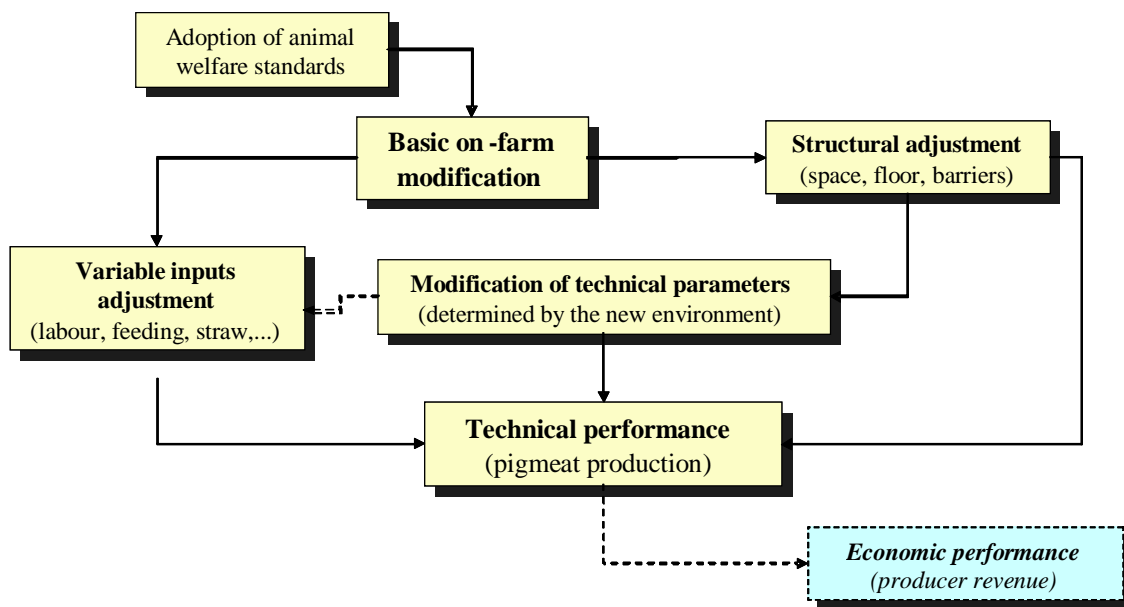


Figure 6: Technical requirements of animal welfare

### 2.2.3 The scenario and impact evaluation

Besides the specific theoretical background, the evaluation of the impacts is obtained by the scenario methodology, largely used to evaluate policy impacts and to support decision making process. The scenario approach is a way to understand the likely result of the human actions on some relevant aspects of a system. In this study, the human actions are firstly the modification of floor type and space allowance and, secondly, the possible change of inputs markets (feed and labour cost). The impacts are the results of the scenario simulation.<sup>2</sup>

<sup>2</sup> - Impacts can be viewed as answers to some specific questions, such as: what are the variables/situations (X, Y, Z) that will change in relation with the independent variables (A, B, C) that characterise the

The evaluation of the impacts related to a given scenario is based on the chain of events determined by the variation of the independent variables<sup>3</sup>. The chain of events is designed through a comprehensive approach to the problem, that allows to understand the width of the consequences and to project them from the farm level to sector and system level. Sector and supply system approach help drawing this functional framework.

The starting point of the simulation process is the farm level. The technical assumptions and the breakdown of production cost allow the calculation of the economic result of the scenario at farm level, in terms of variation of input, related cost and subsequent farm profitability. Increasing space allowance and/or modifying floor type also call for investments, that farmers will adopt according to their financial capability (witnessed by income level). This step is crucial to project farm impact at sector level. In fact, as a consequence of cost modification, some farmers will be obliged to leave the sector, some others will stay, and possibly develop their activity. The result of individual decisions will result in a structural adjustment in the medium-long term, influencing other relevant variables of the impact (sector supply, farmers revenue, international competition), as shown in Figure 7.

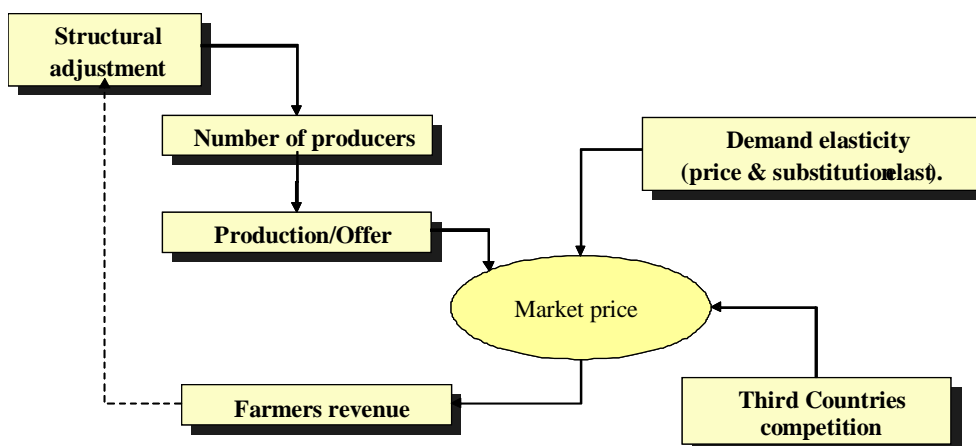


Figure 7 : Chain of events behind the impact analysis (example)

scenario? In what direction and in what measure they will change? What will be the overall situation drawn by the scenario?

<sup>3</sup> - Example of the chain of events quoted in the text are shown in Figure 5 and Figure 6, ahead in the text. Figure 5 describes the causal relationship between the adoption of technical requirements of animal welfare and the economic result at farm level. Figure 6 is an example of the chain of events linking the structural adjustment at farm level (due to the modification of the producing structure of the farm to comply with enhanced animal welfare requirements) with the sector and aggregate effects.

## **Section A - Description**

## A.1 Pig rearing in the European Union structure, rearing systems, regional peculiarities

This chapter describes the various aspects of the economy of EU pigmeat sector which are relevant in the framework of the study:

- 1) structure of the pig sector (number and size of holdings; dimension and distribution of the pig population);
- 2) pigmeat production;
- 3) pigmeat consumption and supply balance;
- 4) characteristics and diffusion of the relevant rearing system typologies.

### A.1.1 Structure of the pig sector in the European Union

#### A.1.1.1 Production capacity of the sector

##### Pig population

According to 2004 Eurostat data, the European Union has a pig population of 151,142,750 heads (fig. 8). As to its distribution, Germany ranks first (26,334,797 heads), followed by Spain (24,894,960), Poland (17,395,568), France (15,265,000) and Denmark (12,969,000), as shown in the fig. 9.

Figure 8: Variation of pig population in the European Union (1990 – 2004)

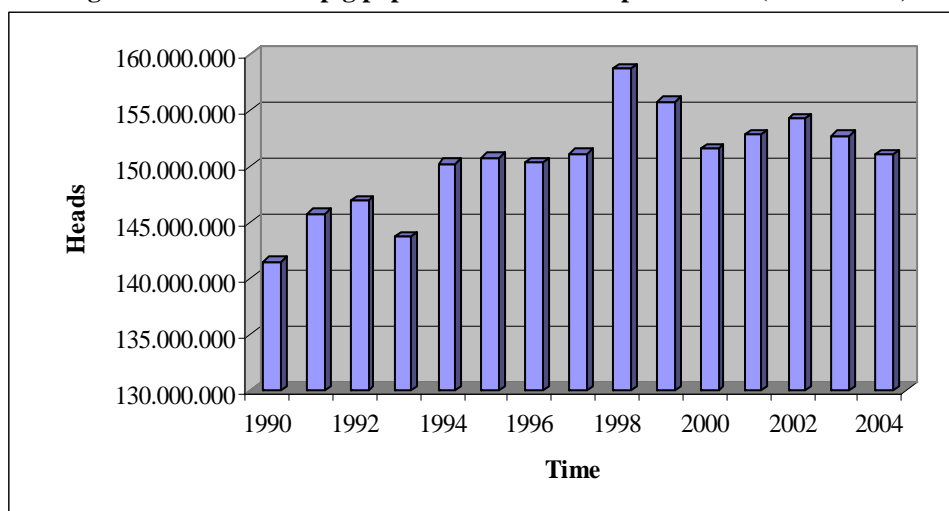
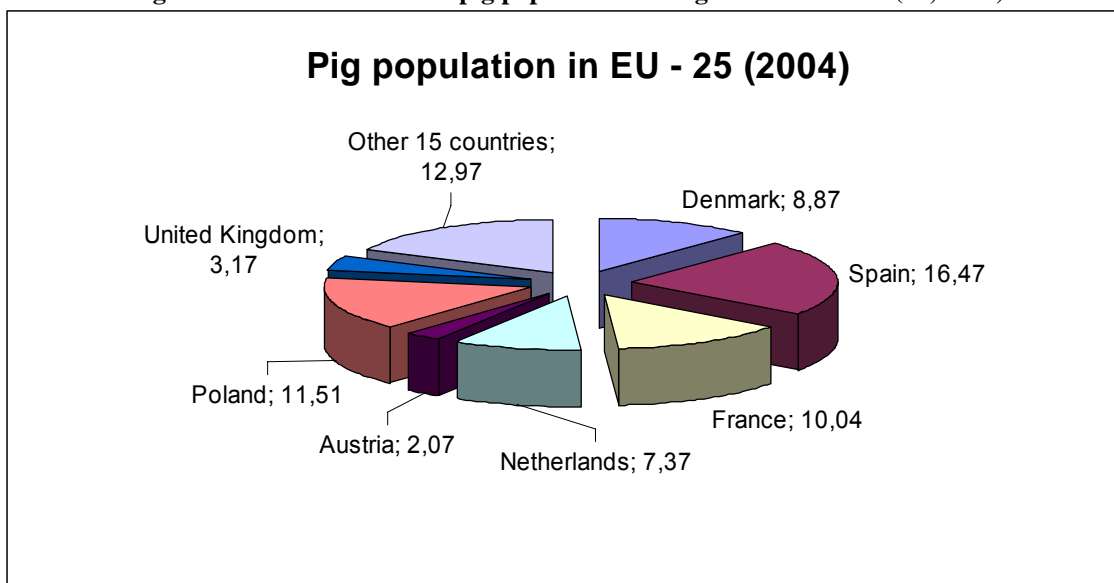


Figure 9: Distribution of EU pig population among Member States (% , 2004)



In comparison to 2000, the pig population has decreased by 1.08% (table 2) mostly due to the decrease in heads in the 10 Eastern EU Member States following the adjustment of their structures to EU standards and the reduction in available cereals occurred in the first half of 2004. In Poland and Hungary, which account for three quarters of the pig population in the new Member States, the number of heads has decreased by, respectively, 5.66% and 17.38%; a considerable decrease in heads has also occurred in the Czech Republic and in Slovakia (-11,91% and -20.36%, respectively).

On the contrary, in the EU-15 the pig population has increased by 0.84% due to its further growth in Spain (+3.31%) and Denmark (+3.38%) as well as to the slowdown in the reduction process taking place in some producer Countries in northern Europe, such as Belgium, United Kingdom and the Netherlands. The Netherlands, in particular, have shown a slight increase (+3.5%) after the decrease that had been going on since the end of the '1990s.

**Table 2: Pig population in the European Union<sup>4</sup> (annual data)**

Country	2000		2001		2002		2003		2004		% Var. 04-03
	Number of heads	% Share	Number of heads	% Share	Number of heads	% Share	Number of heads	% Share	Number of heads	% Share	
Belgium	7.266.174	4,79	6.775.231	4,43	6.600.158	4,28	6.366.248	4,17	6.318.734	4,18	-0,75
Denmark	12.642.000	8,33	12.975.000	8,49	12.879.000	8,34	12.969.000	8,49	13.407.000	8,87	3,38
Germany	25.766.825	16,99	25.957.757	16,98	26.251.490	17,01	26.495.300	17,34	26.334.797	17,42	-0,61
Greece	936.000	0,62	861.000	0,56	1.027.000	0,67	993.000	0,65	994.000	0,66	0,10
Spain	22.149.308	14,60	23.857.775	15,60	23.517.740	15,24	24.097.540	15,77	24.894.960	16,47	3,31
France	15.168.000	10,00	15.275.430	9,99	15.378.000	9,96	15.265.000	9,99	15.168.000	10,04	-0,64
Ireland	1.731.480	1,14	1.762.940	1,15	1.781.500	1,15	1.731.620	1,13	1.757.600	1,16	1,50
Italy	8.645.536	5,70	8.766.262	5,73	9.166.000	5,94	9.157.000	5,99	8.971.762	5,94	-2,02
Luxembourg	82.596	0,05	76.206	0,05	76.478	0,05	75.891	0,05	77.133	0,05	1,64
Netherlands	12.822.000	8,45	11.514.000	7,53	11.154.000	7,23	10.765.540	7,05	11.140.000	7,37	3,48
Austria	3.347.931	2,21	3.440.405	2,25	3.304.650	2,14	3.254.866	2,13	3.125.204	2,07	-3,98
Portugal	2.337.814	1,54	2.389.011	1,56	2.343.705	1,52	2.249.053	1,47	2.347.852	1,55	4,39
Finland	1.455.500	0,96	1.453.800	0,95	1.422.800	0,92	1.394.200	0,91	1.435.000	0,95	2,93
Sweden	1.896.100	1,25	1.920.173	1,26	1.982.000	1,28	2.004.000	1,31	1.920.420	1,27	-4,17
United Kingdom	5.948.201	3,92	5.686.955	3,72	5.330.121	3,45	4.842.464	3,17	4.787.379	3,17	-1,14
<b>EU (15 countries)</b>	<b>122.195.465</b>	<b>80,56</b>	<b>122.711.945</b>	<b>80,26</b>	<b>122.214.642</b>	<b>79,18</b>	<b>121.660.722</b>	<b>79,62</b>	<b>122.679.841</b>	<b>81,17</b>	<b>0,84</b>
Cyprus	413.805	0,27	450.977	0,29	490.818	0,32	488.101	0,32	470.504	0,31	-3,61
Czech Republic	3.594.000	2,37	3.441.000	2,25	3.429.000	2,22	3.309.000	2,17	2.915.000	1,93	-11,91
Estonia	300.200	0,20	345.000	0,23	340.800	0,22	344.600	0,23	353.700	0,23	2,64
Hungary	4.834.000	3,19	4.822.000	3,15	5.082.000	3,29	4.913.000	3,22	4.059.000	2,69	-17,38
Latvia	393.500	0,26	428.700	0,28	453.200	0,29	444.400	0,29	435.700	0,29	-1,96
Lithuania	867.600	0,57	1.010.800	0,66	1.061.000	0,69	1.057.400	0,69	1.073.300	0,71	1,50
Malta	:	:	80.898	0,05	78.303	0,05	73.067	0,05	76.853	0,05	5,18
Poland	16.991.500	11,20	17.493.960	11,44	18.997.030	12,31	18.439.240	12,07	17.395.568	11,51	-5,66
Slovenia	603.594	0,40	599.895	0,39	655.665	0,42	620.506	0,41	533.998	0,35	-13,94
Slovakia	1.488.441	0,98	1.517.291	0,99	1.553.880	1,01	1.443.013	0,94	1.149.282	0,76	-20,36
<b>EU (25 countries)</b>	<b>151.682.105</b>	<b>100,00</b>	<b>152.902.470</b>	<b>100,00</b>	<b>154.356.340</b>	<b>100,00</b>	<b>152.793.050</b>	<b>100,00</b>	<b>151.142.750</b>	<b>100,00</b>	<b>-1,08</b>

Source: Eurostat

<sup>4</sup> EU-25 data for the years preceding the 10 New Member States' (NMS) accession to EU, consider the 10 NMS as if they were part of the EU.

### Pig holdings

The tables 3 – 6 show the structure and characteristics of the pig holdings which conduct pig fattening activities.

As it can be seen, within the European Union there are many differences in the number and size of pig-farms.

In Italy, Greece, Spain, Portugal and in the 10 new Member States, the number of very small holdings (i.e. holdings with a number of heads between 1 and 99) is very high (tab. 3 and 4); as a matter of fact, this type of holdings account for most of the national pig-farms: 96.5% in Italy, 89.2% in Spain, 98.5% in Portugal, 98.1% in Greece, 98.5% in Poland, and 99.7% in Hungary.

**Table 3: Number of holdings with pigs by size classes (2003)**

Country	Total	Size Classes				Average dimension (n. of pigs)
		1 - 99	100 - 399	400 - 999	>1000	
Belgium	8.230	2.470	1.780	2.790	1.190	502
Czech Republic	16.860	15.280	750	420	410	118
Denmark	10.900	2.770	2.500	3.110	2.520	691
Germany	95.650	67.000	14.910	10.240	3.490	178
Estonia	5.300	5.160	50	40	40	38
Greece	29.230	28.680	320	120	110	17
Spain	111.670	99.620	4.090	3.990	3.960	110
France	49.440	35.920	5.560	5.880	2.090	171
Ireland	1.100	640	90	140	240	920
Italy	122.630	118.390	1.550	1.100	1.580	50
Cyprus	860	750	20	20	80	276
Latvia	41.490	41.310	140	20	20	6
Lithuania	148.130	147.920	130	40	50	5
Luxembourg	200	120	30	20	10	229
Hungary	425.280	424.150	660	160	310	8
Malta	150	:	60	30	10	321
Netherlands	10.520	2.870	3.340	2.750	1.550	523
Austria	59.830	53.560	5.330	900	40	35
Poland	603.790	590.420	11.980	1.030	360	17
Portugal	87.470	86.200	720	270	270	14
Slovenia	38.430	38.100	290	20	10	9
Slovakia	44.410	43.690	320	200	200	20
Finland	3.480	1.660	1.270	440	110	214
Sweden	3.310	1.720	690	560	340	342
United Kingdom	8.940	5.950	1.060	970	970	344
<b>EU - 25</b>	<b>1.927.300</b>	<b>1.814.350</b>	<b>57.640</b>	<b>35.260</b>	<b>19.960</b>	<b>46</b>

Source: Eurostat

Most of the heads, however, are reared in big holdings with over one thousand heads, as shown by the tab. 5 and 6.

On the other hand, in the northern European countries like the Netherlands, Belgium and Denmark, there is a quite limited number of small holdings, which account, on average, for 25-30% of total holdings and for just 1-2% of total heads raised at the national level.

**Table 4: Distribution of holdings with pigs among different size classes - 2003 (% on total)**

Country	Size Classes			
	1 - 99	100 - 399	400 - 999	>1000
Belgium	30,0	21,6	33,9	14,5
Czech Republic	90,6	4,4	2,5	2,4
Denmark	25,4	22,9	28,5	23,1
Germany	70,0	15,6	10,7	3,6
Estonia	97,4	0,9	0,8	0,8
Greece	98,1	1,1	0,4	0,4
Spain	89,2	3,7	3,6	3,5
France	72,7	11,2	11,9	4,2
Ireland	58,2	8,2	12,7	21,8
Italy	96,5	1,3	0,9	1,3
Cyprus	87,2	2,3	2,3	9,3
Latvia	99,6	0,3	0,0	0,0
Lithuania	99,9	0,1	0,0	0,0
Luxembourg	60,0	15,0	10,0	5,0
Hungary	99,7	0,2	0,0	0,1
Malta	:	:	:	:
Netherlands	27,3	31,7	26,1	14,7
Austria	89,5	8,9	1,5	0,1
Poland	97,8	2,0	0,2	0,1
Portugal	98,5	0,8	0,3	0,3
Slovenia	99,1	0,8	0,1	0,0
Slovakia	98,4	0,7	0,5	0,5
Finland	47,7	36,5	12,6	3,2
Sweden	52,0	20,8	16,9	10,3
United Kingdom	66,6	11,9	10,9	10,9
EU - 25	94,1	3,0	1,8	1,0

Source: Eurostat

**Table 5: Number of pigs by size class of the holding - 2003 (heads)**

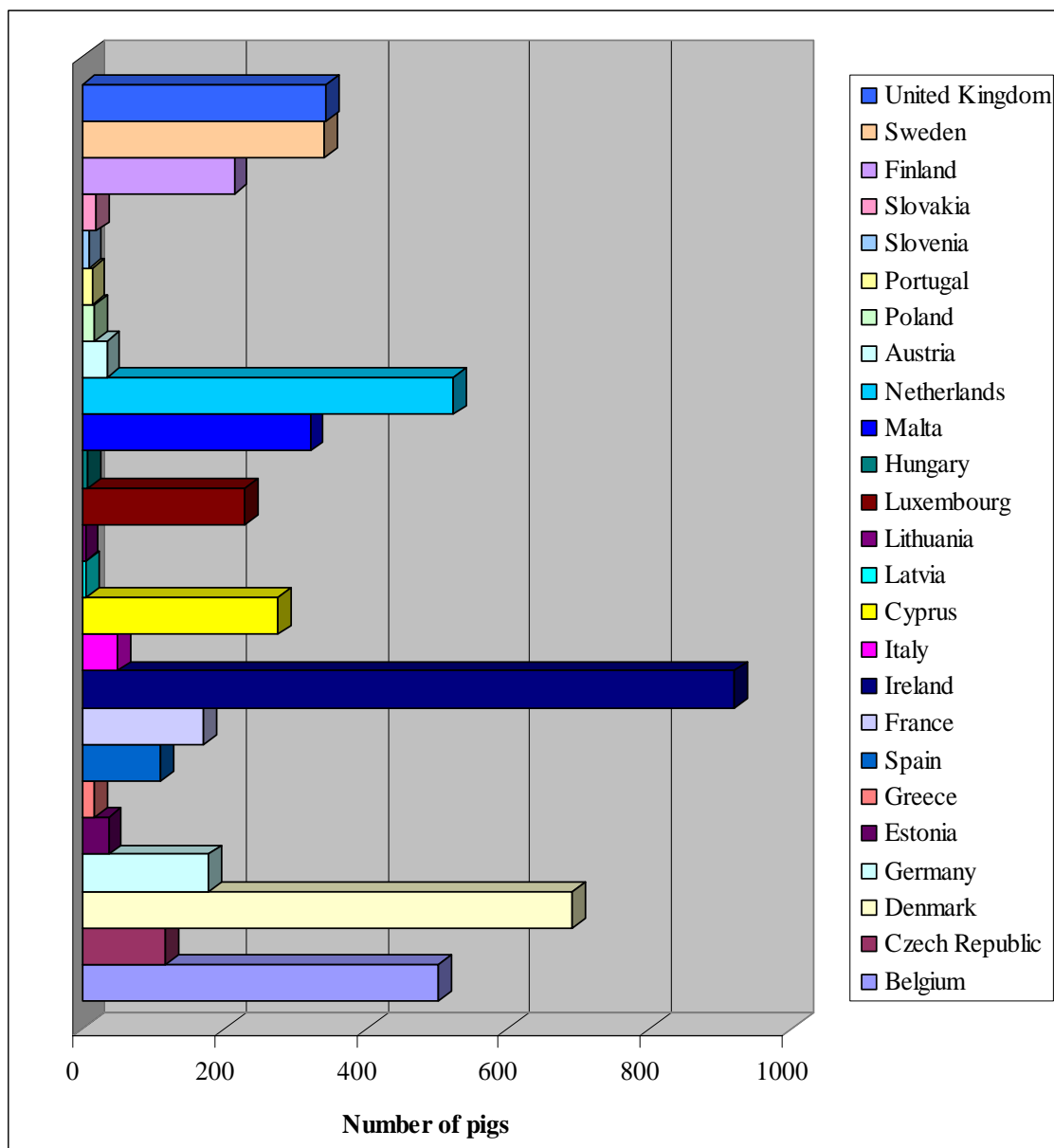
Country	Total	Size Classes			
		1 - 99	100 - 399	400 - 999	>1000
Belgium	4.135.380	40.130	432.190	1.848.800	1.814.270
Czech Republic	1.984.270	91.570	155.780	275.150	1.461.770
Denmark	7.527.750	88.910	585.180	2.055.780	4.797.890
Germany	17.056.780	1.176.490	3.204.720	6.431.410	6.244.160
Estonia	198.920	20.370	12.360	27.440	138.740
Greece	508.810	127.880	57.660	70.970	252.290
Spain	12.338.500	432.610	851.750	2.575.260	8.478.880
France	8.465.930	177.530	1.419.940	3.565.050	3.303.410
Ireland	1.011.600	4.980	20.610	87.660	898.360
Italy	6.141.840	367.240	319.280	721.270	4.734.050
Cyprus	237.730	3.470	3.140	14.190	216.940
Latvia	266.930	142.180	26.320	11.710	86.720
Lithuania	721.610	433.840	21.500	23.950	242.320
Luxembourg	45.890	880	8.000	12.200	24.330
Hungary	3.295.140	1.457.130	110.090	97.050	1.630.870
Malta	48.220	:	13.930	15.710	15.700
Netherlands	5.500.810	80.470	776.900	1.755.500	2.887.950
Austria	2.089.470	454.340	1.096.080	476.320	62.720
Poland	10.193.550	6.564.690	1.941.180	594.610	1.093.070
Portugal	1.181.270	226.580	145.300	173.740	635.660
Slovenia	347.820	193.740	49.680	12.240	92.170
Slovakia	889.180	118.470	69.660	133.270	567.800
Finland	746.000	58.660	270.660	264.000	152.680
Sweden	1.131.350	39.720	152.380	351.340	587.910
United Kingdom	3.074.720	77.380	240.590	633.980	2.122.760
EU - 25	89.139.470	12.379.260	11.984.880	22.228.600	42.543.420

Excluding breeding sows over 50 kg and piglets under 20

**Table 6: Holdings with pigs by size classes (% , 2003)**

Country	Size Classes			
	1 - 99	100 - 399	400 - 999	>1000
Belgium	1,0	10,5	44,7	43,9
Czech Republic	4,6	7,9	13,9	73,7
Denmark	1,2	7,8	27,3	63,7
Germany	6,9	18,8	37,7	36,6
Estonia	10,2	6,2	13,8	69,7
Greece	25,1	11,3	13,9	49,6
Spain	3,5	6,9	20,9	68,7
France	2,1	16,8	42,1	39,0
Ireland	0,5	2,0	8,7	88,8
Italy	6,0	5,2	11,7	77,1
Cyprus	1,5	1,3	6,0	91,3
Latvia	53,3	9,9	4,4	32,5
Lithuania	60,1	3,0	3,3	33,6
Luxembourg	1,9	17,4	26,6	53,0
Hungary	44,2	3,3	2,9	49,5
Malta	:	:	:	:
Netherlands	1,5	14,1	31,9	52,5
Austria	21,7	52,5	22,8	3,0
Poland	64,4	19,0	5,8	10,7
Portugal	19,2	12,3	14,7	53,8
Slovenia	55,7	14,3	3,5	26,5
Slovakia	13,3	7,8	15,0	63,9
Finland	7,9	36,3	35,4	20,5
Sweden	3,5	13,5	31,1	52,0
United Kingdom	2,5	7,8	20,6	69,0
EU - 25	13,9	13,4	24,9	47,7

Figure 10: Average dimension of holdings (Number of pigs, 2003)

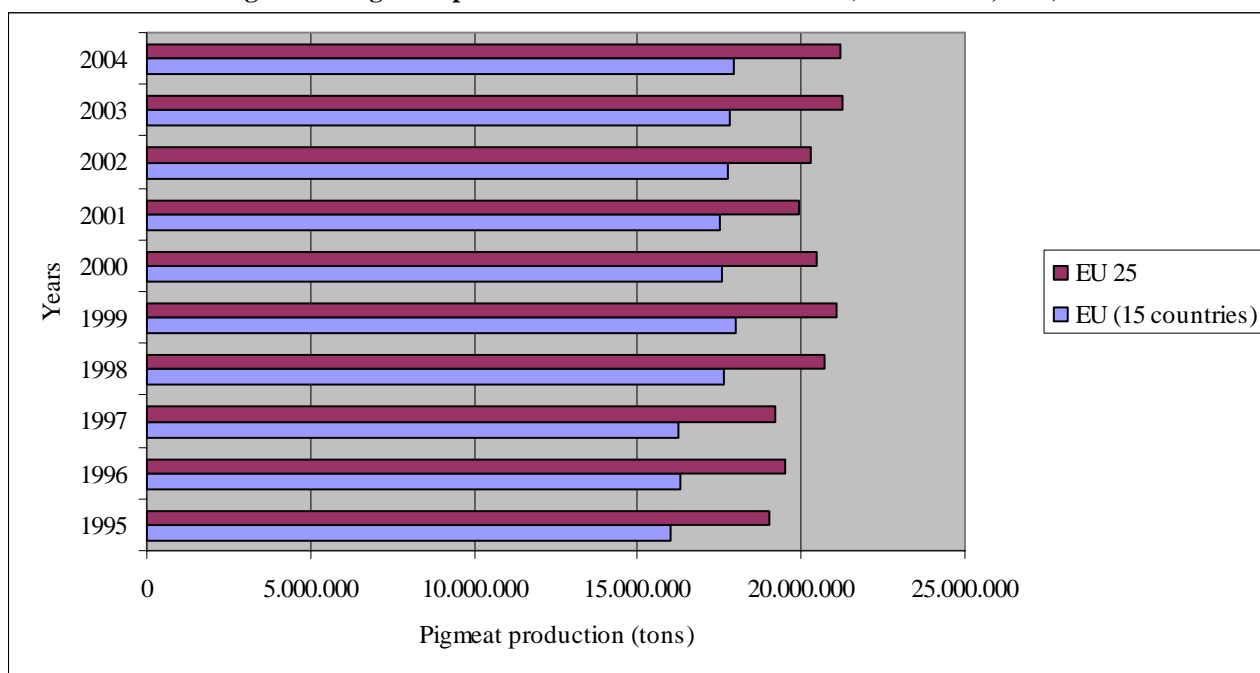


It can be seen from figure 10 above that the average dimension of holdings differs greatly from Member State to Member State, within a range that goes from 5 pigs per holding in Lithuania to 920 pigs per holding in Ireland.

### Pig meat production

As shown in fig. 11, from 1995 to 2004, the EU pig meat production slightly increased (+11.7%).

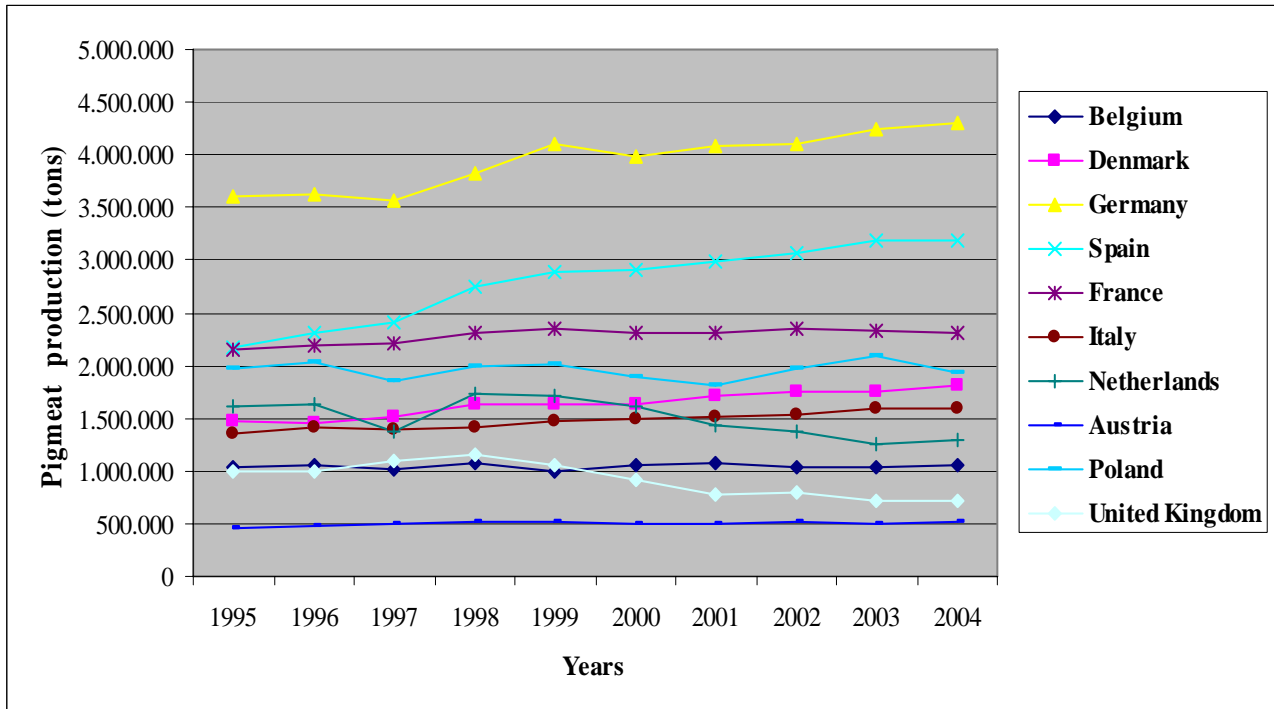
Figure 11: Pig meat production in EU- 15 and EU – 25 (annual data, tons)



Source: Eurostat

However, within the EU, the situations of the single countries are quite different (fig. 12, table 7). As a matter of fact, while pig meat production increased in some Member States like Spain and Denmark, in other countries like France, Belgium, the United Kingdom and the Netherlands, it remained the same or it even decreased.

Figure 12: Pigmeat production in relevant EU member states (annual data, tons)



Source: Eurostat

If we analyse the short-term trend following the decrease in production occurred in 2001, we note that there had been a slight but progressive increase in pig meat production in the EU, which in 2003 reached a production peak of 21,232,186 tons. In 2004, there was, instead, a slight drop, which caused production volumes to fall to lower levels than those recorded in the last few years.

**Table 7: Pig meat production in EU member states (annual data, tons)**

Country	2000		2001		2002		2003		2004		% Var. 04-03
	Tons	% Share	Tons	% Share	Tons	% Share	Tons	% Share	Tons	% Share	
Belgium	1.055.234	5,15	1.071.651	5,38	1.043.510	5,14	1.028.661	4,84	1.054.010	4,98	2,46
Denmark	1.624.470	7,93	1.714.380	8,61	1.759.350	8,66	1.761.546	8,30	1.809.495	8,55	2,72
Germany	3.981.870	19,44	4.074.324	20,46	4.110.146	20,24	4.239.308	19,97	4.307.948	20,34	1,62
Greece	141.368	0,69	136.625	0,69	139.408	0,69	133.608	0,63	136.671	0,65	2,29
Spain	2.912.390	14,22	2.992.707	15,03	3.070.116	15,12	3.189.508	15,02	3.190.999	15,07	0,05
France	2.317.963	11,31	2.315.182	11,63	2.350.416	11,57	2.339.129	11,02	2.312.261	10,92	-1,15
Ireland	230.400	1,12	239.800	1,20	229.700	1,13	217.200	1,02	207.500	0,98	-4,47
Italy	1.488.454	7,27	1.509.643	7,58	1.535.900	7,56	1.588.908	7,48	1.589.891	7,51	0,06
Luxembourg	10.227	0,05	9.904	0,05	11.692	0,06	12.316	0,06	11.451	0,05	-7,02
Netherlands	1.622.761	7,92	1.432.470	7,20	1.377.121	6,78	1.252.898	5,90	1.287.242	6,08	2,74
Austria	502.004	2,45	488.488	2,45	511.488	2,52	505.946	2,38	515.532	2,43	1,89
Portugal	327.098	1,60	315.235	1,58	328.038	1,62	327.849	1,54	315.142	1,49	-3,88
Finland	172.313	0,84	175.532	0,88	183.897	0,91	193.021	0,91	198.109	0,94	2,64
Sweden	276.975	1,35	275.866	1,39	283.814	1,40	287.526	1,35	294.498	1,39	2,42
United Kingdom	923.059	4,51	781.410	3,92	795.265	3,92	714.500	3,37	720.036	3,40	0,77
<b>EU (15 countries)</b>	<b>17.586.586</b>	<b>85,84</b>	<b>17.533.217</b>	<b>88,07</b>	<b>17.729.861</b>	<b>87,29</b>	<b>17.791.924</b>	<b>83,80</b>	<b>17.950.785</b>	<b>84,77</b>	<b>0,89</b>
Cyprus	:	:	:	:	:	:	54.312	0,26	55.215	0,26	1,66
Czech Republic	457.083	2,23	459.895	2,31	467.617	2,30	464.041	2,19	425.502	2,01	-8,31
Estonia	:	:	:	:	:	:	:	:	:	:	:
Hungary	375.100	1,83	:	:	:	:	510.295	2,40	482.832	2,28	-5,38
Latvia	31.541	0,15	31.648	0,16	35.891	0,18	36.905	0,17	36.800	0,17	-0,28
Lithuania	85.000	0,41	64.000	0,32	85.700	0,42	91.300	0,43	97.119	0,46	6,37
Malta	:	:	:	:	10.405	0,05	9.822	0,05	8.470	0,04	-13,77
Poland	1.892.000	9,23	1.820.000	9,14	1.981.000	9,75	2.094.187	9,86	1.923.484	9,08	-8,15
Slovenia	60.400	0,29	:	:	:	:	:	:	34.622	0,16	:
Slovakia	:	:	:	:	:	:	179.400	0,84	160.900	0,76	-10,31
<b>EU (25 countries)</b>	<b>20.487.710</b>	<b>100,00</b>	<b>19.908.760</b>	<b>100,00</b>	<b>20.310.474</b>	<b>100,00</b>	<b>21.232.186</b>	<b>100,00</b>	<b>21.175.729</b>	<b>100,00</b>	<b>-0,27</b>

Source: Eurostat

This drop was due to both a structural reduction in Germany, Spain and France, and to a decrease in production in the Eastern European Countries. In Poland, for example, which accounts for over 50% of the pig meat production of Central and Eastern European Countries (CEEC), pig meat production decreased by 8%, which reflected the considerable decrease in stocks.

As to medium-term estimates, pig meat production is expected to slightly increase, but at a lower growth rate than the one recorded in the '1990s. This increase, which should allow the EU-25 to achieve a pig meat production of about 22 million tons in 2012 (18,664,000 t in the EU-15 and 3,334,000 in the 10 new Member States), is linked to the stability of the demand in every single Member State as well as to an increase in pigmeat prices and a decrease in feed prices (European Commission, Agricultural and Rural Development, 2004).

### Pigmeat consumption<sup>5</sup>

Over 90% of the total EU pigmeat production is for internal consumption, which, thus, represents the main market outlet.

Pigmeat ranks first in the European consumer preferences mainly due to the great number of products that can be obtained from it. As a matter of fact, the offer ranges from fresh products to a wide selection of meat products and charcuterie, which vary from country to country (Rieu, 2003). In 2003, out of 97.7 kg of total meat consumed, on average, by each European consumer, 43.6 kg were pig meat, that is, almost 45% of total meat consumption against 21.4% of beef (20.9 kg/person).

There are, however, great differences between the single Member States. As a matter of fact, while pigmeat consumption is very high in Spain, Denmark and Germany

<sup>5</sup> **Human consumption:** quantities of products made available for human consumption in all forms: quantities consumed without further processing and quantities supplied by the distributive trades and the food industry.

(respectively, 67.8 kg, 58.2 kg and 54.1 kg per person), in Greece and in the United Kingdom it is much lower and amounts to about 25 – 28 kg per person.

The data about the per capita pigmeat consumption between 2000 and 2003 are shown in table 8, which indicates a fluctuation in the EU–15 of about 43 – 43.5 Kg.

**Table 8: Pigmeat consumption (annual data, kg/head)**

Country	2000	2001	2002	2003
Belgium	:	:	52,0	:
Denmark	64,3	63,1	58,2	74,4
Germany	54,2	54,1	54,1	54,8
Greece	32,6	32,3	27,9	28,1
France	36,3	36,6	36,6	36,6
Ireland	39,7	40,1	38,9	:
Italy	36,5	37,9	38,6	40,1
Luxembourg	41,1	43,4	44,2	:
Netherlands	43,6	42,6	42,4	42,5
Austria	60,7	56,4	55,9	57,4
Portugal	44,3	43,6	44,1	43,0
Finland	32,9	32,0	31,9	32,8
Sweden	35,5	34,7	36,2	36,2
United Kingdom	23,7	25,1	25,5	16,1
<b>EU - 15</b>	<b>42,9</b>	<b>43,1</b>	<b>43,4</b>	<b>:</b>
Czech Republic				43,3
Estonia				27,0
Hungary				47,7
Latvia				25,0
Lithuania				32,3
Poland				49,5
Slovakia				32,5

Source: Eurostat and FAO for the New Member States (NMS)

As regards the distribution of consumption between fresh and processed pigmeat, no homogeneous official data were found: nevertheless, the research team collected useful indications on the matter through independent experts and selected stakeholders in a number of Member States. On the basis of such indications data can be summed up as follows:

- Austria: 70% processed pigmeat, 30% fresh pigmeat;
- Denmark: 55% processed pigmeat, 45% fresh pigmeat;
- Portugal: 35% processed pigmeat, 65% fresh pigmeat;
- Germany: 65% processed pigmeat, 35% fresh pigmeat;
- United Kingdom: 77% processed pigmeat, 23% fresh pigmeat;
- Hungary: 75% processed pigmeat, 25% fresh pigmeat;
- Italy: 75% processed pigmeat, 25% fresh pigmeat;
- Belgium: 75% processed pigmeat, 25% fresh pigmeat;
- Greece: 75% processed pigmeat, 25% fresh pigmeat;
- Czech Republic: 75% processed pigmeat, 25% fresh pigmeat;
- Spain: 70% processed, 30% fresh pigmeat;
- Ireland: 65% processed, 35% fresh pigmeat;

- Netherlands: 65% processed, 35% fresh pigmeat.

### Degree of self-sufficiency<sup>6</sup>

The self-sufficiency rate shows the ratio of production to internal consumption and it is calculated by dividing production by internal consumption and multiplying the result by one hundred.

The Countries with a self-sufficiency rate higher than 100% are clearly exporting countries, while all countries with a self-sufficiency rate lower than 100% are importing countries.

As shown by the tab. 9, the self-sufficiency rate for pig meat greatly varies from one EU-15 Member State to the other. Denmark, which shows the highest self-sufficiency rate (601.0% in 2004), is the main exporter of pig meat, followed by the Netherlands and Spain.

Table 9: Self-sufficiency rate in EU – 15 (annual data, %)

Country	2000	2001	2002	2003	2004
Belgium	:	-	197,5	:	:
Denmark	488,9	522,6	581,7	455,3	601,0
Germany	87,1	87,8	89,7	89,7	90,5
Greece	40,3	39,5	45,0	44,2	46,5
Spain	113,9	115,3	116,5	119,0	125,3
France	105,5	104,4	106,0	105,1	106,6
Ireland	160,7	160,1	163,3	:	:
Italy	66,5	65,0	66,5	67,0	68,8
Luxembourg	52,1	47,2	55,6	:	:
Netherlands	255,6	251,8	235,6	226,9	:
Austria	98,7	101,7	103,8	103,5	102,4
Portugal	63,9	63,1	63,4	67,3	:
Finland	101,6	104,8	111,3	113,1	114,0
Sweden	88,7	90,2	88,7	89,7	:
United Kingdom	63,7	51,8	51,1	72,0	43,4
EU-15	108,5	107,4	108,6	:	:
Czech Republic				92,8	
Estonia				100,0	
Hungary				129,4	
Latvia				63,8	
Lithuania				92,1	
Poland				114,3	
Slovakia				90,3	

Source: Eurostat and FAO for the New Member States (NMS)

<sup>6</sup> **“Degree of self-sufficiency”**: The degree of self-sufficiency of a given region indicates up to what point “domestic production” (from a domestic raw material) of this region is in a position to cover all the needs or “domestic use” (total use for humans, animals and industry) of this region. With regard to the balance sheets, the degree of self-sufficiency is calculated by Eurostat using the “domestic use” as with the “domestic production” quotient.

$$\frac{\text{“Domestic production”}}{\text{“Domestic use”}} \times 100$$

### Pigmeat supply balance in EU-15

The table 10 below illustrates the pigmeat supply balance in EU-15.

**Table 10: Pigmeat supply balance in EU – 15, (2000 – 2003)**

Supply balance	Quantity (1.000 t*)				%
	2000	2001	2002	2003	Var (02)
Gross internal production	17.596	17.574	17.873	17.795	-0,4
Imports (live animals)	0,4	0,2	0,1	0,2	66,1
Exports (live animals)	0,5	0,4	0,7	0,4	-44,4
Intra - EU trade	321	227	228	n.a. :	
Usable production	17586	17548	17814	17793	-0,1
Change in stocks	-82	-6	53	n.a. :	
Imports	49	52	51	68	34,4
Exports	1.260	1.032	1.164	1.198	2,9
Intra - EU trade	3.111	3.273	2.478	n.a. :	
Internal use (total)	16.212	16.357	16.465	16.670	1,2
Gross consumption (kg/head/year)	42,9	43,1	43,4	43,8	0,9
Self sufficiency (%)	108,5	107,4	108,6	106,7	-1,7

\*Carcass weight

Source: European Commission (Eurostat)

### A.1.2 Pig rearing system typologies in the European Union

Existing rearing systems have been classified into the following typologies, each of which characterized by a different space per pig and floor type:

<b>Box A.1.2 – Glossary</b>	
▪	<b>Pig:</b> an animal of the porcine species, of any age, kept for breeding or fattening;
▪	<b>Piglet:</b> a pig from birth to weaning;
▪	<b>Weaner:</b> a pig from weaning to the age of ten weeks (weight: 5 – 35kg);
▪	<b>Growers and Finishers:</b> Pigs from 10 weeks to slaughter (generally 90 – 120 kg but also up to 150kg in some countries such as Italy).
▪	<b>Rearing pig:</b> a pig from ten weeks to slaughter or service;
▪	<b>Slatted Floor:</b> A combination of solid parts, which support the lower surface of the claw of the pig, and gaps which would allow manure and other liquids to pass through. It is also called perforated floor.
▪	<b>Slat:</b> The solid part of the floor between gaps that supports the lower surface of pig’s claw.
▪	<b>Gap:</b> The open area of a slatted floor that allows manure and other liquids to pass through. It is also called slot, slit, void, perforation.
▪	<b>Solid Floor:</b> A continuous flat surface which allows full contact with and support to the lower surface of pig’s claw.

#### A.1.2.1 Relevant rearing systems typologies

### Weaners

In general, post-weaning occurs in specific rooms equipped with cages, pens with fully or partly slatted floor, solid floor or litter (fig. 13).

Features	Housing system			
	Slatted floor		Solid floor	
	Cages with fully slatted floor	Pens with partly slatted floor	Pens with permanent litter	Pens with sloped litter
Space m <sup>2</sup> /weaner	0,36	0,31	0,29	0,28

Figure 13: Housing systems for farming weaners (Monetti, 2000)

A further subdivision of the “slatted floor” category was not deemed necessary as, according to some experts and literature information, a slatted floor system<sup>7</sup>, when appropriately managed, shows no significant differences in the effects on animal welfare which can be linked with different floor characteristics.

<sup>7</sup>Slatted floors may differ in terms of:

- Width of slats;
- Ratio between “solid area” and slats;
- Profile;
- Degree of elasticity of slat material;
- etc.

### **1. Cages with slatted floor**

Weaners can stay in the same cage until they reach the weight of 25 – 30 Kg or they can be housed in so-called first stage weaner cages with a surface of about 1 m<sup>2</sup> until they reach the weight of 15 Kg to be later moved, after 2 – 4 weeks, to second stage weaner cages with a surface of about 2 m<sup>2</sup> until they reach the weight of 30 – 40 Kg (when they are 10 weeks old).

In general, the first solution is used, then weaners are “laid on the ground”.

Cages have a supporting structure to which a feeding trough, a trough and the following elements are welded:

- Fully or partly slatted floor with slats made of several materials: reinforced concrete panels, perforated sheets, plastic material or cast iron joists, or slats made of reinforcement rods or triangular section bars, galvanized steel, etc.
- 60 – 70 cm high slatted or solid walls.

In general, pens have a dimension of about 2 – 3 m<sup>2</sup> and, in compliance with Directive 91/630/EEC, they may house 10 – 12 weaners with a final weight of maximum 20 Kg or 6 – 8 weaners with a final weight of maximum 30 kg.

### **2. Pens with slatted floor**

In general, pens with fully or partly slatted floor have a rectangular shape and a total surface of 6 – 10 m<sup>2</sup>. They house 15 – 30 weaners and have a bigger surface per head than that available in cages, and specifically:

- Fully slatted floor: 0.30 – 0.32 m<sup>2</sup> for weaners weighing up to 30 kg.
- Partly slatted floor (2/3 solid floor, 1/3 slatted floor): 0.35 – 0.40 m<sup>2</sup> per weaner. In Denmark, this system has been developed in a pen that provides weaners with a covered lying area and two-thirds solid floor.

### **3. Pens with solid floor**

Solid floor enables to use floor heating and to distribute rooting material, such as straw, directly on the floor. Draught from the slurry channel and poor air quality under the cover are also avoided.

#### **3.1. Pens with permanent litter**

In these pens, which are usually used in countries with colder climates, the litter covers most of the pen surface. Only the area near the feeding trough has a solid floor.

#### **3.2. Pens with sloped litter**

In these pens there are 3 separate areas, which are all covered with straw: the feeding area, the area where excrements are collected and removed, to which weaners may have access or not, and the lying area with a solid, 3-4 % sloping floor. As weaners stamp on it, this slope facilitates the moving down of the straw mixed with excrements to the excretion area, from which it is daily removed using scrapers. This solution allows weaners to lie on a dry and clean litter, which is not subject to the typical fermentations of a permanent litter.

## **Growing and finishing pigs**

In modern piggeries, pigs are fattened in multiple or collective pens housing, in general, a small number of pigs with, thus, a considerable improvement in their welfare conditions and production performance.

According to average space available per pig (at the end of the finishing phase), and to type of floor, collective pens for fattening pigs, may be classified as follows (fig.14).

A further subdivision of the “slatted floor” category was not deemed necessary as, according to some experts and literature information, a slatted floor system<sup>8</sup>, when appropriately managed, shows no significant differences in the effects on animal welfare which can be linked with different floor characteristics.

### **1. Slatted floor**

#### **1.1. Pen with fully slatted floor**

In this type of pig rearing system, slats cover the whole pen surface, so that dung falls into the dung channel under the slats.

- The slatted floor consists of reinforced concrete precast slabs laid on the side-walls marking off the underlying pits or on beams supported by posts. However, metal or plastic materials can be used as well.

With this type of flooring, it is not necessary to have a separate excretion area inside the pen. The pen can be, therefore, smaller and reduced to the minimum space required per head, which obviously increases as pig grows up to reach, at the end of the fattening stage, 0.65 m<sup>2</sup>.

The increase in housing density is just one of the many advantages of this housing system, among which it is also to mention:

- Better hygienic conditions inside the pen;
- No need to manually clean the floor;
- Decrease in the total covered housing surface

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<sup>8</sup>Slatted floors may differ in terms of:

- Width of slats;
- Ratio between “solid area” and slats;
- Profile;
- Degree of elasticity of slat material;
- etc.

Features	Housing systems					
	Slatted floor		Solid floor			
	Fully - slatted	Partly - slatted	Solid floor with no bedding	Straw flow	Deep - litter	Outdoor - free range
<b>Floor</b>	Enclosed slatted pen	Solid floor kennel with slatted dunging area (20%)	Dry solid concrete floor with no bedding materials	Pen with bedding and sloped flooring	Earthen floor deep bedded with a concrete feeding pad	Straw-bedded hut and paddocks
<b>Space m<sup>2</sup>/pig</b>	0,65	0,75	0,9 - 1,0	1,00 - 1,3	1,00	0,75 + pasture

Organic
Slatted area (< 50% ) and straw bedded area
<110 kg LW: 1,0 indoor + 1,3 outdoor
>110 kg LW: 1,6 + 2,0

Figure 14: Housing systems for fattening pig

These advantages are, however, counterbalanced by the following disadvantages:

- Need of a more careful environmental control to limit noxious gases coming up from sludge pits;
- Lower thermal comfort for the animals under low temperatures.

### **1.2 Pen with partly slatted floor**

This type of pen, which is an evolution of the traditional pen with external defecation gangway, has two separate areas, that is, a lying area with solid floor where pigs eat and lie, and an excretion area with slatted floor. The ratio between the two types of floor may greatly vary. In the most common solutions, the slatted floor covers 1/3-1/4 of the whole pen surface. The slatted area should be at least 1 m wide in case of pigs weighing up to 50 Kg and at least 1.5 m wide in case of pigs weighing up to 150 Kg. In general, the area with solid floor is made of tamped concrete and it slopes by 2 – 3% towards the excretion area to allow pigs to locate it more easily.

Sometimes the pen has a real internal defecation gangway bounded by the feeding area and by a wall or hurdle.

If duly managed, in comparison to the pen with litter, this system enables to reduce the ammonia and other gases emitted by excrements (Voermans et al, 1992).

## **2. Solid floor**

In this system, the solid floor consists of a non-perforated surface whose characteristics depend on the type of material used and on the treatments it underwent. In comparison to the fully slatted floor, it has the disadvantage of requiring manual cleaning, but it also has some big advantages, such as:

- Better deambulation of pigs, if the pen surface is clean enough not to be slippery;
- Greater thermal comfort in winter;
- No or very low consumption of heat and/or electricity since, in general, this system has no artificial ventilation or heating system.

### **2.1 Pen with litter**

In the rearing systems with solid floor, several organic materials are often used in the excretion area for the creation of a litter allowing pigs to fully express their natural behaviours, such as wallowing in mud, chewing and cleaning their body (Wechsler, 1997). The need to keep the litter in acceptable cleaning conditions requires a greater pen surface, thus, ensuring more space for each pig and contributing to creating an habitat that better satisfies the animal welfare requirements.

However, it is important to note that a litter requires correct litter and pen disinfection management since it facilitates the production of particulate in the air, such as dust, dirt and fungus, which may cause respiratory diseases both in animals and in humans (Boon and Wrey, 1989; Jensen, 2003).

The use of the litter also provides great benefits in terms of thermal conform in winter. As a matter of fact, with the same weight of pigs and feed ration, the lower critical temperature is lowered by 5 – 7 °C in comparison to lying on a slatted floor. In summer, however, the litter is subject to intense fermentations due to high temperatures and it has the disadvantage of a critical heat loss by pigs.

Another advantage of the use of the litter is the production of manure with total or partial replacement of the “problematic” sludge.

Therefore, if, on the one hand, the pen with litter has higher production costs due to the bigger surface per head required in comparison to traditional systems and higher labour costs linked to litter management (distribution, removal and litter care), on the other, it enables to considerably reduce investment costs since simple buildings with no slurry channels and, often, no environmental control systems are required.

The types of rearing systems with litter for fattening pigs can be divided into the following 2 schemes:

- Straw – flow;
- Deep – litter.

### **2.1.1 Straw flow**

The straw flow system is a really promising option for an animal and environmental friendly rearing of fattening pigs (Bartussek et al, 1995; Zaludik, 1997). Its development started in Scotland in 1987, to provide the welfare advantages of straw without the associated management disadvantages.

Straw flow offers pigs the possibility to show their natural behaviour, to keep the lying area dry and clean and to excrete elsewhere (Stolba, 1983).

It is designed on the basis of the systems that are used in cattle husbandry, and consists of a pen with bedding and sloped flooring (fig. 16). In detail, in each pen, which houses about 10-12 pigs, there are an excretion area with slatted floor and a lying area sloping towards the excretion area by 6 – 10%. The lying area is not slatted and is equipped with a straw supply rack supplying straw to pigs directly. The straw (50 -100 g non chopped straw/day per pig) is taken from the rack by pigs, which play with it and chew it and it is slowly transported to the excretion area, where it falls into the dung channel under the slats. In this way the straw on the lying area stays dry and clean. In this system, the straw consumption in case of pigs weighing 30 - 100 kg is between 0.1-0.2 kg/head/day (Monetti, 2000), which is certainly a very small quantity in comparison to other rearing systems. Moreover, thanks to its straw flow system, this system requires shorter working times than any other rearing system.

Feed is supplied at the front of the pen, instead water is supplied via nipple drinkers that are installed in the excretion area. All pigs can eat at the same time, which is an important factor for animal welfare.

A straw flow pen offers, on average, 1 – 1,3 m<sup>2</sup> per pig, 40% more than in conventional fully slatted floors, which is really important for animal welfare.

Nevertheless, this system may cause disadvantages, particularly on warm days, when pigs are likely to suffer from thermal stress. In that case, pigs may mistake one area for the other, lying down on the excretion area and defecating on the lying area. In order to prevent that from happening, the excretion area is equipped with some sprinklers, which start automatically.

### **2.1.1 Deep litter**

The Deep-litter system is the most commonly used straw based system for fattening pigs; it generally consists of a earthen floor deep bedded with a concrete feeding pad at one end of the shed, and of a deep layer of an organic material (>10 -15cm, on average), such as straw, rice hulls, saw dust, wood chips, peat, oat or barley straw, or a combination of various materials, that will absorb moisture and help keep pigs dry and

warm. In deep litter systems, there is no separation between excretion and lying area and the pigs excrete on the full pen area.

A large variety of deep-litter system can be used regarding to the amount of bedding, the number of pig per group, floor space allowance per pig. The amount of deep bedding material is 1 kg per kg live weight gain, the group size is more than 30 pigs, with an area of 1 m<sup>2</sup> at the end of the finishing period (EFSA, 2005).

The system is cheaper to establish, it is perceived more “welfare-friendly” for pigs and more environmentally-sustainable, as the need for effluent pond is eliminated and the deep-litter substrate is sold as a natural fertiliser. Growing pigs are often housed in groups on deep-litter from 8 weeks of age (approximately 30 kg in live weight), to slaughter at 23 weeks of age (approximately 110 kg live weight).

Deep litter needs to be managed so that it does not compromise pig health and welfare; as a matter of fact, if, on the one hand, it fulfils most of the pigs` needs and is an animal friendly system, on the other, there may be serious disadvantages (Bartussek 1993b). A high amount of straw is required. The pigs are often more dirty than in other systems and especially during summer, the potential for malodour emissions is high. There is a strong indication that deep litter systems emit more NH<sub>3</sub>, N<sub>2</sub>O, and CH<sub>4</sub>, than conventional fully slatted floors.

Moreover, the heating up of the litter in closed housings especially in summer may obviously cause animals some problems of thermoregulation, which may cause heat stress and reduce production performance (van de Weghe et al, 1999; de Oliviera et al, 1999).

In general, a comparison between the conventionally housed pigs and the deep-litter system shows for the latter the following problem (Morrison et al., 2003):

- reduction of the efficiency in converting feed provided to live weight gain (about 10%);
- higher backfat thickness of carcasses, 1 to 2 mm;
- increased incidence of bruising and non-arthritis stifle joint damage and, consequently, a lower quality of carcasses

### **3. Outdoor system – free range**

A large variety of outdoor systems can be reported regarding floor design and pen dimension, which may vary according to environmental conditions, soil characteristics, and management.

These systems usually consist of an outdoor pen in the early stages of pig growing and large paddocks later, and of an indoor resting area or kennels/huts, generally provided with a solid concrete floor, bedded with straw and insulated. Pigs had continual access to the shelter hut that is provided of drinkers attached to the front outside panel of each hut.

Outdoor rearing system offers, on average, more space per pig than in conventional fully slatted floors (0,75 m<sup>2</sup> per pig in indoor resting area, plus outdoor pasture), so that it is often perceived to be animal and environmental friendly. If managed correctly, the outdoor systems can accomplish this, but under poor management, outdoor pigs can have poorer performance, because of adverse effects of climatic conditions (excess heat and cold), and parasite infections (Edwards, 1999) that are likely to be more severe.

Moreover, pigs may cause damage to the environment (soil damage and potential pollution), so that under this finishing system, some environmental factors must be

constantly monitored, such as removal of vegetation, nitrate leaching, soil erosion and compaction. (Edwards, 1999).

Nevertheless, outdoor housing systems offers pigs the possibility to show a great variety of natural behaviour patterns and suffer fewer health problems than in fully-slatted pens (Guy et al., 2002).

An example of outdoor housing is Free range system; the outdoor shelter is constructed of light steel framework and covered by high ultra violet protective shade cloth. The shelter is partitioned into four identical quadrants each having feeders, drinkers and a mechanically operated curtain to enable manipulation of ventilation. Each quadrant provides access to a separate 0.5 hectare paddock for grazing. The shelter can house a total of 32 growers.

#### A.1.2.2 Distribution of relevant rearing system typologies in the EU

##### Distribution of rearing systems for weaned pigs

**Table 11: Distribution of rearing systems for weaned pigs<sup>9</sup> in EU countries (EFSA, 2005 on the basis of data collected by Hendricks and Van de Weerdhof, 1999)**

Country	Housing systems					
	Without / restricted straw				With straw	
	Partly slatted		Fully slatted		Fully solid concrete	
	Piglets	% Share	Piglets	% Share	Piglets	% Share
Belgium	405	18	1689	75	45	2
Denmark	1098	30	2196	60	366	10
France	696	16	3045	70	522	12
Germany	780	10	5694	73	702	9
Greece	105	25	273	65	:	:
Hungary	21	5	357	85	:	:
Ireland	855	15	4788	84	:	:
Italy	124	6	1656	80	83	4
Netherlands	1261	29	2480	57	:	:
Portugal	180	18	750	75	20	2
Spain	988	60	494	30	82	5
United Kingdom	679	25	950	35	1086	40
<b>Total</b>	<b>679</b>	<b>20</b>	<b>950</b>	<b>67</b>	<b>1086</b>	<b>8</b>
			<b>31564</b>	<b>87</b>		

Source: Hendriks H.J.M., van de Weerdhof A. M., (1999)

<sup>9</sup> Table 11 does not cover all the existing rearing system typologies, but only the reported ones, which are the most common.

According to available data (EFSA, 2005), almost 87% of all weaners is housed in pen with slatted floors and of these, 67% is housed in fully slatted systems. This rearing typology is increasing in the majority of EU countries, except for Belgium, the Netherlands and Denmark, where a system with a covered lying area and two-thirds solid floor, have been developed in recent years and has become more and more diffuse. Housing systems with partly slatted floor follow a diverse pattern: its popularity tends to decrease, mostly because of pen fouling, which is one of the main reasons why pig producers select fully slatted over partly slatted flooring. However, in countries including Belgium and Netherlands, where strong incentives to reduce ammonia emission (Hendriks, 1997) are provided, partly slatted systems are increasing, as farmers are rewarded for installing them.

Weaner housing in UK is dominated by straw – based pens (40%), due to factors such as mild climatic conditions and, particularly, traditions: use of low-cost housing systems requiring more labour input might be the main explanation for this result. The system is also diffused in countries, such as Denmark and France, provided of large amounts of straw, that generally comes from crop, normally tied in with pig production.

### Distribution of rearing systems for fattening pigs

**Table 12: Distribution of rearing systems for fattening pigs in EU**

Finishers	Housing systems									
	Without / restricted straw						With straw			
	Partly slatted		Fully slatted		Solid floor with no bedding		Solid floor		Deep litter	
Finishers	% Share	Finishers	% Share	Finishers	% Share	Finishers	% Share	Finishers	% Share	
Belgium	1092	31	2291	65	:	:	71	2	71	2
Denmark	2185	35	3558	57	:	:	312	5	187	3
Finland	:	:	:	:	:	:	:	:	:	:
France	1099	11	7994	80	599	6	:	:	300	3
Germany	9385	60	4693	30	:	:	1251	8	313	2
Greece	289	60	193	40	:	:	:	:	:	:
Hungary	420	60	280	40	:	:	:	:	:	:
Ireland	359	35	615	60	:	:	51	5	:	:
Italy	3558	60	1482	25	890	15	:	:	:	:
Netherlands	5997	83	1084	15	:	:	145	2	:	:
Portugal	764	55	417	30	208	15	:	:	:	:
Spain	5818	50	5818	50	:	:	:	:	:	:
Switzerland	135	20	405	60	:	:	135	20	:	:
United Kingdom	1756	37	1803	38	:	:	712	15	475	10
<b>Total</b>	<b>29580</b>	<b>47</b>	<b>24784</b>	<b>44</b>	<b>208</b>	<b>3</b>	<b>847</b>	<b>4</b>	<b>475</b>	<b>2</b>
	Systems without / restricted straw				65187	94	Systems with straw		4023	6

Source: Hendriks H.J.M., van de Weerdhof A. M., (1999)

Distribution of rearing system typologies used for growing-finishing pigs shows that in all countries partly and fully slatted pens are the most representative RSTs.

Fully slatted flooring is increasing in the majority of EU countries, except for Belgium, Denmark, the Netherlands, and Switzerland. In Spain, France, Greece and Italy these systems are the only one used, as they have not yet been affected by the welfare debate to a large degree. On the other hand, the German trend might reflect general demands by the public for more welfare-friendly systems (Hendriks H.J.M., van de Weerdhof A. M., 1999).

### Distribution of rearing systems for fattening pigs – Update

In this paragraph, an update of identified RSTs, for some Member States, is reported. The survey has been carried out directly at relevant stakeholders in the pig sector; a list of the stakeholders who accepted to answer our questions is provided in table 13.

**Table 13: Stakeholders being interviewed**

Country	Source
Belgium	Fédération Wallonne de l'Agriculture
Sweden	Federation of Swedish Farmers and Association of Swedish Pig Producers
Italy	CRPA - Centro Ricerche Produzioni Animali
Netherlands	PVE - Product Boards for Livestock, Meat and Eggs
Netherlands	LLTB - Limburgse Land en Tuionbouwbond and LTO Netherland
Poland	POLSUS - Polish Association of Pig Producers
Spain	Anrogaporc
Slovakia	COPA - COGECA
United Kingdom	BPEX - British Pig Executive
Denmark	National experts

The results of the investigation are reported in table 14.

Distribution of rearing system typologies for fattening pigs shows that more intensive systems (partly and fully slatted systems) are the most representative RSTs in the majority of studied Member States, with the exceptions of Great Britain and Poland.

In the UK, in particular, a notable decrease in the number of fully and partly slatted systems has occurred, equal to, respectively, -26% and -20%, in the 1999 - 2005 period, while the housing systems with straw (straw based and deep litter) have risen (respectively +25,00% and +17,00%).

**Table 14: Distribution of RSTs (2005)**

Country	Rearing System Typologies							
	Partly slatted	Fully slatted	Straw based	Deep litter	Outdoor	Organic	Alternative typology 1	Alternative typology 2
Belgium	21	75	3	0,5	0,5	-	-	-
Sweden	-	-	-	1	-	-	99	-
Italy (CRPA)	55	26	-	-	1	-	18	-
Netherlands (PVE)	100	-	-	-	-	1	-	-
Netherlands (LTO/LLTB)	94	0	< 1	< 1	< 1	< 4	-	-
Poland (POLSUS)	18	5	56	19	1	1	-	-
Spain (Anrogaporc)	10	90	-	-	-	-	-	-
Slovakia	15	30	-	-	-	-	30	25
United Kingdom (BPEX)	17	12	40	27	2	3	-	-
Denmark	55	35	5	4	0,5	0,5	-	-

#### A.1.3 Summary

The average size of EU pig farms varies enormously from Member State to Member State (from 5 to 920 pigs per farm, with an EU average value of 46 pigs per farm in 2003). The EU pig population counted about 151 million heads in 2004. The most important pigmeat producer is Germany (20% of total EU output in 2004), followed by Spain, France and Poland. Denmark featured the highest per capita consumption of pigmeat (74,4 Kg in 2003). Denmark is also the Member State with the greatest pigmeat surplus, with a degree of self-sufficiency of 601% in 2004; the Member States with the

greatest pigmeat deficit are United Kingdom and Greece, with a self-sufficiency rate of 43,4% and 46,5% respectively.

The most common rearing systems in the EU are partly slatted and fully slatted systems, with a combined share of about 90% of the EU pig population. Straw based systems account for about 6% of the EU pig population.

As far as the evolution in the distribution of rearing systems among the different typologies is concerned, the most significant changes are an increase in fully slatted typologies versus partly slatted ones in Spain, and a decrease of both partly and fully slatted systems versus straw based ones in the United Kingdom. No significant changes occurred in the remaining Member States.

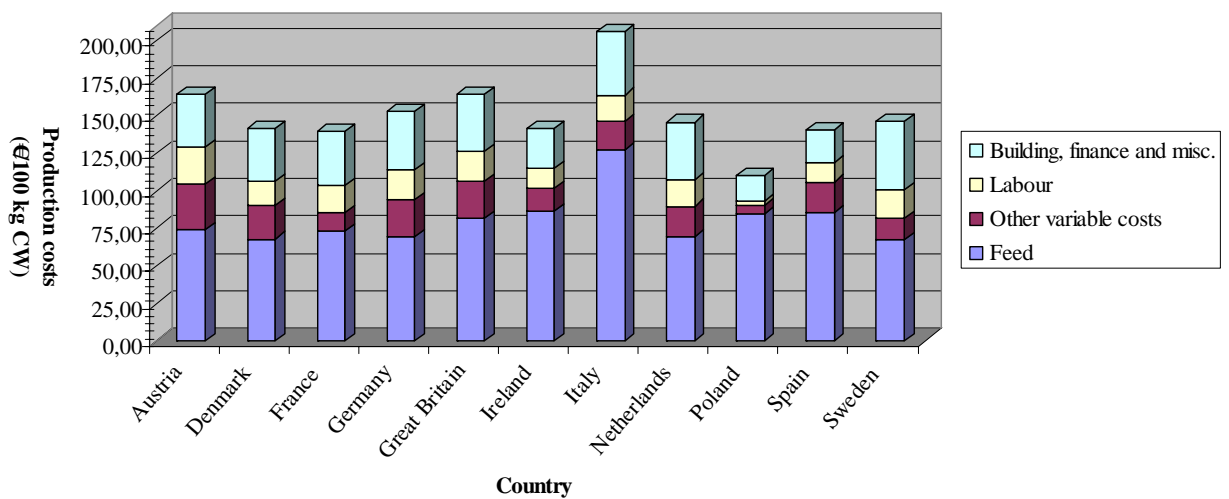
The average per capita consumption of pigmeat in the EU-15 was around 43 kilos in the 2000-2003 period.

## A.2 Production costs

This chapter reports the results of an analysis of the pig meat production costs carried out for the main eleven pigmeat producing Member States. The information and the data presented in this chapter are essential to perform the assessment of the impacts resulting from different combinations of space allowance and floor type (section B, § B.2) and the comparative analysis between factors deriving from animal welfare requirements on space allowance and floor types and other factors affecting production costs (section C, § C.1).

### A.2.1 Production costs in selected Member States

The following chart shows pig meat production costs in 2004 for the major EU producing countries. Costs are expressed in Euro per 100 kilos of Carcass Weight (CW).



Source: InterPIG – British Pig Executive (BPEX) and Department of Agricultural Economics and Engineering (Deiagra)

**Figure 15: Production costs in selected Member States**

The average production cost (excluding Italy, where a particular production process – heavy pig production – is adopted) is 144,67 Euro per 100kg CW. The highest production cost (excluding Italy) was recorded in Great Britain, with 164,21 Euro. The lowest production cost was recorded in Poland, with 110,00 Euro.

**Box A.2.1. - Glossary**

**Total fixed costs:** the total obligations incurred by the firm per unit of time for all fixed inputs

**Total variable costs:** the total obligations incurred by the firm per unit of time for all variable inputs

**Total costs of production (production costs):** the sum of total fixed costs plus total variable costs

**Total unit fixed cost (average fixed costs):** equals total fixed costs divided by output

**Total unit variable cost (average variable costs):** equals total variable costs divided by output

**Total unit cost (average production costs or average costs of production):** equals total costs divided by output

**Explicit costs:** the actual expenditure of the firm to purchase or hire the inputs it needs

**Implicit costs:** the value of owned inputs used by the firm in its own production process

**Marginal costs:** equals the change in total costs or total variable costs per unit change in output

**Cost components by category:**

<b>Cost categories</b>	<b>Components</b>
Variable costs	Feed
	Breeding costs
	Veterinary and medicines
	Energy
	Maintenance
	Levies, insurances and inspection
Fixed costs	Miscellaneous, which includes bedding costs
	Labour
	Finance costs (Depreciation rate of machinery and buildings) Interest in working capital.

**Buildings, finance and miscellaneous:** aggregation of cost components which includes: depreciation charges on buildings and machinery, maintenance charge for machinery and buildings, interest on working capital, levies, manure disposal charge and costs of disposal of dead animals. The depreciation estimates are based on replacement costs, with building being amortized over a period of 20 years and equipment over a period of 10 year.

**Miscellaneous include:**

1. bedding costs
2. manure disposal charge
3. costs disposal of dead animals

**Other variable costs:** aggregation of cost components which includes:

1. Breeding costs (associated with breeding sows' depreciation and the cost of fecundation);
2. Veterinary and medicines;
3. Energy;
4. Insurances and inspection.

**Opportunity costs criteria:** the cost of the use of any input owned by the firm is equal to what the same input could earn in its best alternative use (e.g. entrepreneur must include as part of the costs of production the return in the best alternative use from the capital, land and any other factor of production that he own and use in the enterprise).

**Replacement costs criteria:** the cost of the use of any input owned by the firm is equal to what the entrepreneur should pay to replace the same input

The table 15 shows the ranking of the major EU pig meat producing countries based on their average production cost.

**Table 15: Ranking of selected Member States on the basis of total production costs (2001- 2004)**

Country	2001	2002	2003	2004
Austria	8	9	9	10
Denmark	3	5	4	5
France	6	4	3	2
Germany	5	3	5	8
Great Britain	9	8	8	9
Ireland	2	2	2	3
Italy				11
Netherlands	4	7	6	6
Poland				1
Spain	1	1	1	4
Sweden	7	6	7	7

Source: InterPIG – British Pig Executive

As can be noticed from the table, the ranking of countries has not changed significantly over time. The only exception is France, which has risen from sixth to second place over the last 4 years.

#### A.2.1.1 Cost differentials among countries

Production costs vary, sometimes significantly, from country to country (tab. 16 and 17).

**Table 16: Breakdown of total production costs in selected Member States, 2004 (Euros per 100kg**

Costs	Country											
	Austria		Denmark		France		Germany		Great Britain		Ireland	
Feed	74,39	45,38%	68,00	47,97%	73,04	52,23%	69,65	45,51%	81,38	49,56%	86,62	61,35%
Other variable costs	30,05	18,33%	22,10	15,59%	12,75	9,11%	24,29	15,87%	24,96	15,20%	15,17	10,74%
Labour	24,35	14,85%	16,47	11,62%	17,72	12,67%	19,98	13,06%	19,94	12,14%	13,40	9,49%
Building, finance and misc.	35,14	21,43%	35,18	24,82%	36,33	25,98%	39,11	25,56%	37,93	23,10%	26,00	18,41%
<b>Total Costs</b>	<b>163,93</b>	<b>100,00%</b>	<b>141,77</b>	<b>100,00%</b>	<b>139,84</b>	<b>100,00%</b>	<b>153,02</b>	<b>100,00%</b>	<b>164,21</b>	<b>100,00%</b>	<b>141,18</b>	<b>100,00%</b>

CW) (part I)

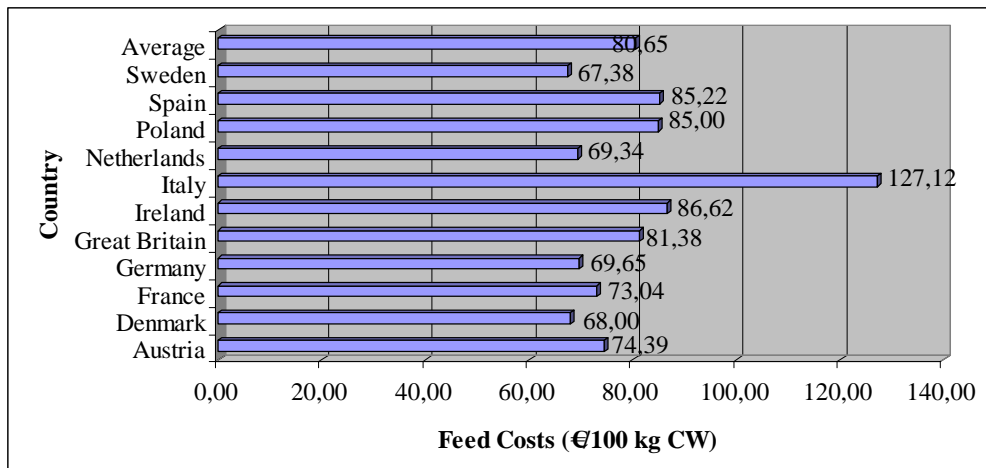
Source: InterPIG – British Pig Executive; DEIAGRA estimates (for Poland)

**Table 17: Breakdown of total production costs in selected Member States, 2004 (Euros per 100kg**  
CW) (part II)

Costs	Country									
	Italy		Netherlands		Poland		Spain		Sweden	
Feed	127,12	61,64%	69,34	47,56%	85,00	77,27%	85,22	60,51%	67,38	46,11%
Other variable costs	19,21	9,31%	20,47	14,04%	5,00	4,55%	20,72	14,71%	14,21	9,72%
Labour	17,51	8,49%	17,46	11,97%	3,00	2,73%	12,43	8,83%	18,86	12,91%
Building, finance and misc.	42,41	20,56%	38,54	26,43%	17,00	15,45%	22,46	15,95%	45,69	31,26%
<b>Total Costs</b>	<b>206,24</b>	<b>100,00%</b>	<b>145,80</b>	<b>100,00%</b>	<b>110,00</b>	<b>100,00%</b>	<b>140,84</b>	<b>100,00%</b>	<b>146,13</b>	<b>100,00%</b>

Source: InterPIG – British Pig Executive; DEIAGRA estimates (for Poland)

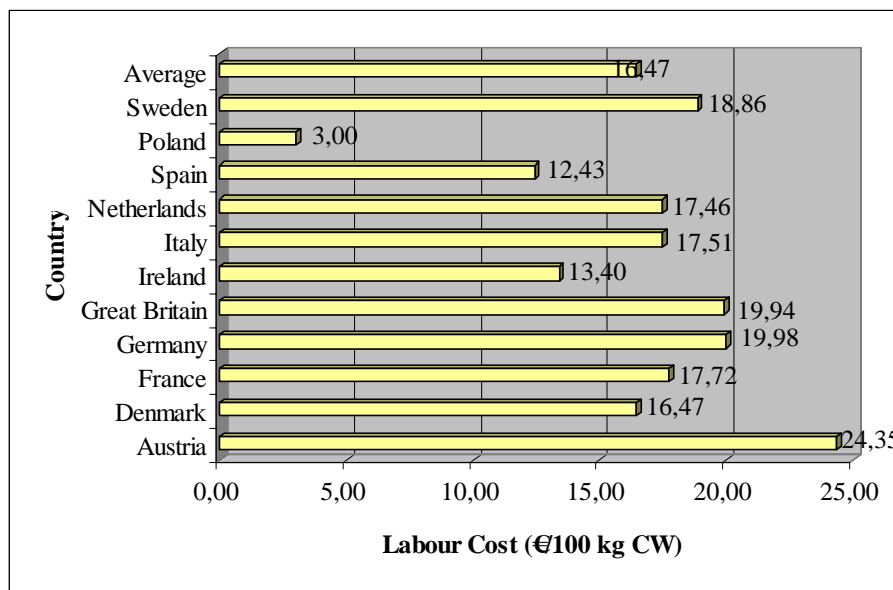
Sweden, Denmark and Netherlands feature low feeding costs (fig. 16), due to the generally lower price of feed in cereal exporting countries, and also due to the higher efficiency of their management practices.



Source: InterPIG – British Pig Executive

**Figure 16: Feed costs in selected Member States, 2004**

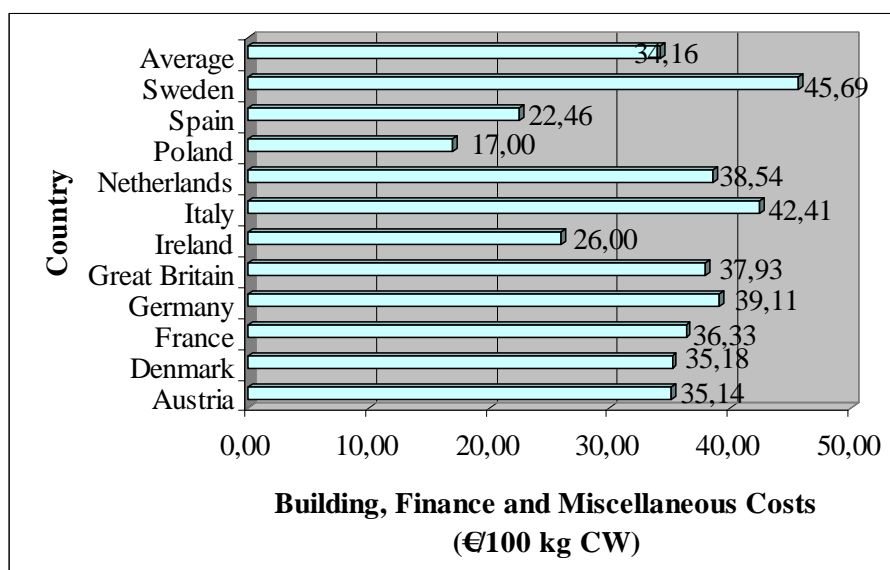
Poland, Spain, Ireland and Denmark are characterized by more contained labour costs (fig. 17). In particular, in Denmark, despite the high unit cost of labour, manages to significantly contain its cost of labour per unit of output thanks to the high productivity of its farms.



Source: InterPIG – British Pig Executive

**Figure 17: Labour costs in selected Member States, 2004**

Poland, Spain and Ireland feature low housing costs and dung disposal costs (fig. 18).



Source: InterPIG – British Pig Executive

Figure 18: Building, finance and miscellaneous costs in selected Member States

The lower average unit cost of production of Poland, France, Spain, Ireland and Denmark can therefore be ascribed to different factors. In general, France and Denmark base their competitiveness on low feed costs, obtained thanks to the high efficiency of their housing systems and the low cost of cereals, the main raw material in the production of feed. Poland, Spain and Ireland, despite having high unit feed costs, are able to achieve very competitive production costs thanks to low costs of labour, housing and dung disposal per unit of output.

Table 18: Ranking of selected Member States on the basis of total production costs and individual cost items, 2004

Country	Feed	Other variable costs	Labour	Building, finance and misc.	Total costs
Austria	6	11	11	4	10
Denmark	2	8	4	5	5
France	5	2	7	6	2
Germany	4	9	10	9	8
Great Britain	7	10	9	7	9
Ireland	10	4	3	3	3
Italy	11	5	6	10	11
Netherlands	3	6	5	8	6
Poland	8	1	1	1	1
Spain	9	7	2	2	4
Sweden	1	3	8	11	7

Source: DEIAGRA elaboration on InterPIG – British Pig Executive data

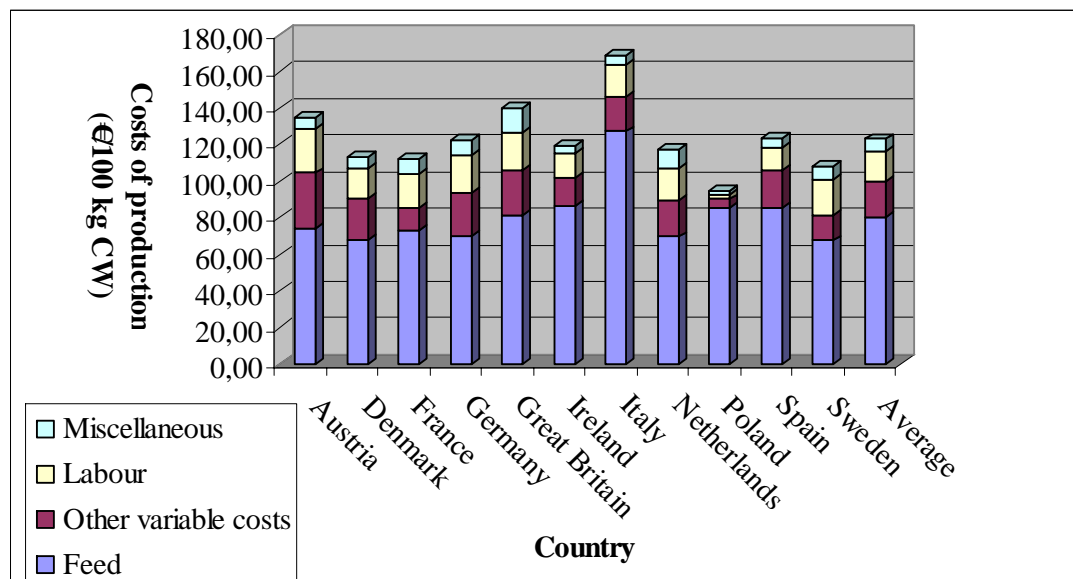
#### A.2.1.4 Explicit cost of production (cash costs of production)

The “building, finance and miscellaneous” costs indicated in the previous tables and figures were calculated by taking into account buildings’ reconstruction costs and the

value of both machines and equipment depreciated over a period of 20 and 10 years respectively.

Many farmers, however, have completely or in large part already depreciated these investments and so their cost doesn't have to be entered.

Therefore, figure 19 and table 19 below show production costs excluding depreciation (of buildings and equipment).



Source: InterPIG – British Pig Executive

**Figure 19: Production cost items without depreciation, in selected Member States**

**Table 19: Production cost items without depreciation, in selected Member States**

Source: InterPIG – British Pig Executive

Costs	Country										
	Austria	Denmark	France	Germany	Great Britain	Ireland	Italy	Netherlands	Poland	Spain	Sweden
Feed	74,39	68,00	73,04	69,65	81,38	86,62	127,12	69,34	85,00	85,22	67,38
Other variable costs	30,05	22,10	12,75	24,29	24,96	15,17	19,21	20,47	5,00	20,72	14,21
Labour	24,35	16,47	17,72	19,98	19,94	13,40	17,51	17,46	3,00	12,43	18,86
Miscellaneous	5,62	6,93	8,25	8,19	13,40	3,91	4,73	9,84	2,00	5,15	7,71
<b>Total Costs</b>	<b>134,41</b>	<b>113,51</b>	<b>111,76</b>	<b>122,11</b>	<b>139,68</b>	<b>119,10</b>	<b>168,57</b>	<b>117,10</b>	<b>95,00</b>	<b>123,52</b>	<b>108,16</b>

The costs indicated in the table 19 and figure 19 above represent the marginal cost which can be interpreted as a sort of “resistance threshold”. Selling prices must not go below this threshold, because, otherwise, explicit costs (cash costs) will not be covered. If selling prices were lower than the threshold value, the financial equilibrium of a large number of farms would be at risk.

**Table 20: Ranking of selected Member States on the basis of full production costs and cash costs**

<b>Country</b>	<b>2004 without depreciations</b>	<b>2004</b>
<b>Austria</b>	9	10
<b>Denmark</b>	4	5
<b>France</b>	3	2
<b>Germany</b>	7	8
<b>Great Britain</b>	10	9
<b>Ireland</b>	6	3
<b>Italy</b>	11	11
<b>Netherlands</b>	5	6
<b>Poland</b>	1	1
<b>Spain</b>	8	4
<b>Sweden</b>	2	7

Source: InterPIG – British Pig Executive

It is interesting to notice that the ranking among countries changes slightly if cash costs are taken into consideration instead of full costs (tab. 20).

### **A.2.2 Summary**

The average production cost for 2004 (excluding Italy, where a peculiar production process – heavy pig production - is adopted) is about 145 Euros per 100 Kg of carcass weight. The highest production cost was recorded in the United Kingdom with 164 Euros; the lowest was recorded in Poland with 110 Euros.

In general, France and Denmark base their competitiveness on low feed costs; Poland, Spain and Ireland, despite having quite high unit feed costs, are able to achieve high levels of cost competitiveness by virtue of the low cost of labour, housing and dung disposal per unit of output.

It is interesting to note that if depreciation charges are not factored in the production cost, this decreases significantly, thus improving cost competitiveness (see § A.2.1.4).

### A.3 Pigmeat selling prices and pigmeat Quality Assurance System

This chapter reports data and information about:

- 1) pigmeat selling prices;
- 2) pigmeat quality assurance schemes;

The above data and information provide useful indications for:

- the assessment of the impacts resulting from different combinations of space allowance and floor type (section B, § B.2);
- the comparative analysis between factors deriving from animal welfare requirements on space allowance and floor types and other factors affecting production costs (section C, § C.1);
- the elaboration of recommendations about ways to minimise possible negative implications for the farm income, in particular as far as the potential role of quality assurance schemes is concerned.

#### A.3.1 Pigmeat retail prices in the EU Member States

##### A.3.1.1 Pigmeat selling prices

Table 21 examines market prices, in ECU/Euros per 100 Kg slaughter weight, for relevant EU Member States, since 1996. The main point to note is that, due to events related to the evolution of the economic situation, prices vary very markedly over time; however, prices have tended to decrease, even if there is some deal of variability among the studied Member States, as far as price trends are concerned.

**Table 21: Market prices for pigmeat (1) - (ECU-EUR/100 kg (2))**

Member State	1996	1997	1998	1999	2000	2001	2002	2003	Var. (96)	Var (00)
Austria	176,47	170,88	122,83	114,80	143,01	172,00	137,38	127,24	-27,9%	-11,0%
Denmark	150,36	153,25	108,93	103,48	132,13	157,18	125,97	109,32	-27,3%	-17,3%
France	161,00	160,28	119,67	113,53	139,50	164,51	129,39	122,55	-23,9%	-12,1%
Germany	173,51	175,91	121,55	113,84	143,80	170,54	138,20	128,51	-25,9%	-10,6%
Ireland	152,37	146,11	113,68	103,14	129,43	146,27	128,29	123,09	-19,2%	-4,9%
Italy	160,77	165,71	140,68	131,22	156,99	191,26	159,06	157,57	-2,0%	0,4%
Spain	161,52	167,36	121,87	111,59	142,36	174,72	136,79	129,14	-20,0%	-9,3%
Sweden	144,71	153,48	130,79	121,81	146,60	152,80	137,72	123,16	-14,9%	-16,0%
The Netherlands	152,51	153,96	100,41	93,11	127,13	141,50	119,38	115,16	-24,5%	-9,4%
United Kingdom	165,51	154,51	120,12	121,27	157,50	159,47	150,41	149,62	-9,6%	-5,0%

(1) Representative markets.

(2) Slaughter weight (CW) - Class E.

Source: European Commission, Directorate-General for Agriculture

Tables 22 and 23 provide the nominal and deflated EC index of producer prices of pigs. Price index analysis confirms the considerations made above; in particular, from the study of the deflated price index (tab. 23), it is extremely clear that pigmeat prices have experienced a decline in real terms. In most Member States, considering 1995 prices equal to 100, selling prices in real terms fell somewhere between 70 and 90 in most cases in the years 2002 and 2003.

**Table 22: Nominal EC - index of producer prices of agricultural products (pigs)<sup>10</sup>**

Country	Time									
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
European Union (15 countries)	100,0	111,5	113,8	83,3	76,6	96,0	113,4	92,3	87,7	:
Belgium	100,0	114,9	122,7	84,2	72,0	98,5	116,9	94,3	86,6	:
Czech Republic	100,0	100,5	97,0	109,7	87,2	103,9	149,1	:	:	:
Denmark	100,0	110,5	113,4	79,0	75,1	97,0	115,6	90,7	78,2	:
Germany	100,0	113,6	118,7	81,4	75,7	96,5	114,7	92,2	85,3	:
Estonia	100,0	:	:	:	:	:	:	:	:	:
Greece	100,0	114,2	120,6	108,9	100,6	116,7	144,7	123,8	116,5	:
Spain	100,0	110,5	119,3	89,1	80,4	99,3	119,3	96,2	91,9	:
France	100,0	114,7	114,9	86,6	80,8	98,7	116,8	91,9	87,0	:
Ireland	100,0	111,5	99,3	80,4	72,8	90,3	102,1	89,5	85,7	:
Italy	100,0	102,1	102,5	86,9	79,6	96,0	117,4	96,9	96,6	:
Cyprus	100,0	102,6	105,1	109,4	:	:	:	:	:	:
Latvia	100,0	93,3	92,5	82,1	56,3	68,8	78,1	62,4	:	:
Lithuania	100,0	119,4	5,3	110,4	86,3	101,5	107,3	:	:	:
Luxembourg	100,0	111,3	123,0	87,9	84,3	96,3	110,8	86,3	76,9	:
Hungary	100,0	101,7	131,4	137,3	115,7	141,5	199,0	165,9	:	:
Netherlands	100,0	116,5	120,0	77,2	72,7	97,0	110,1	88,3	81,8	:
Austria	100,0	109,2	117,5	85,4	72,0	90,3	108,5	85,9	79,4	:
Poland	100,0	116,6	146,9	134,0	117,6	142,9	168,7	:	:	:
Portugal	100,0	110,3	108,6	83,3	77,0	96,8	119,5	91,9	86,3	92,5
Slovenia	100,0	:	:	:	:	:	:	:	:	:
Slovakia	100,0	102,2	109,8	112,8	110,9	118,3	135,1	:	:	:
Finland	100,0	100,5	105,1	95,0	84,5	97,0	113,0	86,5	86,5	:
Sweden	100,0	95,6	100,2	82,4	77,0	87,4	102,1	102,1	102,1	:
United Kingdom	100,0	115,0	92,6	67,0	65,3	78,2	81,1	85,0	85,0	:

Source: Eurostat

**Table 23: Deflated EC - index of producer prices (pigs)<sup>11</sup>**

Country	Time									
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
European Union (15 countries)	100,0	108,9	109,3	78,8	71,5	87,6	100,8	80,0	74,5	:
Belgium	100,0	112,9	118,8	80,8	68,3	91,0	105,4	83,7	75,8	:
Czech Republic	100,0	92,3	82,1	84,0	65,4	74,9	102,9	:	:	:
Denmark	100,0	108,3	109,1	74,9	69,8	87,8	102,3	78,3	66,3	:
Germany	100,0	112,2	115,5	78,8	72,8	91,5	106,7	84,7	77,5	:
Estonia	100,0	:	:	:	:	:	:	:	:	:
Greece	100,0	105,9	106,1	91,6	82,8	93,4	111,7	92,0	83,6	:
Spain	100,0	106,7	113,1	83,0	73,3	87,4	102,1	79,5	73,7	:
France	100,0	112,4	111,2	83,2	77,2	92,7	107,6	83,1	77,0	:
Ireland	100,0	109,2	96,1	76,1	67,2	79,3	86,2	72,1	66,4	:
Italy	100,0	98,2	96,8	80,5	72,4	85,2	101,8	81,9	79,4	:
Cyprus	100,0	99,6	98,5	100,3	:	:	:	:	:	:
Latvia	100,0	79,3	72,6	61,5	41,2	49,1	54,3	43,4	:	:
Lithuania	100,0	95,8	94,1	77,4	60,1	70,0	73,0	:	:	:
Luxembourg	100,0	109,9	119,8	84,8	80,5	88,7	99,6	76,0	66,0	:
Hungary	100,0	82,3	89,8	82,1	62,9	70,0	90,2	71,5	:	:
Netherlands	100,0	114,9	116,1	73,4	67,8	88,4	95,4	73,6	66,8	:
Austria	100,0	107,2	114,0	82,2	69,0	84,8	99,7	77,6	70,8	:
Poland	100,0	97,2	106,6	87,0	71,2	78,6	88,0	:	:	:
Portugal	100,0	107,2	103,6	77,7	70,3	86,0	101,7	75,4	68,6	71,8
Slovenia	100,0	:	:	:	:	:	:	:	:	:
Slovakia	100,0	96,6	97,8	94,2	83,7	79,7	84,9	:	:	:
Finland	100,0	99,4	102,7	91,6	80,4	89,6	101,8	91,3	75,3	:
Sweden	100,0	94,8	97,5	79,4	73,9	82,8	94,1	81,8	90,2	:
United Kingdom	100,0	112,3	88,8	63,3	60,8	72,3	74,1	69,5	75,6	:

Source: Eurostat

<sup>10</sup> A nominal price index is used to express the evolution in price levels purely in nominal terms i.e. without taking into account the effects of inflation.

<sup>11</sup> A deflated price index is used to express the evolution in price levels net of the effects of inflation.

### *A.3.1.2 The effect of quality assurance systems on pigmeat retail prices*

Quality Assurance Systems (hereinafter referred to as QAS) have recently become increasingly important within the EU food scenario. A recently publicated study by the EC – DG JRC<sup>12</sup> clearly shows how their number and economic relevance has gone continuously increasing during the last ten years, to the point that an overall number of some dozens different schemes can be identified at present in the EU countries<sup>13</sup>.

The majority of these systems are aimed at identifying and enhancing particular characteristics of products. Through the identification of such distinctive signs in products and their communication to consumers/clients by a specific brand name or certification, a certain product can be differentiated from its competitors and its market value increased.

The study<sup>14</sup> also shows how the product quality aspects certified are typically those that consumers/clients are not able to recognize and appreciate by themselves when choosing and/or consuming a product (the so-called “credence attributes”). Some examples may be product or raw material origin, associated health conditions, use of special production techniques, and so on. These “subtle” quality attributes to consumers can be turned into immediately recognizable and valued attributes (“search attributes”) thanks to the application of a quality assurance label or certification<sup>15</sup>.

As long as consumers are willing to pay a higher price to buy a product in which those particular quality aspects are certified and guaranteed, producers will benefit from a higher profit than if they were marketing a non-certified product.

The actual income for producers will depend on this price differential (therefore, more-or-less directly, on consumers’ Willingness To Pay), as well as on higher costs possibly sustained to produce a certified product as compared to a standard product, including both direct costs (controls, certification process, etc.) and indirect costs (changes to the standard production system, etc.

As mentioned above, the European Union agro-food sector has now become particularly keen on quality assurance schemes, promoted by different subjects (public bodies, producers’ organizations, retailers, recognized and non-recognized private bodies) and aimed at enhancing the value of different aspects of production. In particular, some

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<sup>12</sup> EC JRC – DEIAgra, *Food Supply Chain Dynamics and Quality Certification*, November 2005. See also:

- Hobbs J., Spriggs J. and Fearne A. (2001), “*Institutional Arrangements and Incentive Structures for Food Safety and Quality Assurance in the Food Chain*”, in Hooker N. and Murano E. (eds.), *Interdisciplinary Food Safety Research*, CRC Press, pp. 43-68.
- Visconti A. (ed.) (1999), *Adozione di Sistemi Qualità dei Prodotti Alimentari - Atti dell’incontro conclusivo del Progetto Speciale del Comitato Nazionale Scienze Agrarie*, 9 Luglio 1998, Facoltà di Agraria, Università degli Studi di Firenze, CNR–Istituto Nazionale di Coordinamento Agro-Industria.

<sup>13</sup> The study identifies between ten and twenty relevant schemes for each EU-15 countries, and an average number of 5-6 relevant schemes for the New Member States.

<sup>14</sup> See note 28.

<sup>15</sup> See also:

- Gellynck X. and Verbeke W. (2001), “Consumer perception of traceability in the meat chain”, *Agrarwirtschaft*, vol. 50, n. 6-2001, pp. 368-374.
- Northen J.R. (2000), “Quality attributes and Quality cues effective communication in the UK meat supply chain”, *British Food Journal*, vol. 102, n. 3-2000, pp. 230-245.

schemes focusing on animal rearing techniques have been developed over the last few years, among which some related to animal welfare<sup>16</sup>.

As we shall argue below, these schemes are present especially in some countries of the Scandinavian area, where consumers seem to be more sensitive to animal welfare requirements.

In the following paragraphs, a short analysis of the situation in the EU regarding this issue is presented both in general terms and through a series of appropriately selected case studies.

### QAS and animal welfare: situation in the EU and case studies

The analysis of the QAS bibliography in the EU reveals the presence of a very high number and variety of such schemes.

Some schemes also deal with rearing techniques, including the use of practices that can safeguard animal health.

This type of schemes are especially common in Scandinavian countries, above all in Sweden, Finland and Denmark, whereas they are much less spread Western European countries and Mediterranean countries. This situation reflects cultural and social differences that result in a lower level of consumer sensitivity to the individual “aspects” of product quality<sup>17</sup>.

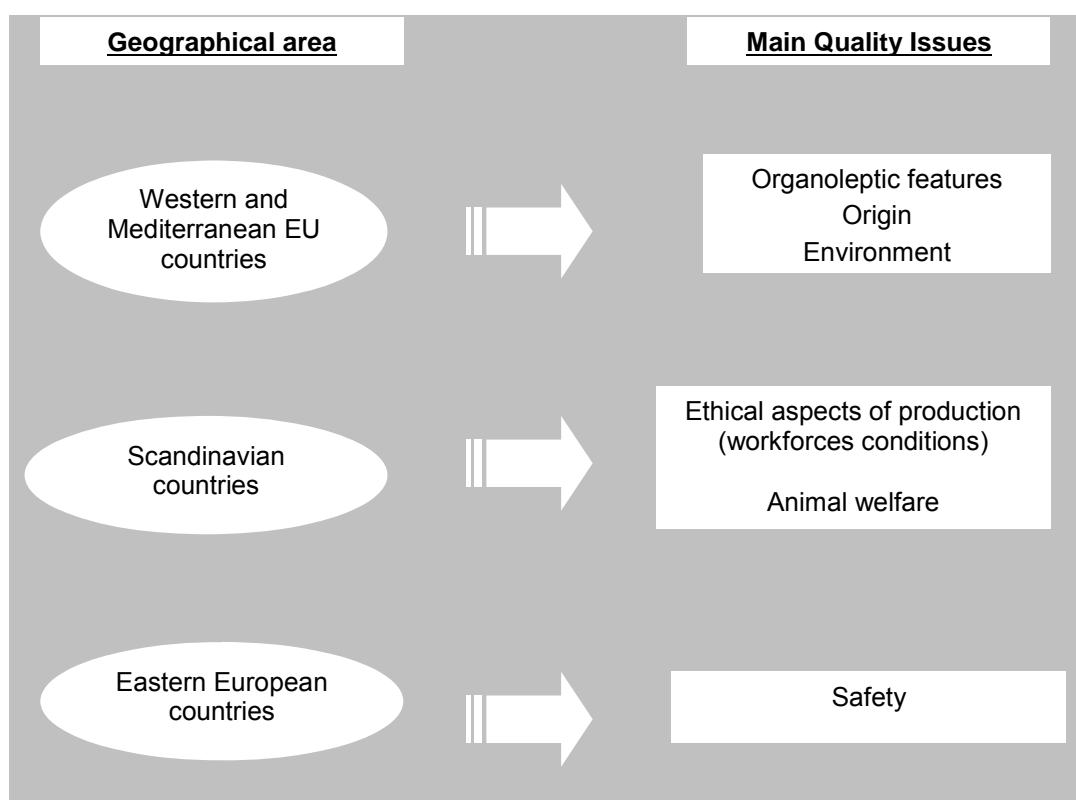


Figure 20: Main quality issues in European Member States

<sup>16</sup> As mentioned in the final report of the study cited in note 11.

<sup>17</sup> As mentioned in the final report (pp. 33-34 and succ.) of the study cited in note 11.

A greater consumer sensitivity to animal welfare issues in the Northern part of the EU is revealed by the analysis of several QASs in these areas.

In Sweden, “THE SWEDISH SEAL” is the most noteworthy examples of QAS in this field.

The SWEDISH SEAL is the label for animal products that comply with the quality assurance scheme called “*IP Lantbruk*” (IP Farm Assurance). This standard was set up and promoted by the Federation of Swedish Farmers and applies to farming, transport and slaughtering of animals. It is a product standard leading to a third-party certification. Controls are conducted by certification bodies accredited under EN 45011. This scheme sets food safety standards (low level of residual chemicals, implementation of increased Salmonella and Bovine Spongiform Encephalopathy - BSE controls), regulates the use of rearing practices that respect animal welfare (natural behaviour, good health, good husbandry), and also sets some environmental and biodiversity parameters.

The scheme, of Sweden origin, is being widely used in Sweden and Finland. The number of producers implementing it is quite high in the dairy sector (600 producers in 2005, 4,000 estimated in 2007), lower in the bovine meat sector (about 100 producers), and still very low in the pig sector (1 producer in 2005).

As regards Finland, the “HK Ruokatalo Quality Assurance Programme” is a scheme promoted by the company HK Ruokatalo, which applies it to farm and slaughterhouse suppliers. It is not a true certification, but rather a supply specification covering several production aspects, such as the use of practices that respect animal welfare, medication, application of growth hormones, hygiene, Salmonella, management and feed.

This scheme, enforced at the beginning of the 1990s, must be followed by all HK Ruokatalo live animal suppliers. Control and certification systems are managed by the company itself.

A similar case in Finland is the “Lantgårdens Bästa” scheme, promoted by Snellmann and applied to all its suppliers (farms, slaughterhouses, animal transport companies). This scheme, which applies to pigs and cattle, sets welfare standards for the rearing, transport and slaughtering of animals. Controls are conducted by Snellmann’s veterinary staff. The scheme is implemented by 100% of the pig producers and about 75% of the cattle producers delivering to Snellmann.

Other noteworthy examples are those from Denmark.

The “Red Seal” (“*Det roede segl*”), created in 1991 by the Animal Protection Society of Denmark, is focused on the welfare of the animals in the primary production including pigs, cattle, calves, and broilers. The certification body, represented by a Danish Non Governmental Organization (NGO) working for the protection and improvement of animals’ welfare, sets standards for the raising of animals on the farms, transportation and slaughtering procedures.

The Animal Protection Society has the final aim to influence the government and the consumers to demand products that guarantee certain criteria for animal welfare.

At the beginning of 2005 there were about 400 independent cattle and pig farmers certified for the “red seal”, as well as 3 processors.

Friland A/S, a Danish company in the meat sector, with aim to promote the production and sale of meat and meat product where environmental aspects and animal welfare has been taken into account, adopted the Red Seal as the required scheme for its suppliers. The scheme includes pigs, cattle and calves and organic meat.

Suppliers of non-organic animals are certified by the Animal Protection Society. Suppliers of organic meat are certified by the Danish Plant Directorate and the Animal Protection Society.

The Danish Code of Practice, created in 2002 by the Danish Crown, is focused on pork farming systems, covering issues related to food safety, which is protection from contamination of diseases, visits, trucks and drivers, delivery of pigs, feed, medical treatment, salmonella, quality of meat and fat, which is feed and genetics and animal ethics, which is natural light in the stables, industries on pigs and sows, trimming of hoofs, delivery of pigs and disposal of dead animals. The final aim can be identified in the qualification of pig meat to be exported, particularly in the EU countries and especially UK, but also to third countries.

The scheme is compulsory for all pig producers delivering to the Danish Crown.

A particularly interesting case is that of the Danish label “Antonius”. Set up in 1976 by Danish Crown, it has been the first Danish scheme for high quality pig meat products. It sets a list of requirements, mainly focused on animal welfare. Some of them are:

- Breed: Duroc Landrace Yorkshire
- No growth promoters or medicine in the feed
- Loose sows in pregnancy period (legislation)
- 30% more space for slaughtering pigs than required in legislation
- 30% more space for piglets than required in legislation
- straws in lying areas
- transport less than three hours
- slaughtering the same day as arrived at slaughterhouse
- weight 80-93,9 kg
- independent control and self-audit
- gentle cooling of meat
- 48 hours ageing of the meat

In Netherlands, an interesting experience can be found in the **Livar** scheme<sup>18</sup>, focused on high quality pig meat. The scheme proposes a code of practice which specifically regulates:

- a) own ‘Livar-breed’ (combination of old pig-breeds from several countries; tastier, more intra-muscular fat etc.).
- b) feed: only Dutch grown cereals, peas and beans (resulting in a better taste).
- c) Low-stress transport and slaughter procedures (because of taste; partnership with local slaughterhouse and with Dumeco)
- d) Adoption of HACCP and International Standard Organization (ISO) systems.

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<sup>18</sup> Wageningen University – Rural Development Group, *Marketing Sustainable Agriculture: an analysis of the potential role of new food supply chains in sustainable rural development*, 2004.

The scheme seems to be interesting in terms of quality requirements as well as of economic value for producers, with a farm level price which hover around 2-3 times higher than current price of the product.

Nevertheless, the certified chain still involves a restricted number of producers (6 pig farmers, 4 butchers, a number of about 50 selected restaurants and specialised stores) and a limited quantity of product (around 200 pigs a year).

Finally, we could mention the “UK PIGS” label (Englandsgrise), again of Danish origin, which is a common programme developed in cooperation between the two pig slaughterhouses Danish Crown and Tican Foods, Danish Bacon and Meat Council and the National Committee on Pig Production.

The scheme focuses on pig products destined for the UK market, but is only applied to pigs reared in Denmark. To date, it has been joined by about 1,000 farmers.

Some other relevant examples of QAS somehow dealing with animal welfare issues, even though not focused on it, can be found in the French “Label Rouge”, the British “Freedom Food” and “Red Tractor”, as well as the German Neuland.

As for the **Label Rouge**, created by the French “*loi d'orientation agricole de 1960*”, it represents a certification testifying that an agricultural product or foodstuff has some pre-defined characteristics which establish a level of superior quality specially dealing with its conditions of production or manufacturing.

Actually the Label covers a wide range of aspects of both production and/or manufacturing, from traceability and good practices to product and process control, plant-related requirements and others. Among these, for the animal products schemes, also some aspects of the production concerning welfare and health of reared animals are regulated.

The national Label is under the ownership of the ministry of agriculture and fishery, while each label within the national “label rouge framework” is owned by a collective structure, which assembles in general all the operators of the chain concerned, commonly called “quality group”.

Some specific national technical guides are published and periodically updated with the objective to define, for a given category of production, the minimum criteria to be included in the specifications of labels.

These technical guides, also homologated by an inter ministerial order, have already been established for the productions of chicken, guinea-fowl, turkey, capon, duck, goose, foie gras, beef, veal, pork, cooked pork meats.

Label Rouge has a relevant diffusion in France<sup>19</sup>, with more than 450 approved labels, among which the most represented products are the poultry products (40% of the lables), the meat products (20%) and the cooked pork meats.

Nevertheless, the un-specific nature of the scheme, not focused on the animal welfare standards but dealing with many other aspects of production and manufacturing, makes it impossible to actually appreciate how much the welfare issues can be considered as relevant and how much French consumers’ sentitivity to them can be considered high.

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<sup>19</sup> According to the survey conduced in the framework of the study mentioned at note 12, a very high percentage of French people and almost all the food chain operators know and are able to recognise the label.

As for the **Little Red Tractor**, it is a wide quality initiative started by British farmers and growers in June 2000, providing standards which include environmental issues, food hygiene and safety, as well as animal welfare.

The intention was to simplify the many already existing independently inspected farm assurance schemes, by providing a single easily recognisable symbol at the point of purchase. Its technical name is the British Farm Standards, but it is colloquially known as the Little Red Tractor. It can be found on beef, lamb, pork, chicken, milk, cereals, vegetables, fruit, and salads. Its produce is available in all sizes of shops on 550 product lines.

Always in the UK, the **Freedom Food** Scheme have been developed by the Royal Society body for Animal Welfare (RSPCA). The scheme provides standards taking into account advice from welfare academics, veterinary specialists, and practical experience from the farming industry aiming at enhancing animal welfare oriented rearing practices. Some benefits are meant to come to producers joining the scheme, in terms of differentiation, visibility and recognisability of the product, which should lead to higher selling prices. Nevertheless, at present, no reliable data are available in this sense.

In Germany, the **Neuland** scheme, applicable to all animal products, involves primary producers, first processors, as well as consumer and environment associations.

The farmers, the Arbeitsgemeinschaft Bäuerliche Landwirtschaft (1 member), Deutscher Tierschutzbund (1 member), Verbraucher Initiative e.V. (1 member), BUKO Agrar Koordination (1 member) and BUND (1 member) are the actors of Neuland. They represent besides the farmers' interests, two agricultural associations, the German Union of Animal Welfare, a consumers association and environment association<sup>20</sup>.

The main objective of the scheme is to realize a new concept of animal welfare (against battery farming), quality (controlled premium quality) and ecologically friendly farming. No data are available, at present, regarding production costs and selling prices.

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<sup>20</sup> Wageningen University – Rural Development Group, *Marketing Sustainable Agriculture: an analysis of the potential role of new food supply chains in sustainable rural development*, 2004.

**Table 24: Some relevant examples of animal welfare related QAS**

Country	Scheme
Sweden	Swedish Seal
Finland	Hk Ruokatalo Quality Assurance Programme
	Lantgårdens Bästa
Denmark	Red Seal
	Friland A/S
	Danish Code Of Practice
	Antonius
	Uk Pigs
Netherlands	Livar
France	Label Rouge
UK	Red Tractor
	Freedom Food
Germany	QS
	Neuland

### Market shares and price differentials

Although the examples presented in the previous paragraph prove that in some countries significant attention is being focused on animal rearing practices linked to animal welfare issues, the actual importance of these schemes in the market is still quite limited (tab. 25 and 26).

**Table 25: Organic livestock (2004, Number of heads)**

Country	Number of organic pigs	Number of pigs	Share %
Belgium	8.359	6.318.734	0,13%
Czech Republic	1.359	2.915.000	0,05%
Denmark	58.361	13.407.000	0,44%
Greece	27.792	994.000	2,80%
Italy	20.513	8.971.762	0,23%
Luxembourg	434	77.133	0,56%
Netherlands	29.268	11.140.000	0,26%
Austria	49.084	3.125.204	1,57%
Portugal	3.507	2.347.852	0,15%
Slovenia	1.235	533.998	0,23%
Finland	2.554	1.435.000	0,18%
Sweden	22.134	1.920.420	1,15%
United Kingdom	66.595	4.787.379	1,39%

Source: Eurostat

**Table 26: Market share of quality assured pigmeat<sup>21</sup> in Denmark**

Quality assurance scheme	Pigmeat market share (1)
UK-pigs	5,0%
Mail pigs	1,0%
Antonius	0,5%

(1) On Danish Pigmeat production

Source: DEIAGRA direct survey

According to Verbeke and Viane (2000), animal welfare generally tends to rank low among fresh pork attributes. Indeed, consumers don't prioritise this issue spontaneously, compared to other product characteristics such as food safety, health, quality, costs; moreover a study by PVE (2001) showed that:

- The share of European consumers having spontaneously concern about animal well being is less than 10%;
- The share of European consumers having concern about animal well being - when asked for, not spontaneously - is about 77%.

More specifically, consumers associate animal welfare with human health and safety, using it as an indicator of the above mentioned product attributes. Consequently, consumers equate good animal welfare standards with good food standards (Harper and Henson, 2001). In other words, consumers are concerned with animal welfare due to the impact on their health more than they are due to animal's well being in rearing and slaughtering.

Moreover, concerns that people have about pig production systems are not automatically translated into practice; consumers declare themselves willing to pay more for improved animal well being, but this is not often expressed in behaviour. Therefore, consumers' willingness to pay for meat produced in an animal friendly way might be a poor indicator of their purchasing behaviour (Burrell and Vrieze, 2001; Jensen et al., 1997).

According to Jensen et al. (1997), "the consumers may not react directly to this higher price but, after a certain period when prices are still higher, it is most likely that they buy less pigmeat and more of another (then relatively cheaper) type of meat".

This explains the reason why even in wealthy society, when pigmeat prices increase, consumers are likely to buy less pigmeat. However, they may not react directly to higher prices, but make adjustments gradually, after a certain period.

However, it must also be highlighted that such phenomena are still difficult to study, because in most cases consumers have no real possibility to choose pigmeat produced in systems with improved animal welfare and/or they lack the awareness of the possibility of such a choice (Eurobarometer, 2005).

In addition, even if, based on production data, the present request for animal welfare alternative products appears rather limited, it is still uncertain if this situation will remain unchanged or if the demand for such products will increase for a substantial share of the market. The analysis on the evolution of similar products such as derived from organic farming indicates that, although it started slowly, the increasing demand of the consumer has pushed the production to adapt and respond accordingly on a significant scale.

<sup>21</sup> Pigmeat covered by such schemes may include also quantities of organic pigmeat.

The almost total of QAS about animal welfare also concern other aspects than production aspects (ex: product's characteristics, environmental aspects, etc.). This is the reason why, even where there are, on the market, price bonus for the certified product in comparison with the standard one, it is not possible to establish a direct link between such a differential and the "animal friendly techniques" attribute. This is the case, for example, of the "Antonius" scheme, from Denmark: a survey done on the English market shows the presence of a price differential (+15% on the retail price) on the certified meat in comparison with the average price of the same product that is not certified<sup>22</sup>. Nevertheless, this is, also in this case, an example which is not representative (the survey is done on a restricted market, the English market, and concerning only one scheme); moreover, this example is related to a scheme which regulates a series of other attributes in comparison with the animal welfare scheme (e.g.: no use of antibiotics and growing regulators, product's traceability, etc.).

### **A.2.2 Summary**

Pigmeat prices at farm level tend to decrease over time in both nominal and deflated terms, while pigmeat retail prices tend to remain stable.

A good number of assurance schemes dealing with pigmeat quality was individuated; however, the focus of these schemes is not exclusively on the welfare of pigs, and the market shares for these schemes are extremely limited.

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<sup>22</sup>Torben Andersen, "International Animal Agriculture and Food Science Conference", 24-28th July 2001, Indianapolis.

## A.4 Third countries exporting pigmeat to the EU

This chapter summarises the main features of the pig sectors in the six Relevant Third Countries (RTC) exporting pigmeat to the EU that have been selected for this study, namely Canada, United States, Brazil, China, Chile and Australia. This is done in order to gather indications on the competitiveness of these countries on both the EU and world pigmeat markets: these indications are extremely useful especially in the study of the competition faced by EU pigmeat exports in the main foreign markets, whose findings are reported in A.5.

The essential data about world pigmeat economy in the 2001-2004 period are summarised in tables 27 below. The bulk of pigmeat production is concentrated in a very limited number of countries, with China's share above 50%, and the EU accounting for nearly 25% of world production.

**Table 27: Pigmeat production in selected countries - 1000 Metric Tons (Carcass Weight Equivalent)**

Production	2001	2002	2003	2004	Average 2001-2004	% on total average 2001-2004	cumulated % on total average 2001-2004
China, People's Republic of	41.845	43.266	45.186	47.016	44.328	50,7%	50,7%
EU-25	20.427	20.938	21.150	20.851	20.842	23,8%	74,6%
United States	8.691	8.929	9.056	9.312	8.997	10,3%	84,9%
Brazil	2.230	2.565	2.560	2.600	2.489	2,8%	87,7%
Canada	1.731	1.854	1.882	1.936	1.851	2,1%	89,8%
Russian Federation	1.560	1.630	1.710	1.725	1.656	1,9%	91,7%
Japan	1.245	1.236	1.260	1.271	1.253	1,4%	93,2%
Korea, Republic of (South Korea)	1.077	1.153	1.149	1.100	1.120	1,3%	94,4%
Philippines	1.064	1.095	1.145	1.145	1.112	1,3%	95,7%
Mexico	1.065	1.085	1.100	1.150	1.100	1,3%	97,0%
Others	2.643	2.700	2.668	2.572	2.646	3,0%	100,0%
<b>Total</b>	<b>83.578</b>	<b>86.451</b>	<b>88.866</b>	<b>90.678</b>	<b>87.393</b>	<b>100,0%</b>	

Source: USDA-Foreign Agricultural Service attache reports, FAO and national official statistics and results of office research.

Note: EU data includes 25 Member States for all years.

**Table 28: Pigmeat trade in selected countries - 1000 Metric Tons (Carcass Weight Equivalent)**

Imports	2001	2002	2003	2004	Average 2001-2004	% on total average 2001-2004	cumulated % on total average 2001-2004
Japan	1.068	1.162	1.133	1.302	1.166	31,3%	31,3%
Russian Federation	528	834	725	629	679	18,2%	49,5%
United States	431	486	538	499	489	13,1%	62,6%
Mexico	294	325	371	458	362	9,7%	72,3%
Hong Kong	260	275	302	332	292	7,8%	80,1%
Korea, Republic of (South Korea)	123	155	153	220	163	4,4%	84,4%
Romania	63	106	133	179	120	3,2%	87,7%
Canada	91	91	91	105	95	2,5%	90,2%
Australia	38	55	67	77	59	1,6%	91,8%
Ukraine	2	2	10	52	17	0,4%	92,2%
Others	244	326	359	230	290	7,8%	100,0%
<b>Total</b>	<b>3.142</b>	<b>3.817</b>	<b>3.882</b>	<b>4.083</b>	<b>3.731</b>	<b>100,0%</b>	

Exports	2001	2002	2003	2004	Average 2001-2004	% on total average 2001-2004	cumulated % on total average 2001-2004
EU-25	1.135	1.158	1.234	1.436	1.241	31,9%	31,9%
Canada	728	864	975	972	885	22,8%	54,7%
United States	707	731	779	989	802	20,6%	75,3%
Brazil	337	590	603	621	538	13,8%	89,1%
China, People's Republic of	139	216	282	383	255	6,6%	95,7%
Australia	67	78	74	59	70	1,8%	97,5%
Mexico	61	61	48	52	56	1,4%	98,9%
Korea, Republic of (South Korea)	42	16	17	10	21	0,5%	99,4%
Ukraine	2	1	12	8	6	0,1%	99,6%
Romania	0	0	0	5	1	0,0%	99,6%
Others	15	13	15	17	15	0,4%	100,0%
<b>Total</b>	<b>3.233</b>	<b>3.728</b>	<b>4.039</b>	<b>4.552</b>	<b>3.888</b>	<b>100,0%</b>	

Source: USDA-Foreign Agricultural Service attache reports, FAO and national official statistics and results of office research.

Note: EU data includes 25 Member States for all years.

**Table 29: Pigmear consumption in selected countries - 1000 Metric Tons (Carcass Weight Equivalent)**

Consumption	2001	2002	2003	2004	Average 2001-2004	% on total average 2001-2004	cumulated % on total average 2001-2004
China, People's Republic of	41.829	43.238	45.098	46.725	44.223	50,7%	50,7%
EU-25	19.317	19.746	20.043	19.459	19.641	22,5%	73,2%
United States	8.389	8.685	8.816	8.817	8.677	9,9%	83,2%
Japan	2.268	2.377	2.373	2.561	2.395	2,7%	85,9%
Russian Federation	2.076	2.453	2.420	2.337	2.322	2,7%	88,6%
Brazil	1.919	1.975	1.957	1.979	1.958	2,2%	90,8%
Mexico	1.298	1.349	1.423	1.556	1.407	1,6%	92,4%
Korea, Republic of (South Korea)	1.158	1.199	1.294	1.331	1.246	1,4%	93,9%
Philippines	1.085	1.137	1.167	1.170	1.140	1,3%	95,2%
Canada	1.082	1.072	1.004	1.067	1.056	1,2%	96,4%
Others	3.038	3.156	3.217	3.235	3.162	3,6%	100,0%
<b>Total</b>	<b>83.459</b>	<b>86.387</b>	<b>88.812</b>	<b>90.237</b>	<b>87.224</b>	<b>100,0%</b>	

**Source: USDA-Foreign Agricultural Service attache reports, FAO and national official statistics and results of office research.**

Note: EU data includes 25 Member States for all years.

More than 90% of world pigmeat imports are concentrated in eight countries: Japan, Russia (the cumulated shares of these two countries is around 50%), USA, Mexico, Hong Kong, South Korea, Romania and Canada. Exports are even more concentrated, with EU, Canada, USA, Brazil and China accounting for nearly 96% of world total. More than 50% of world pigmeat consumption takes place in China.

#### ***A.4.1 Pigmear trade flows between the relevant third countries and the EU***

The average value of the trade flows between the relevant third countries selected for the study (Australia, Brazil, Canada, Chile, China and USA) and the EU, for the two main pigmeat products groups (pigmear proper and frozen edible offal) in the five-year period 2000-2004 are summarised in tables 30 below.

**Table 30: MEAT OF SWINE, FRESH, CHILLED OR FROZEN: EU trade with the selected third countries (value in Euros).**

EU imports from:	Avg. 00-04	Var. 00-04	Share of total EU imports from third countries	Cumulated share of total EU imports from third countries
AUSTRALIA	10.455.163	-0,2%	22,1%	22,1%
BRAZIL	25.401	188,1%	0,1%	22,2%
CANADA	4.043.121	-100,0%	8,6%	30,7%
CHILE	4.536.306	ns	9,6%	40,3%
CHINA	39.853	ns	0,1%	40,4%
USA	20.946.746	-4,3%	44,3%	<b>84,7%</b>
<b>ALL THIRD COUNTRIES</b>	<b>47.287.819</b>	<b>2,9%</b>	<b>100,0%</b>	
EU exports to:	Avg. 00-04	Var. 00-04	Share of total EU exports to third countries	Cumulated share of total EU exports to third countries
AUSTRALIA	52.224.189	65,0%	2,8%	2,8%
BRAZIL	123.876	-15,6%	0,0%	2,8%
CANADA	13.727.954	-68,5%	0,7%	3,5%
CHILE	17.650	-2,4%	0,0%	3,5%
CHINA	7.537.120	-56,2%	0,4%	3,9%
USA	170.218.402	4,5%	9,0%	<b>12,9%</b>
<b>ALL THIRD COUNTRIES</b>	<b>1.891.183.278</b>	<b>2,8%</b>	<b>100,0%</b>	

**Table 31: EDIBLE OFFAL OF SWINE, FROZEN (EXCL. LIVERS): EU trade with the selected third countries (value in Euros).**

EU imports from:	Avg. 00-04	Var. 00-04	Share of total EU imports from third countries	Cumulated share of total EU imports from third countries
AUSTRALIA	113.933	-100,0%	13,6%	13,6%
BRAZIL	0	ns	0,0%	13,6%
CANADA	144.649	-100,0%	17,3%	30,9%
CHILE	3.271	ns	0,4%	31,3%
CHINA	10.671	ns	1,3%	32,6%
USA	387.618	-94,4%	46,3%	<b>78,9%</b>
<b>ALL THIRD COUNTRIES</b>	<b>836.921</b>	<b>-89,6%</b>	<b>100,0%</b>	
EU exports to:	Avg. 00-04	Var. 00-04	Share of total EU exports to third countries	Cumulated share of total EU exports to third countries
AUSTRALIA	138.161	-22,5%	0,1%	0,1%
BRAZIL	201.203	112,1%	0,1%	0,2%
CANADA	441.490	54,7%	0,2%	0,4%
CHILE	25.846	ns	0,0%	0,4%
CHINA	28.792.482	14,1%	15,5%	15,9%
USA	646.630	5,6%	0,3%	<b>16,3%</b>
<b>ALL THIRD COUNTRIES</b>	<b>185.818.950</b>	<b>81,6%</b>	<b>100,0%</b>	

Source: EUROSTAT-COMEXT database

As far as the aforementioned trade flows are concerned, the following considerations can be made:

- 1) The trade flows balance (exports vs. imports) is markedly in favour of the EU for both product groups (with the only exception of Chile for pigmeat products proper).

- 2) The six RTC cover a substantial share of the (rather limited) total EU imports from third countries for both product groups (84,7% for pigmeat products proper, 78,9% for frozen offal); the USA are the biggest shipper among the six RTC.
- 3) On the other hand, the six RTC represent only a small portion of total EU exports to third countries for both products groups (12,9% and 16,3% respectively); among the six RTC, the USA are the biggest EU customer for pigmeats, while China is the main one for frozen offal.

#### ***A.4.2 The pigmeat sector in the relevant third countries: structure, production costs and pigmeat prices***

The main facts and findings that must be highlighted as far as the economy of the pigmeat sector in the six selected RTCs is concerned are the following:

- 1) The trend towards a more concentrated structure of the pig sector emerges in all the six RTCs: marked differences are however present among these countries as far as the present degree of concentration is concerned. The structure of the Chinese sector, in particular, is still extremely fragmented.
- 2) Marked differences are also present as far as both production technology and marketing organisation in the pigmeat supply chain are concerned. Canada, USA and Australia boast advanced logistics and have specialised in the production of high quality, lean pigmeat. Brazil and Chile see the prevalence of large, vertically integrated firms, but still suffer from weaknesses in logistics and from inferior - by “western” standards – meat quality; in China these drawbacks are even more evident, and are not counterbalanced by the gains in efficiency stemming from vertical integration.
- 3) The cost competitiveness of the six RTCs also varies greatly, according to the varying influence exerted by both technology and the level of unit prices/costs for the critical factors, feed and labour above all.

An *indicative* comparison among the six RTCs in terms of total production costs and feed costs is proposed in tables 32 and 33 below.

**Table 32: Comparison among total pig production costs in the relevant third countries (Euros)**

Country	2000	2001	2002	2003
Canada - production costs (farrow-to-finish) for 100 Kg cwt	n.a.	n.a.	109,01	n.a.
USA - production costs (farrow-to-finish) for 100 Kg cwt gain	120,67	127,96	123,73	105,29
Australia - production costs (farrow-to-finish) for 100 Kg cwt	n.a.	n.a.	n.a.	129,47
Brazil- production costs (farrow-to-finish) for 100 Kg cwt	53,04	n.a.	n.a.	n.a.
Chile- producer price for live animals (Euros for 100 Kg cwt)	64,6	59,61	56,45	53,44

Source: DEIAGRA elaboration on data by Rasmussen (2004), USDA-ERS, Australian Pig Check, Tortuga e FNP Consulting, Chilean National Institute of Statistics - ODEPA

**Table 33: Comparison among feed costs in the relevant third countries (Euros)**

Country - Items	Years			
	2000	2001	2002	2003
Canada - Feed costs (farrow-to-finish) per 100 Kg cwt	n.a.	n.a.	64,60	n.a.
U.S.A. - Feed costs (farrow-to-finish) per 100 Kg cwt gain	49,40	53,67	54,70	46,19
Australia - Feed costs (farrow-to-finish) per 100 Kg cwt	n.a.	n.a.	n.a.	74,23
Brazil - Feed costs (farrow-to-finish) per 100 Kg lwt	54,79	n.a.	n.a.	n.a.

Source: DEIAGRA elaboration on data by Rasmussen (2004), USDA-ERS, Australian Pig Check, Tortuga e FNP Consulting

The most synthetic indicator of the substantial differences existing among the six RTCs - as far as the economy of the pigmeat sector, and the economy in general, are concerned - is however the level of pigmeat retail prices (table 34).

**Table 34: Comparison among pigmeat retail prices in the relevant third countries (Euros per Kg)**

Country	Years				
	2000	2001	2002	2003	2004
Australia	n.a.	5,46	5,90	5,88	6,05
USA	6,15	6,62	6,18	5,17	4,94
Chile	3,26	2,96	2,63	2,25	2,56
China	n.a.	n.a.	n.a.	1,12	1,34

Source: DEIAGRA elaboration on data by ABARE, Australian Bureau of Statistics, USDA-ERS, Chilean National Institute of Statistics – ODEPA, The Ministry of Agriculture of China

#### A.4.3 Summary

In conclusion, the six relevant RTCs can be clustered in two groups, according to the different fundamentals and characteristics of their competitive potential:

- a) Canada, USA, Australia: “western” pigmeat exporters, with good cost competitiveness, advanced logistics and focus on high quality products and high-income export markets;
- b) Brazil, Chile, China: “emerging” pigmeat exporters, which base their competitiveness mainly on low production costs and are thus focused on low-income export markets, which are less demanding in terms of both logistics and product quality.

## **A.5 Competition faced by EU pigmeat in the main foreign markets**

This chapter illustrates the most relevant aspects concerning the competition faced by EU pigmeat exports in the main foreign markets, in order to gather useful indications about the possible effects of stricter animal welfare requirements on the competitiveness of the main EU exporters of pigmeat to third countries.

The analysis of competition is focused on the value of export flows, as this permits to individuate the export markets which are essential to create value to EU exporters and to their main competitors.

### ***A.5.1 Main foreign markets for EU pigmeat exports***

The structure of EU exports of pigmeat and related products to third countries can be analysed according to the following criteria:

- “product” criterion, useful to analyse the combination of different product markets and their relative importance in contributing to total export value;
- “destination” criterion, useful to analyse the combination of different geographical markets (identified by third countries countries of destination) and their relative importance in contributing to total export value;
- “origin” criterion, useful to analyse the combination of different EU Member States forwarding shipments to third countries, and their relative importance in contributing to total export value.

As far as product identification is concerned, for trade flows originating or terminating in the EU, United States and Canada the *Harmonized Commodity Description and Coding System* or *Harmonized System (HS)* has been adopted in this study, as EU Combined Nomenclature cannot be used in international comparisons. The HS is an international commodity classification (with six-digits codes) developed under the auspices of the *World Customs Organization (WCO)*, an independent intergovernmental body formerly called the *Customs Cooperation Council*. The HS nomenclature is logically structured by economic activity or component material, and permits international comparisons among countries.

The “product-mix” of EU exports of pigmeat and related products to all third countries combined is described in table 35 below.

**Table 35: EU exports of pigmeat products to third countries, by HS groups (value in Euros)**

HS Heading or Subheading	2000	2004	Avg. 00-04	Share on TOTAL	Var. 00-04
HS-020311-FRESH OR CHILLED CARCASSES AND HALF-CARCASSES OF SWINE	55.308.401	89.930.777	72.139.024	3,3%	62,6%
HS-020312-FRESH OR CHILLED HAMS, SHOULDERS AND CUTS THEREOF OF SWINE, WITH BONE IN	8.637.414	17.168.475	13.167.905	0,6%	98,8%
HS-020319-FRESH OR CHILLED MEAT OF SWINE (EXCL. CARCASSES AND HALF-CARCASSES, AND HAMS, SHOULDERS AND CUTS THEREOF, WITH BONE IN)	48.300.927	58.692.749	50.412.891	2,3%	21,5%
HS-020321-FROZEN CARCASSES AND HALF-CARCASSES OF SWINE	99.664.563	83.380.966	76.016.284	3,4%	-16,3%
HS-020322-FROZEN HAMS, SHOULDERS AND CUTS THEREOF OF SWINE, BONELESS	58.687.770	59.228.883	43.638.705	2,0%	0,9%
HS-020329-FROZEN MEAT OF SWINE (EXCL. CARCASSES AND HALF-CARCASSES, AND HAMS, SHOULDERS AND CUTS THEREOF, BONELESS)	1.771.864.168	1.790.893.218	1.635.808.470	73,9%	1,1%
<b>HS-0203-MEAT OF SWINE, FRESH, CHILLED OR FROZEN (pigmeat proper)</b>	<b>2.042.463.243</b>	<b>2.099.295.068</b>	<b>1.891.183.279</b>	<b>85,4%</b>	<b>2,8%</b>
HS-020630-FRESH OR CHILLED EDIBLE OFFAL OF SWINE	2.153.875	1.261.717	1.616.578	0,1%	-41,4%
HS-020641-FROZEN EDIBLE LIVERS OF SWINE	16.149.463	15.026.052	15.061.799	0,7%	-7,0%
HS-020649-EDIBLE OFFAL OF SWINE, FROZEN (EXCL. LIVERS)	142.022.786	257.951.733	185.818.950	8,4%	81,6%
<b>SWINE-SPECIFIC SUBHEADINGS IN HS-0206 (offal and other edible by-products)</b>	<b>160.326.124</b>	<b>274.239.502</b>	<b>202.497.328</b>	<b>9,1%</b>	<b>71,1%</b>
HS-021011-HAMS, SHOULDERS AND CUTS THEREOF OF SWINE, SALTED, IN BRINE, DRIED OR SMOKED, WITH BONE IN	10.799.692	13.370.656	12.162.226	0,5%	23,8%
HS-021012-BELLIES 'STREAKY' AND CUTS THEREOF OF SWINE, SALTED, IN BRINE, DRIED OR SMOKED	6.630.760	4.943.900	5.635.851	0,3%	-25,4%
HS-021019-MEAT OF SWINE, SALTED, IN BRINE, DRIED OR SMOKED (EXCL. HAMS, SHOULDERS AND CUTS THEREOF, WITH BONE IN, AND BELLIES AND CUTS THEREOF)	101.961.598	115.993.162	103.466.058	4,7%	13,8%
<b>SWINE-SPECIFIC SUBHEADINGS IN HS-0210 (pigmeat products salted, in brine, dried or smoked)</b>	<b>119.392.050</b>	<b>134.307.718</b>	<b>121.264.135</b>	<b>5,5%</b>	<b>12,5%</b>
<b>TOTAL - ALL SWINE-SPECIFIC SUBHEADINGS IN HS-02</b>	<b>2.322.181.417</b>	<b>2.507.842.288</b>	<b>2.214.944.741</b>	<b>100,0%</b>	<b>8,0%</b>

Source: EUROSTAT-COMEXT database

The product-mix analysis clearly suggests to concentrate our attention on the product market identified by frozen meat of swine (excluding carcasses and half-carcasses, and hams, shoulders and cuts thereof).

The “destination-mix” of EU exports to third countries for the aforementioned product market is described in table 36 below.

**Table 36: HS-020329-FROZEN MEAT OF SWINE (EXCL. CARCASSES AND HALF-CARCASSES, AND HAMS, SHOULDERS AND CUTS THEREOF, BONELESS): main foreign export markets (value in Euros).**

PARTNER	2000	2004	Avg. 00-04	Share on TOTAL	Cumulated share on TOTAL	Var. 00-04
<b>JAPAN</b>	981.496.253	985.515.506	931.934.933	57,0%	57,0%	0,4%
<b>UNITED STATES</b>	175.779.979	186.119.782	168.955.118	10,3%	67,3%	5,9%
<b>KOREA, REPUBLIC OF (SOUTH KOREA)</b>	162.101.290	168.985.337	135.944.008	8,3%	75,6%	4,2%
<b>RUSSIAN FEDERATION (RUSSIA)</b>	174.746.567	101.388.031	117.433.391	7,2%	82,8%	-42,0%
<b>AUSTRALIA</b>	43.059.541	73.863.139	51.862.851	3,2%	86,0%	71,5%
<b>ROMANIA</b>	12.264.640	83.415.648	39.169.466	2,4%	88,4%	580,1%
<b>CROATIA</b>	23.012.653	29.020.976	27.311.308	1,7%	90,0%	26,1%
<b>SINGAPORE</b>	34.883.694	14.403.961	17.898.308	1,1%	91,1%	-58,7%
<b>HONG KONG</b>	20.225.539	19.647.369	15.464.462	0,9%	92,1%	-2,9%
<b>CANADA</b>	19.334.975	6.045.049	13.622.457	0,8%	92,9%	-68,7%
<b>BULGARIA</b>	12.226.248	14.803.250	13.492.057	0,8%	93,7%	21,1%
<b>SOUTH AFRICA</b>	9.762.132	8.407.187	8.764.496	0,5%	94,3%	-13,9%
<b>PHILIPPINES</b>	14.240.461	8.127.235	6.797.383	0,4%	94,7%	-42,9%
<b>CHINA (PEOPLE'S REPUBLIC OF)</b>	7.053.723	3.182.778	6.519.690	0,4%	95,1%	-54,9%
<b>FORMER YUGOSLAV REPUBLIC OF MACEDONIA</b>	4.911.232	6.455.101	5.023.181	0,3%	95,4%	31,4%
<b>TAIWAN</b>	3.307.085	4.389.182	4.539.960	0,3%	95,7%	32,7%
<b>BOSNIA AND HERZEGOVINA</b>	3.377.950	4.018.005	3.923.291	0,2%	95,9%	18,9%
<b>ANGOLA</b>	2.317.250	5.159.088	3.830.993	0,2%	96,1%	122,6%
<b>YUGOSLAVIA -&gt; SERBIA + MONTENEGRO</b>	1.717.405	3.827.774	3.435.569	0,2%	96,3%	122,9%
<b>ALBANIA</b>	6.017.569	1.723.963	3.253.475	0,2%	96,5%	-71,4%
<b>NEW ZEALAND</b>	3.188.416	4.053.952	2.848.466	0,2%	96,7%	27,1%
<b>BELARUS (BELORUSSIA)</b>	999.138	8.427.820	2.759.188	0,2%	96,9%	743,5%
<b>NORWAY</b>	2.006.922	1.964.493	2.524.657	0,2%	97,0%	-2,1%
<b>OTHER THIRD COUNTRIES</b>	53.833.506	47.950.455	48.500.133	3,0%	100,0%	-9,8%
<b>TOTAL</b>	<b>1.771.864.168</b>	<b>1.790.895.081</b>	<b>1.635.808.843</b>	<b>100,0%</b>		<b>1,1%</b>

Source: EUROSTAT-COMEXT database

Notes: countries in **BOLD** types: competition with USA and/or Canada; countries in **BOLD AND CORSIVE** types: competition with China and/or Brazil, but not with USA and/or Canada; countries in **NORMAL** type: no competition with the four main exporting RTC

The “origin-mix” of EU exports, for the aforementioned product market, is described in table 37 below.

**Table 37: HS-020329-FROZEN MEAT OF SWINE (EXCL. CARCASSES AND HALF-CARCASSES, AND HAMS, SHOULDERS AND CUTS THEREOF, BONELESS): origin of EU exports to third countries (value in Euros).**

MEMBER STATES	2000	2004	Avg. 00-04	Share on TOTAL	Cumulated share on TOTAL	Var. 00-04
DENMARK	1.098.882.609	1.106.893.968	1.093.903.298	66,9%	66,9%	0,7%
FRANCE	214.230.240	128.611.879	111.004.452	6,8%	73,7%	-40,0%
NETHERLANDS	136.108.355	111.054.001	92.699.613	5,7%	79,3%	-18,4%
HUNGARY	75.471.073	76.247.665	82.789.917	5,1%	84,4%	1,0%
GERMANY	56.106.770	64.577.478	55.311.201	3,4%	87,8%	15,1%
BELGIUM	23.863.369	62.376.785	49.472.064	3,0%	90,8%	161,4%
AUSTRIA	24.530.957	64.524.600	36.400.090	2,2%	93,0%	163,0%
FINLAND	18.829.200	31.958.785	26.490.382	1,6%	94,6%	69,7%
IRELAND	38.210.166	35.567.638	23.935.877	1,5%	96,1%	-6,9%
SPAIN	17.357.643	35.967.757	16.332.431	1,0%	97,1%	107,2%
UNITED KINGDOM	40.294.355	14.537.099	14.228.386	0,9%	98,0%	-63,9%
SWEDEN	9.397.822	17.309.456	11.557.602	0,7%	98,7%	84,2%
ITALY	10.943.083	20.156.176	10.623.717	0,6%	99,3%	84,2%
POLAND		17.651.001	3.530.200	0,2%	99,5%	ns
CYPRUS	2.178.391	1.449.615	1.794.588	0,1%	99,6%	-33,5%
PORTUGAL	1.344.719	997.672	1.240.664	0,1%	99,7%	-25,8%
GREECE	1.709.944	384.890	877.267	0,1%	99,8%	-77,5%
CZECH REPUBLIC	71.470	310.586	215.777	0,0%	99,8%	334,6%
ESTONIA	80.464	23.943	55.590	0,0%	99,8%	-70,2%
LITHUANIA	20.370	154.775	35.054	0,0%	99,8%	659,8%
LATVIA	8.255	102.811	34.718	0,0%	99,8%	1145,4%
SLOVENIA	58.365	34.275	29.037	0,0%	99,8%	-41,3%
MALTA			27.286	0,0%	99,8%	ns
LUXEMBOURG		363	21.677	0,0%	99,8%	ns
SLOVAKIA			0	0,0%	99,8%	ns
<b>TOTAL</b>	<b>1.771.864.168</b>	<b>1.790.893.218</b>	<b>1.635.808.470</b>	<b>100,0%</b>		<b>1,1%</b>

Source: EUROSTAT-COMEXT database

Summarising, the export of EU pigmeat products towards third countries has quite marked features in terms of:

- product mix: specialisation in the export of frozen meat (excluding carcasses and half-carcasses, and hams, shoulders and cuts thereof); to a lesser extent, specialisation in the export of frozen edible offal (excluding livers);
- destination mix: Japan is by a large margin the main export market for frozen meat (USA, South Korea and Russia hold significant but much smaller shares);
- origin mix: Denmark is the undisputed EU leader in the export of both frozen meat and frozen edible offal to third countries.

### A.5.2 EU pigmeat exports vs. relevant third country exports in the main foreign markets

Once the picture is clear from an EU perspective, there remains to determine where and to what extent EU pigmeat exports to third countries are facing competition from exports originating in the main exporting RTC, i.e. Canada and USA (“traditional” exporters) and Brazil and China (“emerging” exporters).

It is interesting to compare the relative position for the year 2004 of EU frozen pigmeat exports versus US and Canadian ones, in three of the main export markets for the EU, namely Japan, South Korea and Russia. The comparison is summarised in table 38 below.

**Table 38 - Comparison among EU, US and Canadian frozen pigmeat exports (HS-020329) in three of the main export markets, 2004**

Export markets	Base data	Reference currency for the base data	Reference currency / € conversion rate (1)	Value of exports (Euros)	US and Canadian exports as % of EU exports
<b>to JAPAN from:</b>					
<b>EU</b>	<b>985.515.506</b>	<b>Euros</b>	<b>1,0000</b>	<b>985.515.506</b>	
United States	324.851.618	US \$	1,2439	261.155.734	26,5%
Canada	358.490.460	US \$	1,2439	288.198.778	29,2%
<b>to SOUTH KOREA from:</b>					
<b>EU</b>	<b>168.985.337</b>	<b>Euros</b>	<b>1,0000</b>	<b>168.985.337</b>	
United States	31.303.921	US \$	1,2439	25.165.947	14,9%
Canada	24.921.704	US \$	1,2439	20.035.135	11,9%
<b>to RUSSIA from:</b>					
<b>EU</b>	<b>101.388.031</b>	<b>Euros</b>	<b>1,0000</b>	<b>101.388.031</b>	
United States	21.357.235	US \$	1,2439	17.169.576	16,9%
Canada	8.788.505	US \$	1,2439	7.065.283	7,0%

(1): average annual bilateral exchange rate (US \$ per Euro) for 2004; source: European Central Bank, Monthly Bulletin

Source: DEIAGRA elaboration of data from EUROSTAT-COMEXT database, U.S. Census Bureau (U.S. Department of Commerce) and STATISTICS CANADA

EU exports are substantially higher than US and Canadian ones in all the three countries. As far as Russia is concerned, however, it must be noted that the competition by Brazilian pigmeat exports has become very strong in recent years.

Table 39 below summarises the main export markets in value for frozen pigmeat for the EU, Canada, USA, Brazil and China<sup>23</sup>.

<sup>23</sup> It must be noted that the data for Brazil and China are not exactly homogeneous with the others, as they do not refer exclusively to frozen pigmeat exports (HS code 020329). The comparison between these two countries and the other three is therefore to be deemed as indicative.

**Table 39 – Comparison among the main export markets in value for pigmeat for the EU, Canada, USA (Frozen pigmeat, HS-020329), Brazil and China (pigmeat)**

Pos.	Export markets EU	Avg. share 2000-2004	Export markets Canada	Avg. share 2000-2004	Export markets United States	Avg. share 2000-2004	Export markets Brazil	Avg. share 2000-2004	Export markets China	Avg. share 2000-2004
1	JAPAN	57,0%	JAPAN	53,3%	JAPAN	61,3%	RUSSIA	60,5%	HONG KONG	37,5%
2	UNITED STATES	10,3%	UNITED STATES	20,8%	MEXICO	8,4%	HONG KONG	10,1%	RUSSIA	24,3%
3	SOUTH KOREA	8,3%	AUSTRALIA	10,1%	CANADA	6,4%	ARGENTINA	6,8%	Korea North	8,6%
4	RUSSIA	7,2%	SOUTH KOREA	3,1%	TAIWAN	5,5%	UKRAINE	3,9%	SINGAPORE	7,3%
5	AUSTRALIA	3,2%	NEW ZEALAND	2,2%	SOUTH KOREA	5,1%	SINGAPORE	3,7%	JAPAN	7,2%
6	ROMANIA	2,4%	RUSSIA	2,0%	RUSSIA	3,3%	Netherlands	2,8%	Malaysia	5,0%
7	CROATIA	1,7%	MEXICO	1,7%	HONG KONG	2,3%	SOUTH AFRICA	2,0%	PHILIPPINES	3,4%
8	SINGAPORE	1,1%	TAIWAN	1,5%	CHINA	1,9%	Uruguay	1,7%	Macau	1,5%
9	HONG KONG	0,9%	CHINA	0,9%	Germany	0,5%	ALBANIA	1,0%	ALBANIA	0,8%
10	CANADA	0,8%	Cuba	0,8%	Colombia	0,5%	BULGARIA	0,9%	Indonesia	0,8%
<b>TOP TEN MARKETS</b>		<b>92,9%</b>		<b>96,5%</b>		<b>95,1%</b>		<b>93,4%</b>		<b>96,3%</b>

Notes: countries in BLOCK letters: competition with the EU exports; countries in normal letters: no competition with the EU exports; countries with yellow background: EU Member States

Source: DEIAGRA elaboration of data from EUROSTAT-COMEXT database, U.S. Census Bureau (U.S. Department of Commerce), STATISTICS CANADA, Associação Brasileira da Indústria Produtora e Exportadora de Carne Suína (ABIEPCS), and USDA Foreign Agricultural Service, "China (Peoples Republic of), Livestock and Products Semi-Annual 2005" (GAIN Report N° CH5010, 31-01-2005)

It appears clear from the table that the focal points of competition for EU frozen pigmeat exports - which constitute by far and large the most important component in the product mix of EU pigmeat exports - are to be found especially:

- in Japan, where competition from American and Canadian exports is significant;
- in the USA, where the competition comes mainly from Canadian exports;
- in Russia, where Brazilian exports (and also Chinese ones, albeit to a lesser extent) have gained a substantial share in recent years.

It is especially important for the EU exporters to maintain their competitiveness on the Japanese market. Exports to Japan are essential to create value to EU exporters of frozen pigmeat, as it is an high-income country. The main competitors on the Japanese market for frozen pigmeat are the US and Canada, i.e. exporting countries which combine cost competitiveness with efficient logistics and a good quality of meat, as we have seen at A.4. Analogous considerations can be made for the American market.

The case of Russia is quite different, as it is a low-income country. The main competitors there are Brazil and China, i.e. exporting countries which more than offset their inefficiency in logistics and the relatively poor quality of their meat with an extremely aggressive cost competitiveness (see A.4): on low-income export markets, it is the possibility to undersell the competitors that can make the difference, more than anything else.

### **A.5.3 Summary**

EU exports of pigmeat to third countries are mostly made of frozen pigmeat and, for a lesser part, frozen offal. The main destination markets of EU frozen pigmeat, in value, are Japan, United States, South Korea and Russia; more than 65% of such exports originates in Denmark. The main competitors of the EU as regards frozen pigmeat exports are: Canada and USA in Japan; Canada in the USA; Brazil and China in Russia. The competition in the first two market is based on quality and service, besides price, while in the Russian export market the importance of low prices is paramount.

## **Section B – Scenarios for future development**

## **B.1 The structural evolution in the EU pig sector and the dynamics of the relevant factors**

In this chapter we will illustrate the main features of the structural evolution that has occurred in the EU pig sector in the last 10 years, putting it in relation with the dynamics of a number of relevant factors that may have caused, or influenced, this evolution over the considered time span.

The information and the data presented in this chapter are essential to perform the assessment of the impacts resulting from different combinations of space allowance and floor type (chapter B.2) and the comparative analysis between factors deriving from animal welfare requirements on space allowances and floor types and other factors affecting production costs (chapter C.1), and this because:

- a notion of the evolutionary trends of the sector, and of the factors that have an influence on them, is necessary to assess correctly in each scenario the deviation from these trends that is likely to be caused by a change in animal welfare requirements, and this especially at the sector level (chapter B.2);
- a notion of the dynamics of the price of cereals and of the level of agricultural wages is required to compare the impacts on production costs deriving from a change in animal welfare requirements with the impacts that may be caused by variations in the price of cereals or in the level of agricultural wages (chapter C.1).

### ***B.1.1 Structural evolution in the EU pig sector***

This section reports the results of a dynamic analysis of pig sector's structure, in ten selected European countries, featuring three relevant aspects describing production capacity of the sector itself, namely:

1. Number of holdings by size classes;
2. Holdings' distribution among size classes;
3. Pigmeat production.

B.1.1.2 Number of holdings and their distribution among size classes

Table 40, 41, 42 and 43 below show the evolution of the number of holdings by size classes, for 10 selected Member States.

**Table 40: Number of holdings (all size classes, 1995 – 2003)**

Country	Time			Var (95)	Var (00)
	1995	2000	2003		
<b>Sweden</b>	8.830	5.340	3.310	-62,51	-38,01
<b>Denmark</b>	20.450	15.060	10.900	-46,70	-27,62
<b>Germany</b>	:	133.770	95.650	:	-28,50
<b>Spain</b>	184.230	151.640	111.670	-39,39	-26,36
<b>France</b>	84.700	56.910	49.440	-41,63	-13,13
<b>Italy</b>	272.950	184.140	122.630	-55,07	-33,40
<b>Netherlands</b>	19.630	16.160	10.520	-46,41	-34,90
<b>Austria</b>	103.960	80.400	59.830	-42,45	-25,58
<b>Poland</b>	:	:	603.790	:	:
<b>United Kingdom</b>	11.190	9.290	8.940	-20,11	-3,77

Source: Eurostat

**Table 41: Number of holdings by size classes, in relevant European Countries 1995 – 2003**

Country	Class 1 - 99			Class: 100 - 399			Class: 400 -999			Class: 1000 or more		
	Time			Time			Time			Time		
	1995	2000	2003	1995	2000	2003	1995	2000	2003	1995	2000	2003
Sweden	6.470	3.300	1.720	1.440	1.100	690	670	650	560	250	300	340
Denmark	8.820	5.510	2.770	6.390	3.980	2.500	3.800	3.640	3.110	1.440	1.930	2.520
Germany	:	102.230	67.000	:	18.580	14.910	:	10.450	10.240	:	2.500	3.490
Spain	174.070	137.630	99.620	4.250	4.920	4.090	3.740	4.890	3.990	2.170	4.200	3.960
France	69.910	43.300	35.920	6.720	5.950	5.560	6.330	5.870	5.880	1.730	1.780	2.090
Italy	267.120	179.710	118.390	2.890	1.470	1.550	1.580	1.300	1.100	1.360	1.660	1.580
Netherlands	6.270	5.070	2.870	7.590	5.560	3.340	4.260	3.770	2.750	1.510	1.760	1.550
Austria	96.800	73.590	53.560	6.730	6.110	5.330	420	680	900	20	40	40
Poland	:	:	590.420	:	:	11.980	:	:	1.030	:	:	360
United Kingdom	5.880	5.530	5.950	2.050	1.260	1.060	1.790	1.300	970	1.460	1.210	970

Source: Eurosta

**Table 42: Variation of the distribution of the number of holdings among size classes (% Share)**

Country	Class 1 - 99			Class: 100 - 399			Class: 400 -999			Class: 1000 or more		
	Time			Time			Time			Time		
	1995	2000	2003	1995	2000	2003	1995	2000	2003	1995	2000	2003
Sweden	73,27	61,80	51,96	16,31	20,60	20,85	7,59	12,17	16,92	2,83	5,62	10,27
Denmark	43,13	36,59	25,41	31,25	26,43	22,94	18,58	24,17	28,53	7,04	12,82	23,12
Germany	:	76,42	70,05	:	13,89	15,59	:	7,81	10,71	:	1,87	3,65
Spain	94,49	90,76	89,21	2,31	3,24	3,66	2,03	3,22	3,57	1,18	2,77	3,55
France	82,54	76,09	72,65	7,93	10,46	11,25	7,47	10,31	11,89	2,04	3,13	4,23
Italy	97,86	97,59	96,54	1,06	0,80	1,26	0,58	0,71	0,90	0,50	0,90	1,29
Netherlands	31,94	31,37	27,28	38,67	34,41	31,75	21,70	23,33	26,14	7,69	10,89	14,73
Austria	93,11	91,53	89,52	6,47	7,60	8,91	0,40	0,85	1,50	0,02	0,05	0,07
Poland	:	:	97,79	:	:	1,98	:	:	0,17	:	:	0,06
United Kingdom	52,55	59,53	66,55	18,32	13,56	11,86	16,00	13,99	10,85	13,05	13,02	10,85

**Table 43: Variation of the distribution of the number of holdings among size classes (%)**

Country	Classes							
	Class 1 - 99		Class: 100 - 399		Class: 400 -999		Class: 1000 or more	
	Var (95)	Var (00)	Var (95)	Var (00)	Var (95)	Var (00)	Var (95)	Var (00)
<b>Sweden</b>	-73,42	-47,88	-52,08	-37,27	-16,42	-13,85	36,00	13,33
<b>Denmark</b>	-68,59	-49,73	-60,88	-37,19	-18,16	-14,56	75,00	30,57
<b>Germany</b>	:	-34,46	:	-19,75	:	-2,01	:	39,60
<b>Spain</b>	-42,77	-27,62	-3,76	-16,87	6,68	-18,40	82,49	-5,71
<b>France</b>	-48,62	-17,04	-17,26	-6,55	-7,11	0,17	20,81	17,42
<b>Italy</b>	-55,68	-34,12	-46,37	5,44	-30,38	-15,38	16,18	-4,82
<b>Netherlands</b>	-54,23	-43,39	-55,99	-39,93	-35,45	-27,06	2,65	-11,93
<b>Austria</b>	-44,67	-27,22	-20,80	-12,77	114,29	32,35	100,00	0,00
<b>Poland</b>	:	:	:	:	:	:	:	:
<b>United Kingdom</b>	1,19	7,59	-48,29	-15,87	-45,81	-25,38	-33,56	-19,83

Source: Eurostat

It can be seen from table 40 that a substantial reduction of the number of farms has occurred in all the studied countries, both with reference to the 1995 and 2000 year.

Table 41 (% Share) shows that a substantial share of holdings is concentrated in the biggest size class which is the sole one showing an increase in the number of farms, with the only exception of Great Britain. In this country, a notable reduction of the number of the medium – size and biggest classes is occurring, while the smallest is rising, especially from year 2000 (table 42).

The dynamic in holdings' distribution among size classes is reported in tables 44, 45, 46 and 47 below.

As it can be seen in table 44, in the 1995-2003 period, the number of pigs, has substantially decreased in some Member States, like United Kingdom (-37,31%), The Netherlands (-22,78%), Austria (-11,46%); on the other hand, they have slightly increased in Italy (+3,47%) and France (+0,88%) and to a high degree in Denmark (+16,49%), and Spain (+58,42%).

Regarding the dynamic of the distribution of pigs in the various size classes is represented (tables 45, 46 and 47), the general trend in the smaller classes (i.e. holdings housing a number of heads between 1 and 99) has been for a significant reduction of the number of pigs in all countries and especially in Denmark (-70,28%), Netherlands (-65,37%) and Italy (-56,25%), with regard to both the 1995 – 2003 and the 2000 – 2003 period.

The same can be said also if we consider the two classes of holdings with a number of pigs between 100 and 399 (i.e. Denmark -57,93%, The Netherlands -52,83% and United Kingdom -47,04%) and between 400 and 999 (i.e. United Kingdom -45,10%, The Netherlands -33,49% and Italy -23,20%) for all considered Member States, with the only exception, for the latter class, of Austria (+123,83%), and Spain (+12,56%) during the same time spans.

**Table 44: Number of pigs, 1995 – 2003**

Country	All classes				
	Time			Var. (95)	Var. (00)
	1995	2000	2003		
<b>Sweden</b>	1.280.780	1.243.700	1.131.350	-11,67	-9,03
<b>Denmark</b>	6.461.960	6.759.510	7.527.750	16,49	11,37
<b>Germany</b>		16.776.110	17.056.780	:	1,67
<b>Spain</b>	7.788.550	13.289.110	12.338.500	58,42	-7,15
<b>France</b>	8.392.310	8.027.030	8.465.930	0,88	5,47
<b>Italy</b>	5.936.040	6.335.140	6.141.840	3,47	-3,05
<b>Netherlands</b>	7.123.920	6.955.230	5.500.810	-22,78	-20,91
<b>Austria</b>	2.359.800	2.229.960	2.089.470	-11,46	-6,30
<b>Poland</b>			10.193.550	:	:
<b>United Kingdom</b>	4.904.760	4.078.900	3.074.720	-37,31	-24,62

Source: Eurostat

**Table 45: Distribution of holdings by size classes, in relevant European countries 1995 – 2003 (number of pigs)**

Country	Class: 1 - 99			Class: 100 - 399			Class: 400 - 999			Class: 1000 and more		
	Time			Time			Time			Time		
	1995	2000	2003	1995	2000	2003	1995	2000	2003	1995	2000	2003
<b>Sweden</b>	112.460	77.260	39.720	304.830	234.430	152.380	412.140	404.500	351.340	451.340	527.510	587.910
<b>Denmark</b>	299.160	175.090	88.910	1.390.990	901.340	585.180	2.371.440	2.340.830	2.055.780	2.400.370	3.342.260	4.797.890
<b>Germany</b>	:	1.678.760	1.176.490	:	3.966.090	3.204.720	:	6.432.820	6.431.410	:	4.698.440	6.244.160
<b>Spain</b>	619.420	598.200	432.610	929.030	1.046.400	851.750	2.287.930	3.038.530	2.575.260	3.952.170	8.605.980	8.478.880
<b>France</b>	267.290	181.550	177.530	1.688.360	1.514.450	1.419.940	3.815.310	3.525.720	3.565.050	2.621.360	2.805.300	3.303.410
<b>Italy</b>	839.380	497.150	367.240	594.530	317.530	319.280	939.140	823.900	721.270	3.563.000	4.696.560	4.734.050
<b>Netherlands</b>	232.390	158.100	80.470	1.647.080	1.255.670	776.900	2.639.430	2.365.440	1.755.500	2.605.030	3.176.020	2.887.950
<b>Austria</b>	836.670	603.580	454.340	1.271.130	1.214.500	1.096.080	212.800	355.510	476.320	39.210	56.370	62.720
<b>Poland</b>	:	:	6.564.690	:	:	1.941.180	:	:	594.610	:	:	1.093.070
<b>United Kingdom</b>	105.540	86.200	77.380	454.270	280.110	240.590	1.154.770	847.940	633.980	3.190.170	2.864.650	2.122.760

Source: Eurostat

**Table 46: Distribution of holdings by size classes, in relevant European countries 1995 – 2003 (% Share)**

Country	Class: 1 - 99			Class: 100 - 399			Class: 400 - 999			Class:1000 and more		
	Time			Time			Time			Time		
	1995	2000	2003	1995	2000	2003	1995	2000	2003	1995	2000	2003
Sweden	8,78	6,21	3,51	23,80	18,85	13,47	32,18	32,52	31,05	35,24	42,41	51,97
Denmark	4,63	2,59	1,18	21,53	13,33	7,77	36,70	34,63	27,31	37,15	49,45	63,74
Germany	:	10,01	6,90	:	23,64	18,79	:	38,35	37,71	:	28,01	36,61
Spain	7,95	4,50	3,51	11,93	7,87	6,90	29,38	22,86	20,87	50,74	64,76	68,72
France	3,18	2,26	2,10	20,12	18,87	16,77	45,46	43,92	42,11	31,24	34,95	39,02
Italy	14,14	7,85	5,98	10,02	5,01	5,20	15,82	13,01	11,74	60,02	74,14	77,08
Netherlands	3,26	2,27	1,46	23,12	18,05	14,12	37,05	34,01	31,91	36,57	45,66	52,50
Austria	35,46	27,07	21,74	53,87	54,46	52,46	9,02	15,94	22,80	1,66	2,53	3,00
Poland	:	:	64,40	:	:	19,04	:	:	5,83	:	:	10,72
United Kingdom	2,15	2,11	2,52	9,26	6,87	7,82	23,54	20,79	20,62	65,04	70,23	69,04

**Table 47: Variation of the distribution of holdings among size classes (number of pigs, %)**

Country	Class							
	1 - 99		100 - 399		400 - 999		1000 and more	
	Var. (95)	Var. (00)	Var. (95)	Var. (00)	Var. (95)	Var. (00)	Var. (95)	Var. (00)
Sweden	-64,68	-48,59	-50,01	-35,00	-14,75	-13,14	30,26	11,45
Denmark	-70,28	-49,22	-57,93	-35,08	-13,31	-12,18	99,88	43,55
Germany	:	-29,92	:	-19,20	:	-0,02	:	32,90
Spain	-30,16	-27,68	-8,32	-18,60	12,56	-15,25	114,54	-1,48
France	-33,58	-2,21	-15,90	-6,24	-6,56	1,12	26,02	17,76
Italy	-56,25	-26,13	-46,30	0,55	-23,20	-12,46	32,87	0,80
Netherlands	-65,37	-49,10	-52,83	-38,13	-33,49	-25,79	10,86	-9,07
Austria	-45,70	-24,73	-13,77	-9,75	123,83	33,98	59,96	11,26
Poland	:	:	:	:	:	:	:	:
United Kingdom	-26,68	-10,23	-47,04	-14,11	-45,10	-25,23	-33,46	-25,90

Instead, as far as big holdings (with over one thousands heads) are concerned, it can be seen that an increase in the number of housed pigs has occurred in all analyzed countries, and quite substantially in a number of cases (i.e. Spain +114,54%, Denmark + 99,88% and Austria 59,96%; see tab. 47), with the sole exception of the United Kingdom in which the trend was for a significant reduction(-33,46%).

From the data presented above, it appears that a process of concentration and intensification is occurring within the pig sector, in all selected Member States, with an increase in the economic importance of the largest pig holdings, which account on average for 40 – 50% of total heads reared at national level. This evolution can be especially seen for Denmark, the Netherlands and Spain, rapidly evolving towards more and more intensive production systems. A notable exception is Poland, (although in this case the only available data are those for year 2003), where the sector is still highly fragmented, with a substantial presence of small holdings, which represent the majority of Polish pig farms and which account for most of total housed pigs.

The sole exception is represented by the United Kingdom situation, which features a slight increase in the number of holdings of the smallest size, in contrast with the decrease experienced by all the other size classes. However, the largest pig farms concentrate the bulk of the British pig herd, just like in the other Member States.

#### B.1.1.3 Pigmear production dynamic

Although from 1995 to 2004, pig meat production in EU has slightly increased (+11.7%), the evolution of the single countries is instead mixed, as some Member States have experienced raises, also to a high degree, as it is the case of Spain (+46,72%), Denmark (22,64%), Germany (+19,60%) and Italy (+18,16%), while other have experienced decreases, that have been quite substantial in the United Kingdom (-7,43%) and the Netherlands (-20,64%) and slight in Poland (-2,61%).

**Table 48: Pigmear production in relevant European Countries, 1995 – 2004 (tons)**

Country	Time			Var. (95)	Var. (00)
	1995	2000	2004		
<b>Sweden</b>	308.814	276.975	294.498	-4,64	6,33
<b>Denmark</b>	1.475.400	1.624.470	1.809.495	22,64	11,39
<b>Germany</b>	3.601.988	3.981.870	4.307.948	19,60	8,19
<b>Spain</b>	2.174.823	2.912.390	3.190.999	46,72	9,57
<b>France</b>	2.143.977	2.317.963	2.312.261	7,85	-0,25
<b>Italy</b>	1.345.562	1.488.454	1.589.891	18,16	6,81
<b>Netherlands</b>	1.622.074	1.622.761	1.287.242	-20,64	-20,68
<b>Austria</b>	466.158	502.004	515.532	10,59	2,69
<b>Poland</b>	1.975.000	1.892.000	1.923.484	-2,61	1,66
<b>United Kingdom</b>	992.238	923.059	720.036	-27,43	-21,99

Source: Eurostat

The substantial increase that occurred in Spain between especially in the 1995-2000 period is probably connected mostly to the low production costs (Rasmussen, 2002).

The trend reversal that occurred in Poland between the 1995-2000 period and the 2000-2004 period may be attributed to the restructuring process that took place in relation with both the transition to market economy and the EU accession.

The reasons for the substantial decrease in Dutch production are to be found mainly in constraints stemming from the strict environmental regulations (Rasmussen, 2002), while the equally substantial decrease that occurred in the United Kingdom may be explained by the high production costs, which result from a mix of factors, including currency conversion rate, production efficiency and inputs costs (British Pig Executive, 2004 and 2005).

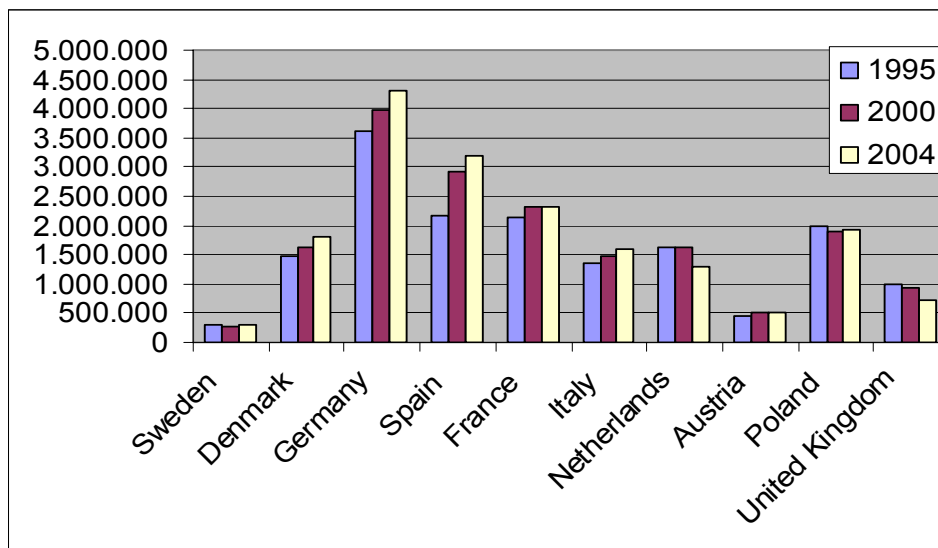


Figure 21: Pigmeat production in relevant European Countries, 1995 – 2004 (tons)

### B.1.2 The dynamics of the relevant factors

In the following paragraphs we will synthetically describe the recent dynamics of the relevant factors that have influenced the structural evolution of the EU pig sector, which was illustrated in the previous paragraphs.

#### Box B.1.2 – Operational methodology

To perform the dynamic analysis of each relevant factor we tried to rely on a single source of data whenever possible, in order to base each analysis on a homogeneous set of data. We also tried to favour EU official statistics as a source of data whenever possible.

However, this also implied that we had to deal with time series of different length, as data for certain years were not available for some Member States. The values in *italics* in the tables that follow indicate that a variation is referred to a time span which is 1 or 2 years shorter than the prevalent one.

All the values are nominal (non-deflated).

As far as the geographical coverage is concerned, we focused on the 10 Member States for which data on production costs were available: Austria, Denmark, France, Germany, Ireland, Italy, Spain, Sweden, The Netherlands and United Kingdom.

#### B.1.2.1 Production costs

The evolution of total production costs for the pig fattening activity in the 2000-2004 period is shown in table 49 below.

**Table 49: Total costs of pigmeat production, 2000-2004 (€/100 kg dead weight)**

Member State	2000	2001	2002	2003	2004	Var.
Austria	n.a.	n.a.	n.a.	157,44	163,93	4,1%
Denmark	135,09	n.a.	154,31	140,70	141,77	4,9%
France	141,77	n.a.	152,65	138,43	139,84	-1,4%
Germany	138,52	n.a.	151,18	142,82	153,02	10,5%
Ireland	123,70	n.a.	138,69	136,11	141,18	14,1%
Italy	n.a.	n.a.	200,54	200,97	206,24	2,8%
Spain	122,29	n.a.	120,05	125,30	140,84	15,2%
Sweden	n.a.	n.a.	n.a.	147,61	146,13	-1,0%
The Netherlands	138,06	n.a.	156,74	146,57	145,80	5,6%
United Kingdom	153,52	n.a.	169,26	156,70	164,21	7,0%

Source: Meat and Livestock Commission

It can be seen that a slight reduction of production costs has occurred in France and Sweden only (but in the latter case the time span considered is shorter). Total costs have increased in the eight other Member States, and quite substantially in a number of cases (Germany, Ireland and Spain above all).

The evolution of two important components of total production cost, i.e. feed costs and labour costs, is shown in tables 50 and 51 below.

**Table 50: Feed costs in pigmeat production, 2000-2004 (€/100 kg dead weight)**

Member State	2000	2001	2002	2003	2004	Var.
Austria	n.a.	n.a.	n.a.	73,02	74,39	1,9%
Denmark	66,01	n.a.	76,65	66,56	68,00	3,0%
France	68,46	n.a.	80,04	68,95	73,04	6,7%
Germany	66,63	n.a.	73,90	67,88	69,65	4,5%
Ireland	76,44	n.a.	82,92	80,69	86,62	13,3%
Italy	n.a.	n.a.	124,10	121,00	127,12	2,4%
Spain	77,43	n.a.	76,21	76,54	85,22	10,1%
Sweden	n.a.	n.a.	n.a.	65,32	67,38	3,1%
The Netherlands	62,95	n.a.	70,03	67,08	69,34	10,1%
United Kingdom	81,63	n.a.	87,55	71,27	81,38	-0,3%

Source: Meat and Livestock Commission

**Table 51: Labour costs in pigmeat production, 2000-2004 (€/100 kg dead weight)**

Member State	2000	2001	2002	2003	2004	Var.
Austria	n.a.	n.a.	n.a.	22,30	24,35	9,2%
Denmark	18,91	n.a.	18,45	16,68	16,47	-12,9%
France	15,92	n.a.	17,32	19,09	17,72	11,3%
Germany	18,25	n.a.	18,13	16,57	19,98	9,5%
Ireland	11,55	n.a.	14,44	13,96	13,40	16,0%
Italy	n.a.	n.a.	17,29	17,89	17,51	1,2%
Spain	11,48	n.a.	13,64	12,23	12,43	8,3%
Sweden	n.a.	n.a.	n.a.	19,41	18,86	-2,8%
The Netherlands	17,89	n.a.	19,74	18,10	17,46	-2,4%
United Kingdom	18,25	n.a.	20,48	19,16	19,94	9,2%

Source: Meat and Livestock Commission

Feed costs have raised in nine Member States out of ten (the only exception being United Kingdom), and quite significantly in The Netherlands, Spain and Ireland. The evolution of labour costs is instead mixed, as some Member States have experienced decreases (Denmark in particular), and other have experienced increases (that have been quite substantial in France and Ireland).

#### B.1.2.2 Cereal prices

It is interesting to compare the above illustrated evolution of production costs with the dynamics of the price of some cereal types (maize, wheat, barley, rye and oats) that can be used in the feeding of pigs, as components of both farm-produced and industrial feed.

As far as the price in the reference market for imported cereals (Cost Insurance and Freight – CIF - Rotterdam price) is concerned, if it is true that in the 1996-2003 period the prices for imported maize, wheat and barley have decreased (quite substantially in the case of maize), it is also true that in the 2000-2003 period (i.e. in the same time span in which the evolution of production costs was analysed in this study) the CIF Rotterdam price has remained stable for maize, and has increased for both barley (albeit slightly) and wheat (substantially).

**Table 52: CIF Rotterdam prices (annual averages) for cereals (EUR/t)**

Cereals	1996	1997	1998	1999	2000	2001	2002	2003	Var. (96)	Var. (00)
Maize	142,57	118,50	104,36	99,00	114,21	121,77	124,63	114,54	-19,7%	0,3%
Common wheat (1)	162,39	140,13	112,00	104,24	126,36	141,32	158,47	see note	-2,4%	25,4%
Barley	148,19	127,34	104,98	106,64	133,92	147,65	151,44	136,88	-7,6%	2,2%

(1) A change occurred in the reference typology of wheat in 2003: 1996-2002: SRW2; 2003: HRS2/14; to obtain a homogeneous set of data, the time series considered goes from 1996 to 2002.

Source: European Commission, Directorate-General for Agriculture.

As far as cereal price dynamics on national markets are concerned (see tables 53, 54, 55, 56 and 57 below), these have been quite mixed, especially in the 2000-2003 period (while in the 1996-2003 period the general trend has been for a reduction, with the only exception of wheat in Ireland).

**Table 53: Producer prices of maize (EUR/T)**

Member State	1996	1997	1998	1999	2000	2001	2002	2003	Var. (96)	Var. (00)
Austria	128,70	100,55	104,95	106,24	110,40	102,10	100,00	128,00	-0,5%	15,9%
France	135,68	112,36	103,59	109,31	123,80	121,70	114,40	n.a.	-15,7%	-7,6%
Germany	141,34	123,86	123,93	115,40	119,20	116,20	108,10	124,60	-11,8%	4,5%
Spain	160,69	140,82	137,25	140,82	143,30	136,40	137,00	147,90	-8,0%	3,2%

Source: European Commission (Eurostat)

**Table 54: Producer prices of common wheat (EUR/T)**

Member State	1996	1997	1998	1999	2000	2001	2002	2003	Var. (96)	Var. (00)
Austria	131,23	110,27	104,94	106,04	110,50	105,30	97,70	100,60	-23,3%	-9,0%
France	132,76	122,95	110,71	104,12	113,40	115,50	106,60	n.a.	-19,7%	-6,0%
Germany	133,07	121,97	110,68	110,80	115,90	111,60	101,40	110,30	-17,1%	-4,8%
Ireland	118,60	103,94	101,51	107,80	103,20	116,60	95,70	124,60	5,1%	20,7%
Spain	160,50	152,15	140,54	135,59	129,90	147,10	130,20	135,00	-15,9%	3,9%
The Netherlands	131,47	113,08	105,39	110,27	108,00	110,70	97,50	n.a.	-25,8%	-9,7%
United Kingdom	138,24	128,12	112,51	113,61	122,40	129,90	110,50	120,70	-12,7%	-1,4%

Source: European Commission (Eurostat)

**Table 55: Producer prices of barley (EUR/T)**

Member State	1996	1997	1998	1999	2000	2001	2002	2003	Var. (96)	Var. (00)
Austria	124,68	105,66	99,21	98,40	97,50	95,50	87,90	87,40	-29,9%	-10,4%
France	122,44	111,76	102,53	99,40	113,10	107,30	94,90	n.a.	-22,5%	-16,1%
Germany	120,71	112,45	99,87	102,16	102,50	98,60	86,70	95,00	-21,3%	-7,3%
Ireland	114,44	101,67	95,92	104,12	102,10	103,30	93,80	109,60	-4,2%	7,3%
Spain	133,00	132,92	115,19	119,48	114,30	124,30	117,80	120,30	-9,6%	5,2%
The Netherlands	129,36	117,15	106,30	109,36	105,70	104,40	91,50	n.a.	-29,3%	-13,4%
United Kingdom	127,43	117,29	104,37	111,34	108,80	110,60	92,70	100,90	-20,8%	-7,3%

Source: European Commission (Eurostat)

**Table 56: Producer prices of rye (EUR/T)**

Member State	1996	1997	1998	1999	2000	2001	2002	2003	Var. (96)	Var. (00)
Austria	130,86	104,57	103,30	107,00	108,60	99,50	92,10	100,40	-23,3%	-7,6%
France	130,60	118,56	104,50	100,01	98,20	99,10	102,30	n.a.	-21,7%	4,2%
Germany	118,41	112,96	100,83	101,70	105,00	97,80	86,20	97,50	-17,7%	-7,1%
Spain	135,24	131,23	118,48	118,70	113,00	123,40	122,20	n.a.	-9,6%	8,1%
The Netherlands	128,66	114,89	101,34	106,64	101,20	102,10	87,00	n.a.	-32,4%	-14,0%

Source: European Commission (Eurostat)

**Table 57: Producer prices of oats (EUR/T)**

Member State	1996	1997	1998	1999	2000	2001	2002	2003	Var. (96)	Var. (00)
Austria	127,66	103,89	91,61	87,91	95,40	98,80	90,30	87,00	-31,8%	-8,8%
France	120,59	119,02	99,50	77,29	92,70	120,70	115,60	n.a.	-4,1%	24,7%
Germany	122,49	111,03	90,12	96,07	106,80	103,20	92,90	89,50	-26,9%	-16,2%
Ireland	114,19	101,27	99,35	107,29	105,30	95,80	98,20	106,50	-6,7%	1,1%
Spain	144,82	145,22	129,42	127,35	118,40	124,70	126,20	123,00	-15,1%	3,9%
The Netherlands	130,20	124,39	112,15	114,81	115,30	112,50	101,00	n.a.	-22,4%	-12,4%
United Kingdom	131,97	120,61	97,71	108,46	109,80	108,50	95,40	84,40	-36,0%	-23,1%

Source: European Commission (Eurostat)

More specifically:

- 1) In the case of maize (table 53), while a significant decrease has occurred in France (albeit over a shorter time span), Spain, Germany and especially Austria have experienced increases.
- 2) In the case of wheat (table 54), only in Spain and Ireland price increases have occurred (substantially in the latter case), while in Austria, France, Germany, The Netherlands and United Kingdom the price has decreased.

- 3) As far as barley price is concerned (table 55), the picture is very similar to the one regarding wheat, with increases in Spain and Ireland only.
- 4) The dynamics of rye price (table 56) and of oats price (table 57) are also mixed, with increases in France (especially for oats) and Spain (especially for rye), and with decreases for the remaining Member States (the only exception being Ireland for oats).

As far as the relation between the evolution of feed costs in pig fattening, on one hand, and price dynamics for cereals, on the other, the following considerations can be made:

- Cereal price dynamics cannot explain entirely the evolution of feed costs, especially if cereal prices on national markets are considered. Indeed, the dynamics of feed costs the majority of the selected Member States does not appear to be in line with the dynamics of cereal prices on domestic markets.
- In the specific case of Spain and Ireland-the evolution of feed costs is more in line with cereal price dynamics at national level, probably because of the higher degree of geographical separation of these national cereal markets both from the cereal surplus areas of the EU and from the main port of entry (Rotterdam).

#### B.1.2.3 Agricultural wages

It is also interesting to compare the evolution of labour costs in the pig fattening activity with the dynamics of the agricultural wages index, which are reported in table 58 below.

**Table 58: Agricultural wages index (2000 = 100)**

Member State	1999	2000	2001	2002	2003
Austria	98,2	100,0	102,3	n.a.	n.a.
Denmark	96,9	100,0	103,4	106,7	109,9
France	97,8	100,0	103,6	107,0	n.a.
Germany	98,6	100,0	101,1	n.a.	n.a.
Spain	94,8	100,0	104,6	109,8	n.a.
Sweden	96,6	100,0	104,3	107,8	111,6
The Netherlands	95,5	100,0	103,9	108,4	114,3
United Kingdom	97,0	100,0	103,6	107,4	109,0

Source: European Commission, Eurostat (on the basis of heterogeneous national indexes)

As it can be seen, the agricultural wages index has increased in all the Member States considered. This means that the decrease in labour costs for the pig fattening activities that has occurred between 2000 and 2004 in Sweden, The Netherlands and especially in Denmark (see table 51 above) is not in line with the dynamics of the agricultural wages index. However, readers should keep in mind the following considerations:

- The agricultural wages index is an aggregate index, which may therefore be unable to express the dynamics of agricultural wages in a certain specific sector (in our case the pig fattening sector).
- A decrease in labour costs in the pig fattening activities can be achieved also through the substitution of hired labour with cheaper family labour and/or through a more intensive use of labour-saving machinery and equipment.

#### B.1.2.4 Pigmeat prices

As table 59 clearly shows, pigmeat prices have decreased in all the ten Member States during the period 1996-2003. The same can be said also if we consider only the years between 2000 and 2003, with the only exception of Italy. In Germany, Austria, France, and especially in Sweden and Denmark, the decrease has been quite substantial.

**Table 59: Market prices for pigmeat (1) - (ECU-EUR/100 kg (2))**

Member State	1996	1997	1998	1999	2000	2001	2002	2003	Var. (96)	Var (00)
Austria	176,47	170,88	122,83	114,80	143,01	172,00	137,38	127,24	-27,9%	-11,0%
Denmark	150,36	153,25	108,93	103,48	132,13	157,18	125,97	109,32	-27,3%	-17,3%
France	161,00	160,28	119,67	113,53	139,50	164,51	129,39	122,55	-23,9%	-12,1%
Germany	173,51	175,91	121,55	113,84	143,80	170,54	138,20	128,51	-25,9%	-10,6%
Ireland	152,37	146,11	113,68	103,14	129,43	146,27	128,29	123,09	-19,2%	-4,9%
Italy	160,77	165,71	140,68	131,22	156,99	191,26	159,06	157,57	-2,0%	0,4%
Spain	161,52	167,36	121,87	111,59	142,36	174,72	136,79	129,14	-20,0%	-9,3%
Sweden	144,71	153,48	130,79	121,81	146,60	152,80	137,72	123,16	-14,9%	-16,0%
The Netherlands	152,51	153,96	100,41	93,11	127,13	141,50	119,38	115,16	-24,5%	-9,4%
United Kingdom	165,51	154,51	120,12	121,27	157,50	159,47	150,41	149,62	-9,6%	-5,0%

(1) Representative markets – price paid to the pig farmers

(2) Slaughter weight (CW) - Class E

Source: European Commission, Directorate-General for Agriculture

### B.1.3 Summary

The EU pig sector has experienced deep changes in its structure (see tab. 60) over the past ten years.

Where the sector's output has remained fairly stable in quantity, the pig fattening activities have concentrated in a relatively limited number of large-scale operations, which now account for a substantial part of the EU pig herd. Great numbers of small-scale operations have gone out of business in most Member States.

Structural change in the other Member States has mostly been driven by the dynamics of two factors:

- pigmeat prices, whose downward trend has encouraged the expansion of the scale of production units, as a larger output was being needed to keep revenues unaffected;
- the level of agricultural wages, whose upward trend has also contributed to boost the increase of the average size of pig fattening operations in some Member States, in an attempt to pursue scale economies and also to make the introduction of labour-saving innovations on the farms feasible.

With pigmeat prices falling and with wages on the rise, EU pig farmers have chosen scale expansion and substitution of labour with capital as their preferred solutions to counterbalance the erosion of their margins.

The dynamics of the price of cereals (with downward trends on the majority of national markets and at the main EU port of entry) seems unable to explain rising feed costs in most Member States (albeit with the notable exception of Ireland) and seems not to have played an important role in the structural evolution of the EU pig sector. This is not so surprising, however, if we consider that the dynamics of the price of commercial feeding stuffs may deviate from the cereals' one, as other factors and situations (the price dynamics of other inputs; the market power of the major feed producers; vertical coordination between pig farmers and feed producers) can influence the pricing strategy of feed producers.

**Table 60: Evolution of the EU pig sector (1995 – 2003)**

Country	Number of holdings		Pigmeat production (tons)		Pig population (heads)		Average dimension (heads/holding)		
	1995	2003	1995	2004	1995	2003	1995	2003	Var % (95)
Sweden	8.830	3.310	308.814	294.498	1.280.780	1.131.350	145	342	135,64%
Denmark	20.450	10.900	1.475.400	1.809.495	6.461.960	7.527.750	316	691	118,56%
Germany	:	95.650	3.601.988	4.307.948	:	17.056.780	:	178	:
Spain	184.230	111.670	2.174.823	3.190.999	7.788.550	12.338.500	42	110	161,35%
France	84.700	49.440	2.143.977	2.312.261	8.392.310	8.465.930	99	171	72,82%
Italy	272.950	122.630	1.345.562	1.589.891	5.936.040	6.141.840	22	50	130,30%
Netherlands	19.630	10.520	1.622.074	1.287.242	7.123.920	5.500.810	363	523	44,08%
Austria	103.960	59.830	466.158	515.532	2.359.800	2.089.470	23	35	53,85%
Poland	:	603.790	1.975.000	1.923.484	:	10.193.550	:	17	:
United Kingdom	11.190	8.940	992.238	720.036	4.904.760	3.074.720	438	344	-21,53%

## **B.2 Production costs in the main relevant rearing system typologies and in different combinations of space allowance and floor type**

### ***B.2.1 Estimation of production costs in the main relevant rearing system typologies***

#### ***B.2.1.1 Methodology for the estimation of production costs***

The estimation of production costs in the main relevant rearing system typologies has been carried out, for the ten selected Member States, on the basis of data and information obtained from various bibliographical sources, namely:

- a. Production costs estimated by *Meat and Livestock Commission* (MLC);
- b. Knowles A., British Pig Executive (BPEX), (2002), “The EU cost of production project”.  
<http://www.bpex.org/technical/publications/pdf/2002COPreport.pdf>
- c. Knowles A., British Pig Executive (BPEX), (2004), “2003 Cost of production in selected EU countries”;
- d. CRPA (2004), “Suinicoltura Italiana e costo di produzione”, Opuscolo CRPA n. 4. <http://www.crpa.it/home/it/Pubblicazi/Opuscoli-C/Archivio-21/1.pdf>
- e. Bornett H. L. I., Guy J. H., Cain P. J., (2003), “Impact of Animal Welfare on Costs and Viability of Pig Production in the UK”, *Journal of Agricultural and Environmental Ethics*, vol. 16, n. 2, pp. 163 – 186;
- f. Eurostat, (2004), “Agricultural situation in the European Union, 2004”.

The indications derived from the bibliographical analysis, were cross-referenced with experts’ opinions and ad hoc surveys, which permitted to quantify production costs in the main relevant rearing system typologies.

Considering the heterogeneous nature of the sources, it is important to point out that the estimation is not aimed at an exact calculation of costs in the various rearing system typologies, but at obtaining reasonably accurate indications about the differences existing among said typologies.

#### ***B.2.1.2 Results of the estimation of production costs***

Tables 62 – 67 illustrate results of an estimation of production costs for the three main relevant rearing system typologies (RST; see Table 61 below), in selected Member States:

- Fully slatted;
- Partly slatted;
- Straw based (straw-flow).

**Table 61: Main characteristics of the relevant RST<sup>24</sup>**

<b>Rearing System Typology</b>	<b>Floor</b>	<b>Space (m<sup>2</sup>/100 kg pigs)</b>
<b>Fully-slatted</b>	Slatted pen	0,65
<b>Partly-slatted</b>	Solid floor kennel with slatted (30%) dunging area	0,75
<b>Straw-based (flow)</b>	Pen with bedding and sloped flooring	0,75

Production costs reported in tables 62-67 are from farrow to finish, and are expressed in cent/Kg (carcass weight).

For each RST, all relevant cost categories were analyzed, namely (see Box A.2.1. pag. 45):

<b>Cost categories</b>	<b>Components</b>
Variable costs	Feed
	Breeding costs
	Veterinary and medicines
	Energy
	Maintenance
	Levies, insurances and inspection
	Miscellaneous, which includes bedding costs
Fixed costs	Labour
	Finance costs (Depreciation rate of machinery and buildings)
	Interest in working capital.

The results are summarized in tables 62 - 67 which compare, for the 10 selected Member States, respectively, total costs, total fixed costs and total variable costs.

**Table 62: Total costs in the selected Member States**

<b>Total costs</b>	<b>Fully slatted</b>	<b>Partly slatted</b>	<b>Straw based</b>
	cent/kg cw	cent/kg cw	cent/kg cw
Austria	165,47	156,36	172,70
Denmark	144,00	134,98	148,30
France	141,73	132,74	147,34
Germany	155,72	146,16	158,96
Ireland	142,53	135,29	147,78
Italy	199,92	197,80	213,22
Netherlands	148,50	139,54	150,86
Spain	137,60	138,47	148,87
Sweden	150,13	138,25	151,58
United Kingdom	164,61	156,48	174,98

<sup>24</sup> Please refer to § A.1, for details.

**Table 63: Total costs index\* in the selected Member States**

Total costs index	Fully slatted	Partly slatted	Straw based
Austria	100,00	94,50	104,37
Denmark	100,00	93,73	102,99
France	100,00	93,66	103,96
Germany	100,00	93,86	102,08
Ireland	100,00	94,92	103,68
Italy	100,00	98,94	106,65
Netherlands	100,00	93,96	101,59
Spain	100,00	100,63	108,19
Sweden	100,00	92,08	100,96
United Kingdom	100,00	95,07	106,30

\*Fully slatted = 100%

**Table 64: Total fixed costs in the selected Member States**

Total fixed costs	Fully slatted	Partly slatted	Straw based
	cent/kg cw	cent/kg cw	cent/kg cw
Austria	55,14	46,70	62,44
Denmark	47,30	39,23	48,85
France	48,27	40,03	50,45
Germany	53,37	44,48	56,51
Ireland	37,18	31,12	39,30
Italy	59,10	48,81	58,53
Netherlands	48,59	40,43	50,82
Spain	30,84	25,92	33,70
Sweden	61,02	50,09	60,30
United Kingdom	45,36	38,61	51,73

**Table 65: Total fixed cost index in the selected Member States**

Total fixed costs index	Fully slatted	Partly slatted	Straw based
Austria	100,00	84,69	113,24
Denmark	100,00	82,95	103,28
France	100,00	82,92	104,51
Germany	100,00	83,35	105,89
Ireland	100,00	83,71	105,70
Italy	100,00	82,59	99,03
Netherlands	100,00	83,21	104,59
Spain	100,00	84,03	109,27
Sweden	100,00	82,08	98,82
United Kingdom	100,00	85,13	114,04

\*Fully slatted = 100%

**Table 66: Total variable costs in the selected Member States**

Total variable costs	Fully slatted	Partly slatted	Straw based
	cent/kg cw	cent/kg cw	cent/kg cw
Austria	110,32	109,66	110,26
Denmark	96,70	95,74	99,45
France	93,46	92,71	96,89
Germany	102,35	101,68	102,45
Ireland	105,35	104,16	108,48
Italy	140,82	148,98	154,69
Netherlands	99,91	99,11	100,04
Spain	106,76	112,56	115,17
Sweden	89,11	88,16	91,28
United Kingdom	119,25	117,87	123,25

**Table 67: Total variable cost index in the selected Member States**

Total variable costs index	Fully slatted	Partly slatted	Straw based
Austria	100,00	99,40	99,94
Denmark	100,00	99,01	102,84
France	100,00	99,20	103,67
Germany	100,00	99,34	100,10
Ireland	100,00	98,87	102,97
Italy	100,00	105,80	109,85
Netherlands	100,00	99,19	100,13
Spain	100,00	105,43	107,87
Sweden	100,00	98,93	102,43
United Kingdom	100,00	98,84	103,36

\*Fully slatted = 100%

From the above illustrated data, we can infer that the least-cost RST is the partly-slatted system, with the fully-slatted system closely following. The straw based system features the highest production costs<sup>25</sup>.

**Table 68: Average production costs: comparison among the three relevant RSTs**

Average costs	Fully slatted	Partly slatted	Straw based
	cent/kg cw	cent/kg cw	cent/kg cw
<b>Total costs</b>	155,02	147,61	161,46
<b>Total fixed costs</b>	48,62	40,54	51,26
<b>Total variable costs</b>	106,40	107,06	110,20

By analysing the various cost categories more in depth, it can be noted that in all the Member States under study the main cost categories contributing to total cost are feed, housing, and labour.

Feed costs are highest in straw based system, and lower in the partly – slatted RST, due to differences in Food Conversion Ratio (FCR).

<sup>25</sup> The simultaneous presence, in a given time, of different rearing system typologies (RSTs) is mainly explained by two reasons: 1) the diffusion of innovations is a non-homogeneous process with reference to both space and time; 2) switching from an RST to another implies a cost.

Because of the presence of slurry channels under the slats, housing costs are greatest in the slatted systems, than in the straw based typology, characterized by simple buildings. Furthermore, labour costs are highest in the straw-based system because of the increase of time linked to litter management (distribution, removal and litter care) in comparison with mechanical slurry disposal in slatted systems and consequently, with no need to manually clean the floor.

Bedding represents another relevant cost category for straw based systems particularly because its presence increases the labour needed to manage it; as a consequence, the rise in labour and straw costs goes to overweight lower housing costs (Bornett, 2002 and Gourmelen et al., 2000), resulting in higher costs of production when compared to slatted systems.

Table 69 summarizes the most significant differences among the RSTs under study as far as the main cost categories are concerned.

**Table 69: Main cost categories: comparison among the three relevant RSTs**

RST	Production costs		
	Total costs	Variable costs	Fixed costs
Fully slatted	intermediate	intermediate feed costs; no bedding costs	highest housing costs; lowest labour costs
Partly slatted	lowest	lowest feed costs; no bedding costs	intermediate housing costs; lowest labour costs
Straw based	highest	highest feed costs and bedding costs	lowest housing costs; highest labour costs

### Outdoor – Free range typology

The outdoor rearing system typology differs significantly from the RSTs considered so far, for a number of features. The outdoor RST offers, on average, 0,75 m<sup>2</sup> per pig in indoor resting area, plus outdoor pasture. A relevant example of outdoor housing is free range system where an outdoor shelter of light steel framework is constructed and covered by high ultra violet protective shade cloth. The shelter is partitioned into four identical quadrants that provide access to a separate paddock. The free range RST is an extensive fattening system with rather limited necessity of permanent structures, where the RSTs considered previously are intensive and feature substantial investments in buildings and equipment.

**Table 70: Variable costs: a comparison among the Free Range and indoor RSTs**

United Kingdom	Fully slatted	Partly slatted	Straw based	Free Range
	cent/kg cw	cent/kg cw	cent/kg cw	cent/kg cw
Feed	80,58	79,01	86,11	97,15
Breeding costs	2,10	2,31	2,00	1,37
Veterinary & Medicines	4,26	4,68	4,04	2,77
Energy	5,54	5,54	1,28	0,00
Maintenance	9,95	9,79	11,09	12,61
Levies, insurance, inspection	3,72	3,66	4,14	4,71
Miscellaneous	13,10	12,89	14,60	16,59
<b>Total Variable Costs</b>	<b>119,25</b>	<b>117,87</b>	<b>123,25</b>	<b>135,19</b>

From the above comparison, it can be noted that the free range system has the highest variable cost among the RSTs under study.

This significant difference in variable costs can be explained mainly by the rise in feed costs, due to the increase in food conversion ratio (FCR) for pigs kept outdoor, in comparison with indoor systems (Edwards, 1999); this occurs mainly because of the higher levels of activity (Edwards, 1996) and of the increase in energy needed to maintain body temperature. Bedding also represents another relevant cost category for outdoor systems, likewise straw based RST.

The additional feed and litter costs are hence the cause of an higher variable production cost for outdoor typologies, in comparison with the indoor ones, as they more than offset the lower labour<sup>26</sup> and housing costs.

This relevant disadvantage of the free range RST in terms of variable costs, i.e. difficulties in covering even relatively low fixed costs (at least with the present pigmeat price levels), and also its extensive nature make it unsuitable for a large-scale implementation and a widespread diffusion: this is particularly true in agricultural realities characterised by significant constraints in terms of space availability, like the ones that can be found in most Member States.

### *B.2.1.3 Summary*

It can be observed through the analysis of the data featured in tables from 62 to 67 that in almost all the Member States under study the lowest production costs are found in the partly-slatted systems, while the highest ones are found in the straw based systems. This happens because the increase in feed, labour and litter costs (besides the additional costs associated with a proper litter management) in the straw based systems more than offset the reduction of the costs associated to buildings and equipment that can be observed in straw based systems in comparison with the more intensive RSTs, which feature a totally or partly slatted floor.

The relative weight of labour costs on total costs is on average 17,74% for straw based systems, in comparison with 9,16% and 9,73% for fully-slatted and partly-slatted systems, respectively.

Generally speaking, if one assumes equal to 100 the production cost associated to the fully-slatted RST, it can be observed that the partly-slatted RST's production costs fall in the 92-101% range (Sweden: 92,08%, Spain: 100,63%), while the straw-based RST's production costs fall in the 101-106% range (100,96% in Sweden and 106,30% in the United Kingdom).

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<sup>26</sup> In the outdoor system, labour costs are lower in comparison to indoor systems, because manure is left in situ or burned and the huts are not cleaned but moved to a new site at the end of each cycle.

### B.3 Assessment of the impacts resulting from different scenarios

#### B.3.1 Relationship between space allowance and production cost in the different RSTs (space allowance and RSTs)

##### B.3.1.1 Methodology

In order to evaluate the relationship between the space allowance for rearing pig (farming weaners and pigs kept for fattening) and the production cost in the different RSTs, we will use a simulation model, which was built to put in relation the various cost items with the space allowance per pig.

The main assumptions at the basis of this model are:

1. basic cost items are those at § B.2;
2. the cost breakdown features the following cost categories (see Box A.2.1. pag. 45):

n°	Costs/revenue categories	Components
1	Revenue	Revenue
2	Variable costs	Feed
		Breeding costs
		Veterinary and medicines
		Energy
		Maintenance
		Levies, insurances and inspection
		Miscellaneous, which includes bedding costs
3=1-2	Gross margin	Gross Margin
4	Fixed costs	Labour
		Finance costs (Depreciation rate of machinery and buildings)
		Interest in working capital.
5=3-4	Profit/loss	

3. within the same RST, the unit fixed costs - housing costs and the cost of labour in particular - tend to increase as the space allowance for pig increases;
4. within the same RST, the food conversion ratio (FCR), remains steady as the space allowance per pig varies; equally, all cost items other than fixed costs do not vary, in their unit value, with the variation of space allowance per pig.

##### B.3.1.2 Selected allowance and RST combinations (microeconomic level)

The combinations between space allowance per pig and RSTs, selected to carry out the simulation, are described in table 71.

The combinations are based on the following assumptions:

- 1) Combinations are based on m<sup>2</sup>/100 kg pigs (live weight);
- 2) Definitions concerning fully slatted floor, partly slatted floor and straw flow systems are based on the description provided in paragraph A.1.2.1 (pag 33 and following).

- 3) “Combinations 0” represent either the minimum standards (0.65 m<sup>2</sup> for fully slatted floor) or the current practice (0.75 m<sup>2</sup> for partly slatted floor);
- 4) Combinations are based on EFSA recommendations.

The combinations between space allowance per pig and RSTs, selected to carry out the simulation, are described in the following table. Also the space allowance increases for sows and farming weaners are considered in the simulation: in table 71 below, two additional rows for each RST report the percentage increase in space allowance per sow and farming weaner, respectively.

**Table 71: RST combinations:**

**a) effect of increases in space allowance**

RST	Space per pig (m <sup>2</sup> /100 kg)			
	0,65	0,75	0,80	1,00
<b>Fully slatted</b>	X (combination 0)	x	x	x
<b>Partly Slatted</b>		X (combination 0)	x	x
<b>Straw flow</b>				X (combination 0)

**b) effect of the shift among RSTs**

RST	RST – Space per pig (m <sup>2</sup> /100 kg)			
	0,65	0,75	Partly Slatted 0,80	Strow flow 1,00
<b>Fully slatted</b>	X (combination 0)		x	
<b>Fully slatted</b>	X (combination 0)			x
<b>Partly slatted</b>		X (combination 0)		x

*B.3.1.3 Production costs variation in relation to space variation*

The tables 72 – 81 show the results of simulations.

**Table 72: Production cost variation in relation to the variation in space allowance: Denmark**

**a) effect of increases in space allowance**

RST	Costs	Space			
		0,65	0,75	0,80	1,00
<b>Fully slatted</b>	Total unit cost	144,00	151,28	154,92	169,47
	Variation total unit cost	0,00%	5,05%	7,58%	17,69%
	Total unit fixed costs	47,30	54,58	58,21	72,77
	Total unit variable costs	96,70	96,70	96,70	96,70
<b>Partly Slatted</b>	Total unit cost		134,98	137,60	148,06
	Variation total unit cost		0,00%	1,94%	9,69%
	Total unit fixed costs		39,24	41,86	52,32
	Total unit variable costs		95,74	95,74	95,74
<b>Straw flow</b>	Total unit cost				164,59
	Variation total unit cost				0,00%
	Total unit fixed costs				65,14
	Total unit variable costs				99,45

**b) effect of the shift among RSTs**

RST	Costs	0,65	0,75	Partly Slatt. 0,80	Strow flow 1,00
<b>Fully slatted</b>	Total unit cost	144,00		153,96	
	Variation total unit cost	0,00%		6,91%	
	Total unit fixed costs	47,30		58,21	
	Total unit variable costs	96,70		95,74	
<b>Fully slatted</b>	Total unit cost	144,00			164,59
	Variation total unit cost	0,00			14,30%
	Total unit fixed costs	47,30			65,14
	Total unit variable costs	96,70			99,45
<b>Partly slatted</b>	Total unit cost		134,98		164,59
	Variation total unit cost		0,00%		21,94%
	Total unit fixed costs		39,24		65,14
	Total unit variable costs		95,74		99,45

Costs in Euro cents per kg CW

**Table 73: Production cost variation in relation to the variation in space allowance: The Netherlands**

**a) effect of increases in space allowance**

RST	Costs	Space			
		0,65	0,75	0,80	1,00
<b>Fully slatted</b>	Total unit cost	148,51	155,99	159,72	174,67
	Variation total unit cost	0,00%	5,03%	7,55%	17,62%
	Total unit fixed costs	48,59	56,07	59,80	74,75
	Total unit variable costs	99,92	99,92	99,92	99,92
<b>Partly Slatted</b>	Total unit cost		139,54	142,24	153,02
	Variation total unit cost		0,00%	1,93%	9,66%
	Total unit fixed costs		40,43	43,13	53,91
	Total unit variable costs		99,11	99,11	99,11
<b>Straw flow</b>	Total unit cost				167,81
	Variation total unit cost				0,00%
	Total unit fixed costs				67,76
	Total unit variable costs				100,05

**b) effect of the shift among RSTs**

RST	Costs	0,65	0,75	Partly Slatt. 0,80	Strow flow 1,00
<b>Fully slatted</b>	Total unit cost	148,51		158,91	
	Variation total unit cost	0,00%		7,00%	
	Total unit fixed costs	48,59		59,80	
	Total unit variable costs	99,92		99,11	
<b>Fully slatted</b>	Total unit cost	148,51			167,81
	Variation total unit cost	0,00			13,00%
	Total unit fixed costs	48,59			67,76
	Total unit variable costs	99,92			100,05
<b>Partly slatted</b>	Total unit cost		139,54		167,81
	Variation total unit cost		0,00%		20,26%
	Total unit fixed costs		40,43		67,76
	Total unit variable costs		99,11		100,05

Costs in Euro cents per kg CW

**Table 74: Production cost variation in relation to the variation in space allowance: Germany**

**a) effect of increases in space allowance**

RST	Costs	Space			
		0,65	0,75	0,80	1,00
<b>Fully slatted</b>	Total unit cost	155,73	163,94	168,05	184,47
	Variation total unit cost	0,00%	5,27%	7,91%	18,46%
	Total unit fixed costs	53,38	61,59	65,70	82,12
	Total unit variable costs	102,35	102,35	102,35	102,35
<b>Partly Slatted</b>	Total unit cost		155,05	158,61	172,84
	Variation total unit cost		0,00%	2,30%	11,48%
	Total unit fixed costs		53,38	56,94	71,17
	Total unit variable costs		101,67	101,67	101,67
<b>Straw flow</b>	Total unit cost				177,81
	Variation total unit cost				0,00%
	Total unit fixed costs				75,35
	Total unit variable costs				102,46

**b) effect of the shift among RSTs**

RST	Costs	0,65	0,75	Partly Slatt. 0,80	Strow flow 1,00
<b>Fully slatted</b>	Total unit cost	155,73		167,37	
	Variation total unit cost	0,00%		7,47%	
	Total unit fixed costs	53,38		65,70	
	Total unit variable costs	102,35		101,67	
<b>Fully slatted</b>	Total unit cost	155,73			177,81
	Variation total unit cost	0,00			14,18%
	Total unit fixed costs	53,38			75,35
	Total unit variable costs	102,35			102,46
<b>Partly slatted</b>	Total unit cost		155,05		177,81
	Variation total unit cost		0,00%		14,68%
	Total unit fixed costs		53,38		75,35
	Total unit variable costs		101,67		102,46

Costs in Euro cents per kg CW

**Table 75: Production cost variation in relation to the variation in space allowance: France**

**a) effect of increases in space allowance**

RST	Costs	Space			
		0,65	0,75	0,80	1,00
<b>Fully slatted</b>	Total unit cost	141,73	149,16	152,87	167,73
	Variation total unit cost	0,00%	5,24%	7,86%	18,34%
	Total unit fixed costs	48,28	55,71	59,42	74,28
	Total unit variable costs	93,45	93,45	93,45	93,45
<b>Partly Slatted</b>	Total unit cost		132,75	135,42	146,09
	Variation total unit cost		0,00%	2,01%	10,05%
	Total unit fixed costs		40,03	42,70	53,37
	Total unit variable costs		92,72	92,72	92,72
<b>Straw flow</b>	Total unit cost				164,16
	Variation total unit cost				0,00%
	Total unit fixed costs				67,28
	Total unit variable costs				96,88

**b) effect of the shift among RSTs**

RST	Costs	0,65	0,75	Partly Slatt. 0,80	Strow flow 1,00
<b>Fully slatted</b>	Total unit cost	141,73		152,14	
	Variation total unit cost	0,00%		7,35%	
	Total unit fixed costs	48,28		59,42	
	Total unit variable costs	93,45		92,72	
<b>Fully slatted</b>	Total unit cost	141,73			164,16
	Variation total unit cost	0,00			15,83%
	Total unit fixed costs	48,28			67,28
	Total unit variable costs	93,45			96,88
<b>Partly slatted</b>	Total unit cost		132,75		164,16
	Variation total unit cost		0,00%		23,66%
	Total unit fixed costs		40,03		67,28
	Total unit variable costs		92,72		96,88

Costs in Euro cents per kg CW

**Table 76: Production cost variation in relation to the variation in space allowance: United Kingdom**

**a) effect of increases in space allowance**

RST	Costs	Space			
		0,65	0,75	0,80	1,00
<b>Fully slatted</b>	Total unit cost	164,60	171,58	175,07	189,02
	Variation total unit cost	0,00%	4,24%	6,36%	14,84%
	Total unit fixed costs	45,35	52,33	55,82	69,77
	Total unit variable costs	119,25	119,25	119,25	119,25
<b>Partly Slatted</b>	Total unit cost		156,49	159,06	169,36
	Variation total unit cost		0,00%	1,64%	8,22%
	Total unit fixed costs		38,61	41,18	51,48
	Total unit variable costs		117,88	117,88	117,88
<b>Straw flow</b>	Total unit cost				192,22
	Variation total unit cost				0,00%
	Total unit fixed costs				68,96
	Total unit variable costs				123,26

**b) effect of the shift among RSTs**

RST	Costs	0,65	0,75	Partly Slatt. 0,80	Strow flow 1,00
<b>Fully slatted</b>	Total unit cost	164,60		173,70	
	Variation total unit cost	0,00%		5,53%	
	Total unit fixed costs	45,35		55,82	
	Total unit variable costs	119,25		117,88	
<b>Fully slatted</b>	Total unit cost	164,60			192,22
	Variation total unit cost	0,00			16,78%
	Total unit fixed costs	45,35			68,96
	Total unit variable costs	119,25			123,26
<b>Partly slatted</b>	Total unit cost		156,49		192,22
	Variation total unit cost		0,00%		22,83%
	Total unit fixed costs		38,61		68,96
	Total unit variable costs		117,88		123,26

Costs in Euro cents per kg CW

**Table 77: Production cost variation in relation to the variation in space allowance: Italy**

**a) effect of increases in space allowance**

RST	Costs	Space			
		0,65	0,75	0,80	1,00
<b>Fully slatted</b>	Total unit cost	199,92	209,01	213,56	231,75
	Variation total unit cost	0,00%	4,55%	6,82%	15,92%
	Total unit fixed costs	59,11	68,20	72,75	90,94
	Total unit variable costs	140,81	140,81	140,81	140,81
<b>Partly Slatted</b>	Total unit cost		197,78	201,03	214,05
	Variation total unit cost		0,00%	1,65%	8,23%
	Total unit fixed costs		48,81	52,06	65,08
	Total unit variable costs		148,97	148,97	148,97
<b>Straw flow</b>	Total unit cost				232,71
	Variation total unit cost				0,00%
	Total unit fixed costs				78,03
	Total unit variable costs				154,68

**b) effect of the shift among RSTs**

RST	Costs	0,65	0,75	Partly Slatt. 0,80	Strow flow 1,00
<b>Fully slatted</b>	Total unit cost	199,92		221,72	
	Variation total unit cost	0,00%		10,90%	
	Total unit fixed costs	59,11		72,75	
	Total unit variable costs	140,81		148,97	
<b>Fully slatted</b>	Total unit cost	199,92			232,71
	Variation total unit cost	0,00			16,40%
	Total unit fixed costs	59,11			78,03
	Total unit variable costs	140,81			154,68
<b>Partly slatted</b>	Total unit cost		197,78		232,71
	Variation total unit cost		0,00%		17,66%
	Total unit fixed costs		48,81		78,03
	Total unit variable costs		148,97		154,68

Costs in Euro cents per kg CW

**Table 78: Production cost variation in relation to the variation in space allowance: Austria**

**a) effect of increases in space allowance**

RST	Costs	Space			
		0,65	0,75	0,80	1,00
<b>Fully slatted</b>	Total unit cost	165,46	173,94	178,18	195,15
	Variation total unit cost	0,00%	5,13%	7,69%	17,94%
	Total unit fixed costs	55,14	63,62	67,86	84,83
	Total unit variable costs	110,32	110,32	110,32	110,32
<b>Partly Slatted</b>	Total unit cost		156,37	159,48	171,94
	Variation total unit cost		0,00%	1,99%	9,96%
	Total unit fixed costs		46,70	49,81	62,27
	Total unit variable costs		109,67	109,67	109,67
<b>Straw flow</b>	Total unit cost				193,52
	Variation total unit cost				0,00%
	Total unit fixed costs				83,27
	Total unit variable costs				110,25

**b) effect of the shift among RSTs**

RST	Costs	0,65	0,75	Partly Slatt. 0,80	Strow flow 1,00
<b>Fully slatted</b>	Total unit cost	165,46		177,53	
	Variation total unit cost	0,00%		7,30%	
	Total unit fixed costs	55,14		67,86	
	Total unit variable costs	110,32		109,67	
<b>Fully slatted</b>	Total unit cost	165,46			193,52
	Variation total unit cost	0,00			16,96%
	Total unit fixed costs	55,14			83,27
	Total unit variable costs	110,32			110,25
<b>Partly slatted</b>	Total unit cost		156,37		193,52
	Variation total unit cost		0,00%		23,76%
	Total unit fixed costs		46,70		83,27
	Total unit variable costs		109,67		110,25

Costs in Euro cents per kg CW

**Table 79: Production cost variation in relation to the variation in space allowance: Spain**

**a) effect of increases in space allowance**

RST	Costs	Space			
		0,65	0,75	0,80	1,00
<b>Fully slatted</b>	Total unit cost	137,61	142,35	144,73	154,22
	Variation total unit cost	0,00%	3,45%	5,17%	12,07%
	Total unit fixed costs	30,84	35,58	37,96	47,45
	Total unit variable costs	106,77	106,77	106,77	106,77
<b>Partly Slatted</b>	Total unit cost		138,47	140,20	147,11
	Variation total unit cost		0,00%	1,25%	6,24%
	Total unit fixed costs		25,92	27,65	34,56
	Total unit variable costs		112,55	112,55	112,55
<b>Straw flow</b>	Total unit cost				160,11
	Variation total unit cost				0,00%
	Total unit fixed costs				44,93
	Total unit variable costs				115,18

**b) effect of the shift among RSTs**

RST	Costs	0,65	0,75	Partly Slatt. 0,80	Strow flow 1,00
<b>Fully slatted</b>	Total unit cost	137,61		150,51	
	Variation total unit cost	0,00%		9,37%	
	Total unit fixed costs	30,84		37,96	
	Total unit variable costs	106,77		112,55	
<b>Fully slatted</b>	Total unit cost	137,61			160,11
	Variation total unit cost	0,00			16,35%
	Total unit fixed costs	30,84			44,93
	Total unit variable costs	106,77			115,18
<b>Partly slatted</b>	Total unit cost		138,47		160,11
	Variation total unit cost		0,00%		15,63%
	Total unit fixed costs		25,92		44,93
	Total unit variable costs		112,55		115,18

Costs in Euro cents per kg CW

**Table 80: Production cost variation in relation to the variation in space allowance: Ireland**

**a) effect of increases in space allowance**

RST	Costs	Space			
		0,65	0,75	0,80	1,00
<b>Fully slatted</b>	Total unit cost	142,53	148,25	151,11	162,55
	Variation total unit cost	0,00%	4,01%	6,02%	14,05%
	Total unit fixed costs	37,18	42,90	45,76	57,20
	Total unit variable costs	105,35	105,35	105,35	105,35
<b>Partly Slatted</b>	Total unit cost		135,28	137,35	145,65
	Variation total unit cost		0,00%	1,53%	7,67%
	Total unit fixed costs		31,12	33,19	41,49
	Total unit variable costs		104,16	104,16	104,16
<b>Straw flow</b>	Total unit cost				160,88
	Variation total unit cost				0,00%
	Total unit fixed costs				52,40
	Total unit variable costs				108,48

**b) effect of the shift among RSTs**

RST	Costs	0,65	0,75	Partly Slatt. 0,80	Strow flow 1,00
<b>Fully slatted</b>	Total unit cost	142,53		149,92	
	Variation total unit cost	0,00%		5,18%	
	Total unit fixed costs	37,18		45,76	
	Total unit variable costs	105,35		104,16	
<b>Fully slatted</b>	Total unit cost	142,53			160,88
	Variation total unit cost	0,00			12,87%
	Total unit fixed costs	37,18			52,40
	Total unit variable costs	105,35			108,48
<b>Partly slatted</b>	Total unit cost		135,28		160,88
	Variation total unit cost		0,00%		18,92%
	Total unit fixed costs		31,12		52,40
	Total unit variable costs		104,16		108,48

Costs in Euro cents per kg CW

**Table 81: Production cost variation in relation to the variation in space allowance: Sweden**

**a) effect of increases in space allowance**

RST	Costs	Space			
		0,65	0,75	0,80	1,00
<b>Fully slatted</b>	Total unit cost	150,13	159,52	164,21	182,99
	Variation total unit cost	0,00%	6,25%	9,38%	21,89%
	Total unit fixed costs	61,02	70,41	75,10	93,88
	Total unit variable costs	89,11	89,11	89,11	89,11
<b>Partly Slatted</b>	Total unit cost		138,25	141,59	154,95
	Variation total unit cost		0,00%	2,42%	12,08%
	Total unit fixed costs		50,09	53,43	66,79
	Total unit variable costs		88,16	88,16	88,16
<b>Straw flow</b>	Total unit cost				171,68
	Variation total unit cost				0,00%
	Total unit fixed costs				80,40
	Total unit variable costs				91,28

**b) effect of the shift among RSTs**

RST	Costs	0,65	0,75	Partly Slatt. 0,80	Strow flow 1,00
<b>Fully slatted</b>	Total unit cost	150,13		163,26	
	Variation total unit cost	0,00%		8,75%	
	Total unit fixed costs	61,02		75,10	
	Total unit variable costs	89,11		88,16	
<b>Fully slatted</b>	Total unit cost	150,13			171,68
	Variation total unit cost	0,00			14,35%
	Total unit fixed costs	61,02			80,40
	Total unit variable costs	89,11			91,28
<b>Partly slatted</b>	Total unit cost		138,25		171,68
	Variation total unit cost		0,00%		24,18%
	Total unit fixed costs		50,09		80,40
	Total unit variable costs		88,16		91,28

Costs in Euro cents per kg CW

Within the same RST, the increase in space allowance results in a proportional increase in total production costs. The latter increase is caused by the increase in total unit fixed costs. As far as the shift among the different RSTs is concerned, two cases can be identified:

1. In the case of the shift from fully slatted to partly slatted RSTs, the production cost associated with the “converted” partly slatted RST is higher than the production cost associated with a partly slatted RST projected and built from the start as such, because part of the investment made to build the fully slatted RST cannot be recovered or re-used in the partly slatted RST. This notwithstanding, the conversion of a fully slatted stable into a partly slatted one is preferable to the construction of the latter from scratch, as the investment needed in the first case is lower. In other words, the investment required for the conversion is lower than the investment needed in the case of green field construction.
2. In the case of the shift from fully slatted or from partly slatted to straw flow RSTs, the “conversion” of the existing stable in a straw flow stable is technically difficult and non economical: it is indeed cheaper to project and build a straw flow stable from scratch, as the construction cost per m<sup>2</sup> of a straw flow stable is much lower than the cost of converting a m<sup>2</sup> of a fully or partly slatted stable to a m<sup>2</sup> of a straw flow one<sup>27</sup>.

### B.3.2 From farm to sector impact

In the previous paragraph we analysed the impact of increased animal welfare requirements on production cost. In this paragraph we go forward to evaluate the consequences of production cost variation at different levels, as described in the next table:

**Table 82: Level of analysis and impacts**

Level of analysis	Impact on:
Farm	- production cost - gross margin <sup>28</sup>
Sector	- production structure <sup>29</sup> - employment <sup>30</sup> - pigmeat supply <sup>31</sup>
Market	- EU pigmeat market equilibrium <sup>32</sup> - competitiveness of EU pigmeat in World markets <sup>33</sup>

<sup>27</sup> The research team – using a network of independent experts in a number of Member States - collected useful data and information on both the cost of conversion of a stable from one RST to another, and the cost of construction of a stable of a specific RST from scratch. According to such data and information, the costs of construction vary, depending on the different countries, from 400 to 500 euro per m<sup>2</sup> for the Fully slatted RST. The costs of conversion from a fully slatted RST to a partly slatted RST results to be lower than the investment needed in the case of green field construction. Finally the costs of conversion from a fully slatted RST or a partly slatted RST to a straw flow RST is higher than the investment needed in the case of green field construction.

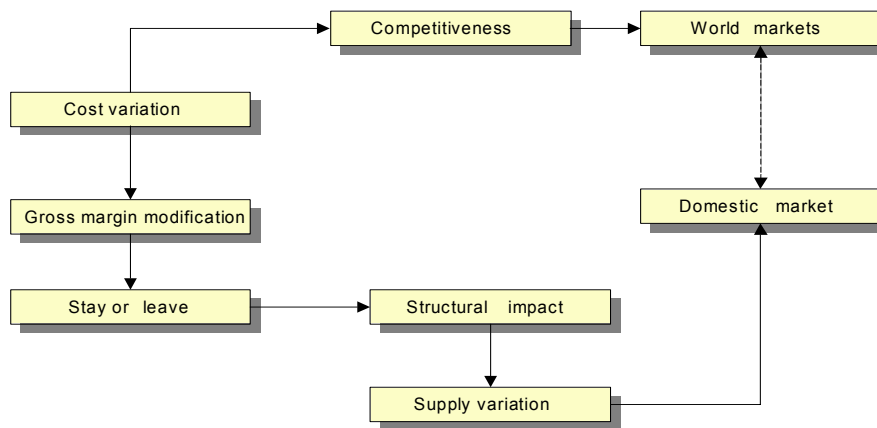
<sup>28</sup> Gross margin: is the difference between the value of production (revenue) and the variable cost (feed, breeding costs, veterinary and medicine, energy, etc.). See § B.3.1.1.

<sup>29</sup> Production structure: at sector level, is the number and the type of producing units or holdings.

<sup>30</sup> Employment: is the number of working units employed in the sector.

<sup>31</sup> Pig meat supply: is the supply of pig meat of the whole sector.

The rationale of the analysis and the links between the levels are shown in the figure below:



**Figure 22: General framework for impact analysis**

Cost variation primarily affects producer’s gross margin and gives the way to structural impact, on the basis of the farmer’s decision to stay in or leave the sector at the new regulatory conditions (enhanced animal welfare requirements). The structural effect may result in a variation of the sector’s performance in terms of pigmeat supply. This can determine an alteration of the current equilibrium on the EU pigmeat market (price variation related to the volume variation, also depending on the hypothesis about the degree of integration between the domestic and the world market). On the other side, the variation of the production cost alters the competitive position of EU pigmeat in the World market, also in relation with the equilibrium of the EU pigmeat market.

The analysis will be developed according to the scenario approach, based on the main rearing system typologies, described in the previous paragraphs. To draw realistic and meaningful scenarios we will apply a *one-step-ahead* process. This approach relies on the progressive increase of the animal welfare standards for the sector, obtained by both an increase of the space allowance and a shift among rearing system typologies. The conceptual background of the process is described in Box B.3.2.

<sup>32</sup> Market equilibrium: is the equilibrium of demand and supply at the market (or equilibrium) price. Variations of demand or (most often in our case) supply, imply variations of the market price, which synthetically describes the market equilibrium.

<sup>33</sup> Competitiveness: is the ability to compete in a market; it can be defined synthetically by a number of indicators, the production cost among them. The production cost is the bottom line of competition. This means that in a competitive market and in a long term equilibrium, price tends to equal production cost. In this view, the lower is the production cost, the higher is the possibility to compete (cost competitiveness). World wide comparison of cost competitiveness must also take into account the quality level as a mean of competition.

**Box B.3.2 - Data and assumptions of the *one-step-ahead* process for the simulation of scenarios**

The *one-step-ahead* process that we used to define the relevant scenarios takes into account few data and assumptions about the animal welfare characteristics of the different rearing system typologies, their diffusion within the sector and the likely behaviour of the farmers facing the change from the current situation. Data and assumptions are listed below.

**Data**

- a) The diffusion of the rearing system typologies in the sector. Fully slatted rearing system is the most diffused system in the EU. Partly slatted is a less diffused but relevant typology. Solid floor is generally rare (with some exceptions – see § A.1).
- b) The degree of animal welfare increases from (i) fully slatted to (ii) partly slatted and to (iii) solid floor/straw based rearing system; and also with the increase of space allowance, within any given typology.

**Assumptions**

- a) Given the technical specification of the different rearing system typologies, we assume that a change in space allowance per head is the easiest and less costly way to enhance animal welfare, if compared with the shift among typologies.
- b) Farmer's strategy towards enhanced animal welfare standards would primarily take into account the possibility to increase the space allowance in the system in use (whatever it is), instead of shifting to another rearing system typology.

We imagined three main kind of strategies that EU regulators could follow to induce a shift towards improved animal welfare standards in the pig sector.

***The adaptive strategy***

The adaptive strategy is mainly based on the modification of space allowance of the most diffused rearing system typology (fully slatted), which can also be associated with the lowest degree of animal welfare. This strategy is articulated in 3 scenarios (scenario 1, scenario 2 and scenario 3), based on a gradual increase in space allowance (see tab. 83).

***The evolutionary strategy***

In this case farms adopting fully slatted rearing systems are forced to change to partly slatted ones. This strategy is articulated in 2 different scenarios, featuring respectively: the shift from fully to basic partly slatted (scenario 4); and the same shift of typology together with enhanced space allowance (scenario 5). This is in fact an adaptive/evolutionary strategy. Compared to the former strategy, it marks one step ahead in the improvement of animal welfare standards.

***The radical strategy***

In this case, a change is forced from fully and partly slatted rearing systems towards the straw based one, which can be deemed as better as far as animal welfare standards are concerned.

All the scenarios are described in the next table (tab. 83).

**Table 83: Simulation scenarios**

<b>Strategy</b>	<b>Scenario</b>	<b>Basic elements of the scenario</b>	<b>Global result of the scenario</b>
<i>adaptive</i>	1	Increase of space allowance in the fully slatted rearing system	Farms adopting fully slatted rearing system change space allowance from the current standard (0,65 m <sup>2</sup> /head) to 0.75 m <sup>2</sup> /head. The other existing rearing system typologies do not change.
	2	Increase of space allowance in the fully slatted rearing system	Farms adopting fully slatted rearing system change space allowance from the current standard (0,65 m <sup>2</sup> /head) to 0.80 m <sup>2</sup> /head. The other existing rearing system typologies do not change.
	3	Increase of space allowance in the fully slatted rearing system	Farms adopting fully slatted rearing system change space allowance from the current standard (0,65 m <sup>2</sup> /head) to 1.00 m <sup>2</sup> /head. The other existing rearing system typologies do not change.
<i>evolutionary</i>	4	Fully slatted rearing systems shift towards partly slatted ones (1)	Farms adopting basic fully slatted rearing system standard (0,65 m <sup>2</sup> /head) change into basic partly slatted typology (0,75 m <sup>2</sup> /head). The other existing rearing system typologies do not change.
	5	Fully slatted and partly slatted rearing systems shift towards improved partly slatted ones (1)	Farms adopting basic fully slatted (0,65 m <sup>2</sup> /head) and basic partly slatted (0,75 m <sup>2</sup> /head) rearing systems shift toward partly slatted with enhanced space allowance (0,80 m <sup>2</sup> /head). The other existing rearing system typologies do not change.
<i>radical</i>	6	Fully slatted and partly slatted rearing systems shift towards straw based rearing systems	Farms adopting basic fully slatted (0,65 m <sup>2</sup> /head) and basic partly slatted (0,75 m <sup>2</sup> /head) rearing systems shift towards the basic straw based rearing system (1 m <sup>2</sup> /head)

(1)The shift from one RSTs to another rearing system is based on the full reconstruction cost of all the buildings.

The adaptive scenarios (scenarios 1, 2 and 3) do not necessarily need farm investments to comply with enhanced animal welfare requirements. In fact, the improvement of space allowance, within a given rearing system typology, can be obtained by reducing the number of reared pigs. Evolutionary and radical scenarios (scenario 4, 5 and 6), require investments anyway, because the shift from one to another rearing system implies a modification of the rearing system itself (even if space allowance does not change).

The impacts (on the sector, on the market equilibrium, etc.) are described separately for each scenario in tables 84, 85, 86, 87, 88 and 89.

The development of the impact analysis scheme, according to the above described process, requires economic evaluations and assumptions that are described analytically in the Annex I.

### B.3.2.1 Assessment of the impacts

The next tables (tables 84, 85, 86, 87, 88 and 89) report the main results of the assessment of the impacts through the scenario analysis. Given the complexity of the subject, Box 3.2.1 provides a guide for a better understanding.

<b>Box 3.2.1 – Guide to scenario report tables</b>		
Scenario report tables report the main result of the scenario simulation. They are drawn for each scenario. Information are quantitative and qualitative, according to the pertinence of the subject and to the availability of the data.		
<b>Column</b>	<b>Column heading</b>	<b>Description</b>
1	<b>Level of analysis</b>	The level at which the impact is analysed, namely: <ul style="list-style-type: none"> <li>- the farm level</li> <li>- the sector level</li> <li>- the market level</li> </ul>
2	<b>Impact</b>	It reports on the main variables of the impact, that is: <ul style="list-style-type: none"> <li>- at the farm level: costs, gross margins</li> <li>- at sector level: the impact on the production structure (number and size of the holdings), employment, pigmeat supply</li> <li>- at market level: the trend of selling price in the EU market; the competitive position of EU pigmeat in the world markets</li> </ul>
3	<b>Reference scenario (Scenario 0)</b>	It reminds the value of the impact variables (or the situation) at each level of impact <i>before</i> the simulation of the <i>Scenario X</i> (reported in column 4). This column is in fact the description of the current situation, that we call <i>Scenario 0</i> . It is reported in each table and is split into 2 sub-columns, that report respectively on:
<i>3a</i>	<b><i>Historical trend</i></b>	The trend that has characterised the sector in the years before (where available). This sub-column may include a short explanation or description.
<i>3b</i>	<b><i>Current situation</i></b>	The current situation, as a result of the historical trend. This is the real <i>Scenario 0</i>
4	<b>Scenario X</b>	It reports on the result of the simulation scenario, at each level, for each impact variable. This column is split into 2 sub-columns:
<i>4a</i>	<b><i>Short period</i></b>	It reports on the consequences of the scenario over a <i>short term perspective</i> . In other words, the short period assumption occurs when new standards of animal welfare are applied; farmers' gross margins have declined, but farmers have not yet modified (increased) the dimension of the herd, to counterbalance the decrease in the gross margin
<i>4b</i>	<b><i>New equilibrium</i></b>	It reports on the consequences of the scenario when farmers have reacted to the change in animal welfare regulations ( <i>long term perspective</i> ). This is done applying adequate countermeasures to re-establish a level of gross margin comparable with the one before the application of new animal welfare standards (e.g. by increasing the dimension of the herd by a number of pigs adequate to re-establish the level of gross margin).
The <b>bottom row</b> (Notes) gives light about particular outcomes or cases rising from the scenario simulation, in particular in those cases (generally concerning individual countries) that do not follow the general trend.		

Tables are conceived for each scenario and provide qualitative and/or quantitative data for the main variables, according to the subject.

**Table 84: Impact assessment – scenario 1 (see table 83 pag. 108)**

Level of analysis	Impact on	Reference scenario – scenario 0		Scenario 1	
		Trend	Present situation	Short period	New equilibrium
<b>Farm</b>	Costs	Increase in costs (from 0 to 15% depending on the country, from 2000 to 2004)	From 139 to 164 Euro/100 kg dead weight depending on the country	Increase in production average unit costs (from +0,76% to +4,19% depending on the country)	
	Gross margin			Reduction in gross margin (from -2% to -10,67% depending on the country)	Recovery of the initial gross margin by an increase in the average farm size
<b>Sector</b>	Production structure	Increase in the average farm size (from +40 to +160% heads per holding, depending on the country)	From 17 to 690 pigs per holding depending on the country		Increase in the average farm size aimed at recovering the initial gross margin (from +2,31% to +12,31%).
	Employment	Reduction in the number of workers employed			Reduction in the number of workers employed following the increase in productivity achieved through the increase in the average farm size (from -2% to -12% depending on the country).
	Pigmeat supply	Increase in supply, with the exception of the Netherlands and the UK	18 million tons in the first 10 countries	Slight reduction in supply	General stability of supply/slight reduction in supply
<b>Market</b>	EU pigmeat market equilibrium	Progressive reduction in pigmeat prices (see table n. 21)	From 110 to 150 Euros per 100 kg		General stability of pigmeat prices
	Competitiveness of EU pigmeat in the World markets	Slight increase in exports over the last 5 years (+2,8%)	2 billions Euros	Slight decrease in exports	Slight decrease in export
The impacts of scenario 1 would be particularly marked in Denmark, France and Ireland due to the high presence of fully slatted systems. The Netherlands would be the least affected country, because of the high presence of partly slatted systems (see the annex 2 to chapter B3 showing the indicators by country).					

**Table 85: Impact assessment – scenario 2**

Level of analysis	Impact on	Reference scenario – scenario 0		Scenario 2	
		Trend	Present situation	Short period	New equilibrium
Farm	Costs	Increase in costs (from 0 to 15% depending on the country, from 2000 to 2004)	From 139 to 164 Euro/100 kg dead weight depending on the country	Increase in production average unit costs (from +1,13% to +6,29% depending on the country)	
	Gross margin			Reduction in gross margin (from -2,81% to -15,00% depending on the country)	Recovery of the initial gross margin by an increase in the average farm size
Sector	Production structure	Increase in the average farm size (from +40 to +160% heads per holding, depending on the country)	From 17 to 690 pigs per holding depending on the country		Increase in the average farm size aimed at recovering the initial gross margin (from +3,5% to +18,5%).
	Employment	Reduction in the number of workers employed			Reduction in the number of workers employed following the increase in productivity achieved through the increase in the average farm size (from -2% to -15% depending on the country).
	Pigmeat supply	Increase in supply, with the exception of the Netherlands and the UK	18 million tons in the first 10 countries	Reduction in supply	Slight reduction in supply
Market	EU pigmeat market equilibrium	Progressive reduction in pigmeat prices (see table n.21)	From 110 to 150 Euros per 100 kg		General stability of pigmeat prices
	Competitiveness of EU pigmeat in the World markets	Slight increase in exports over the last 5 years (+2,8%)	2 billions Euros	Decrease in exports	Decrease in export
<p>The impacts of scenario 2 would be particularly marked in Denmark, France and Ireland due to the high presence of fully slatted systems. The Netherlands would be the least affected country, because of the high presence of partly slatted systems (see the annex 2 to chapter B3 showing the indicators by country).</p>					

**Table 86: Impact assessment – scenario 3**

Level of analysis	Impact on	Reference scenario – scenario 0		Scenario 3	
		Trend	Present situation	Short period	New equilibrium
<b>Farm</b>	Costs	Increase in costs (from 0 to 15% depending on the country, from 2000 to 2004)	From 139 to 164 Euro/100 kg dead weight depending on the country	Increase in production average unit costs (from +2,64% to +14,67% depending on the country)	
	Gross margin			Reduction in gross margin (from -5,25% to -28% depending on the country)	Recovery of the initial gross margin by an increase in the average farm size
<b>Sector</b>	Production structure	Increase in the average farm size (from +40 to +160% heads per holding, depending on the country)	From 17 to 690 pigs per holding depending on the country		Increase in the average farm size aimed at recovering the initial gross margin (from +8,08% to +43,08%).
	Employment	Reduction in the number of workers employed			Reduction in the number of workers employed following the increase in productivity achieved through the increase in the average farm size (from -5% to -28% depending on the country).
	Pigmeat supply	Increase in supply, with the exception of the Netherlands and the UK	18 million tons in the first 10 countries	Relevant reduction in supply	Reduction in supply
<b>Market</b>	EU pigmeat market equilibrium	Progressive reduction in pigmeat prices (see table n.21)	From 110 to 150 Euros per 100 kg		General stability of pigmeat prices
	Competitiveness of EU pigmeat in the World markets	Slight increase in exports over the last 5 years (+2,8%)	2 billions Euros	Strong decrease in exports	Relevant decrease in export
<p>The impacts of scenario 3 would be particularly marked in Denmark, France and Ireland due to the high presence of fully slatted systems. The Netherlands would be the least affected country, because of the high presence of partly slatted systems (see the annex 2 to chapter B3 showing the indicators by country).</p>					

**Table 87: Impact assessment – scenario 4**

Level of analysis	Impact on	Reference scenario – scenario 0		Scenario 4	
		Trend	Present situation	Short period	New equilibrium
<b>Farm</b>	Costs	Increase in costs (from 0 to 15% depending on the country, from 2000 to 2004)	From 139 to 164 Euro/100 kg dead weight depending on the country		- Decrease in the average unit cost of production (from -0.13 to -5.07%, depending on the country) - Need to make investments to restructure the farms and to replace fully slatted floors with partly slatted ones
	Gross margin				Increase in gross margin (from +0.8% to +4.0% depending on the country)
<b>Sector</b>	Production structure	Increase in the average farm size (from +40 to +160% heads per holding, depending on the country)	From 17 to 690 pigs per holding depending on the country		- Increase in the average farm size: the investments needed to adapt the farms to the scenario will result in a selection process among farms - In principle, farms with the greatest investment capacity (generally the biggest ones) will remain in operation, while farms with less investment capacity will cease production
	Employment	Reduction in the number of workers employed			Reduction in the number of workers employed
	Pigmeat supply	Increase in supply, with the exception of the Netherlands and the UK	18 million tons in the first 10 countries		General stability of supply/slight decrease in supply
<b>Market</b>	EU pigmeat market equilibrium	Progressive reduction in pigmeat prices (see table n.21)	From 110 to 150 Euros per 100 kg		General stability of pigmeat prices
	Competitiveness of EU pigmeat in the World markets	Slight increase in exports over the last 5 years (+ 2,8%)	2 billions Euros		Slight decrease in export

The impacts of scenario 4 would be particularly marked in Denmark, France and Ireland due to the high presence of fully slatted systems. The Netherlands would be the least affected country, because of the high presence of partly slatted systems (see the annex 2 to chapter B3 showing the indicators by country).

**Table 88: Impact assessment – scenario 5**

Level of analysis	Impact on	Reference scenario – scenario 0		Scenario 5	
		Trend	Present situation	Short period	New equilibrium
<b>Farm</b>	Costs	Increase in costs (from 0 to 15% depending on the country, from 2000 to 2004)	From 139 to 164 Euro/100 kg dead weight depending on the country		- Variation of the average unit cost of production (from -1,86 to +3,34% depending on the country); - Need to make investments to restructure the farms and to replace fully slatted floors with partly slatted ones
	Gross margin				Decrease in gross margin (from -3,08% to -5,38% depending on the country)
<b>Sector</b>	Production structure	Increase in the average farm size (from +40 to +160% heads per holding, depending on the country)	From 17 to 690 pigs per holding depending on the country		- Increase in the average farm size: the investments needed to adapt the farms to the scenario will result in a selection process among farms - In principle, farms with the greatest investment capacity (generally the biggest ones) will remain in operation, while farms with less investment capacity will cease production
	Employment	Reduction in the number of workers employed			Reduction in the number of workers employed
	Pigmeat supply	Increase in supply, with the exception of the Netherlands and the UK	18 million tons in the first 10 countries		Slight decrease/decrease in supply
<b>Market</b>	EU pigmeat market equilibrium	Progressive reduction in pigmeat prices (see table n.21)	From 110 to 150 Euros per 100 kg		General stability of pigmeat prices/increase
	Competitiveness of EU pigmeat in the World markets	Slight increase in exports over the last 5 years (+2,8%)	2 billions Euros		Decrease in exports

The impacts of scenario 5 would be particularly marked in Denmark, France and Ireland due to the high presence of fully slatted systems. The Netherlands would be the least affected country, because of the high presence of partly slatted systems (see the annex 2 to chapter B3 showing the indicators by country).

**Table 89: Impact assessment – scenario 6**

Level of analysis	Impact on	Reference scenario – scenario 0		Scenario 6	
		Trend	Present situation	Short period	New equilibrium
<b>Farm</b>	Costs	Increase in costs (from 0 to 15% depending on the country, from 2000 to 2004)	From 139 to 164 Euro/100 kg dead weight depending on the country		- Increase in the average unit cost of production (from +8,68% to +15,78% depending on the country) - Need to make investments to restructure the farms
	Gross margin				- Decrease in gross margin (from -22,55% to -30,75% depending on the country) as a consequence of the increase in variable costs (feed costs and litter costs in particular) - Increase in the use of labour and increase of the related costs - Gross margin unable to cover labour costs fully (labour cost coverage levels vary between 50 and 70%)
<b>Sector</b>	Production structure	Increase in the average farm size (from +40 to +160% heads per holding, depending on the country)	From 17 to 690 pigs per holding depending on the country		- High reduction in the number of holdings, - Production structure becomes bi-polarized
	Employment	Reduction in the number of workers employed			Marked reduction in the number of workers employed
	Pigmeat supply	Increase in supply, with the exception of the Netherlands and the UK	18 million tons in the first 10 countries		Strong decrease in supply
<b>Market</b>	EU pigmeat market equilibrium	Progressive reduction in pigmeat prices (see table n.21)	From 110 to 150 Euros per 100 kg		Increase in pigmeat prices
	Competitiveness of EU pigmeat in the World markets	Slight increase in exports over the last 5 years (+2,8%)	2 billions Euros		Very strong decrease in exports

The impacts of scenario 6 would be slightly very strong in all Member States (see the annex 2 to chapter B3 showing the indicators by country).

In the next paragraph we provide:

- a synthetic description of the results for each scenario
- a description of the overall results, grouping similar scenarios and trends.

Comments are focused on farm, sector and domestic market level. The effects of the competitive position of the EU in the world market will be treated separately.

### **Impact at farm, sector and domestic market level**

#### ***Scenario 1***

In the short period, scenario 1 results in an increase of unit cost (between 0,76 and 4,19% according to the country). The decrease of the number of reared pigs leads to a loss of gross farm margin between 2,00 and 10,67%, (due to the reduction of output and to an increase of fixed cost per unit). At sector level, production might fall slightly, with no relevant consequences on the domestic market equilibrium.

In the new market equilibrium situation, the re-establishment of the gross margin level would push farmers to increase holding dimensions in a measure that is now appreciable (2 to 12%). By this way they will re-establish the gross margin of the scenario 0, but not all farmers will be able to do that, even if investment may be considered marginal in relation to the dimension of the holding. Structural dynamic will accelerate to maintain the global level of the offer. The number of holdings would decrease consequently, assuming a stable/slightly decreasing supply in the long term.

The different diffusion of fully slatted rearing system within EU contributes to enhance the scenario's impacts in some countries (Denmark, France and Ireland) and to attenuate them in others (The Netherlands).

#### ***Scenario 2***

In the short period, unit cost increases by 1,13-6,29% in this scenario, with a significant loss of gross margin between -2,81 and -15,00%. At sector level, production may fall meaningfully. In the new equilibrium, the re-establishment of the gross margin level is obtained at the cost of restructuration stronger than scenario 1, with a structural push between 3,5 and 18,5%. Consequently, the number of workers may fall by -2 to -15%. After the structural adjustment, sector pigmeat supply would be slightly lower anyway. Together with the increase of production cost, this will lead to a loss of competitiveness.

#### ***Scenario 3***

The results of this scenario follow the trend of scenario 1 and 2, with much grater effects on all the impact indicators (production cost, gross margin, etc.).

### **Scenario 4<sup>34</sup>**

This scenario results in a decrease of the production cost up to 5% and a consequent rise of the gross margin up to 4%. This can be obtained at the cost of relevant investments to shift from fully and basic partly slatted to improved partly slatted rearing system. The access to investment is the critical factor of this scenario, that will favour the holdings with a greater economic gross margin, which are usually the largest ones. The structural trend is submitted to a relevant push that will reduce the number of people working in the sector. Supply would not change/slightly decrease, thanks to the structural adjustment, in the long run.

### **Scenario 5**

Cost of production in this scenario varies among Member States, marking a significant reduction in Ireland, Denmark and France (from - 1,6 to -3,3%), versus an increase in Germany (+ 1,93%). The gross margin decreases from -3,0 to -5,4%. The same forces we encountered in the former scenario also play in this case, but with a major effect on gross margin. This negative situation adds to the critical factor of the access to the investment, that still remains and reinforces its influence. This turns in a stronger structural push, in comparison with scenario 3, with stronger effects on employment, on one side, and sector supply, on the other one. Supply may fall in the long run due to the strong economic selection.

### **Scenario 6**

Scenario 6 requires pig farmers to shift from fully and partly slatted system directly to straw based rearing system. Production cost increase is between 8,68 and 15,78%. Gross margin also falls substantially, especially because of the lower feed conversion rate.

At sector level, the structural trend would be reverted. Larger holdings must apply stronger scale economies to improve work productivity (but this is possible if also technological innovation is available, which is a critical point, as straw based system is quite marginal at EU level); on the other side economic flexibility would favour family (smaller) holdings. The number of holdings would decrease and a change in the structural trend would appear (smaller holdings would increase or decrease less rapidly than in scenario 0; larger holdings would suffer from a strong structural push, that is an acceleration of the exit rate).

At sector level, the sector employment would decrease, and the pig meat production would fall substantially. In an open market, selling price would not rise significantly, but the competitive position of the EU pig meat on the world market could worsen substantially.

### **EU competitiveness in the world market**

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<sup>34</sup> - All the scenarios that impose a modification of the floor type (regardless the modification of space allowance) do not comply with the short period assumptions. The short period assumptions imply that farmers reduce the number of pigs to comply with enhanced standard of animal welfare (particularly increased space allowance), but they do not enlarge the dimension of the holding and of the herd. This means that in the short period farmers do not apply any investment. On the opposite, scenarios that impose to change the type of floor necessarily imply investments. As a consequence, these scenarios do not comply with the assumption of the short period. In economic terms, the difference between long and short period is determined by the possibility to apply or not apply investment (see also Box 3 under *short period* and *new equilibrium*).

Given the current situation, mainly described by the production cost comparison between countries and by the geographical distribution of export markets (see chapter A.4 and A.5), the effect of the scenarios is described in the Table 90.

Two factors may determine a change in the competitive position of the EU pigmeat.

- The effect on production cost (*pure cost competitiveness*). The production cost constitutes a benchmark that allows the comparison between the EU and the main competitors in the world market.
- The effect on domestic supply (*supply effect*). The variation of the domestic supply may alter the degree of self-sufficiency and, subsequently, the volume of product available for export. Considering that EU pigmeat market is not highly regulated, and that there is a strong degree of integration between the EU and the world market, a decrease in domestic pigmeat supply would result in a variation of the self sufficiency. This would imply, in turn, a re-positioning of the EU on the international market.

Table 90 gives light about the pure cost competitiveness for some of the main competitors of the EU (by Member States).

**Table 90: Total costs of pigmeat production, comparison among selected Member States and third countries (€100 kg live weight)**

Country (year)	present costs			variation in different scenarios					
	Reference currency for the base data	Reference currency / € conversion rate (1)	Costs (€100kg live weight)	scenario 1	scenario 2	scenario 3	scenario 4	scenario 5	scenario 6
Spain (2000)	Euro (2000)	1,00	96,00	1,72%	2,59%	6,03%	0,31%	1,56%	9,15%
Ireland (2000)	Euro (2000)	1,00	93,73	2,41%	3,61%	8,43%	-3,05%	-1,64%	11,11%
France (2000)	Euro (2000)	1,00	108,51	4,19%	6,29%	14,67%	-5,07%	-3,34%	15,78%
Denmark (2000)	Euro (2000)	1,00	102,11	2,88%	4,32%	10,08%	-3,57%	-1,86%	13,47%
The Netherlands (2000)	Euro (2000)	1,00	105,62	0,76%	1,13%	2,64%	-0,91%	0,97%	10,66%
Germany (2000)	Euro (2000)	1,00	109,43	1,58%	2,37%	5,54%	-0,13%	1,93%	12,42%
United Kingdom (2000)	Euro (2000)	1,00	115,66	1,61%	2,42%	5,64%	-1,87%	-0,67%	8,68%
United States (2001)	US \$ (2000)	0,9236	91,40						
Australia (2000)	Australian \$ (2000)	1,5889	88,55						
Brazil (2000)	US \$ (2000)	0,9236	67,56						

(1) Third countries: average annual bilateral exchange rate (units of national currency per Euro); source: European Central Bank, Monthly Bulletin

Source: Member States: Meat and Livestock Commission; USA: Iowa State University - Dept. Of Agricultural Economics; Australia: Australian Pork Limited; Brazil: Tortuga e FNP Consulting

Cost variation in scenarios 4 and 5 are not relevant. Scenario 2 and 3 have an appreciable effect, especially in some countries among which France and Denmark, but it is particularly scenario 6 that has the greatest impact on competitiveness, including for the major EU exporters. Scenario 4 results in a reduction of the production cost, that would be appreciable in some cases. Considering that export trend has held during the last 4 years (+2,8%), notwithstanding the unfavorable exchange rate, the pure cost competitiveness is only one of the relevant concern in this case.

Table 91 updates the data above with the notion of the supply effect for each scenario.

**Table 91: Impact on EU competitiveness**

<b>Scenario</b>	<b>Effects on:</b>		
	<b>production cost</b>	<b>domestic supply</b>	<b>competitiveness</b>
1 adaptive	++	v /-	-
2 adaptive	+++ geografical differentiation	-	--
3 adaptive	++++ geografical differentiation	--	---
4 evolutionary	-	v /-	v /-
5 evolutionary	-/v geographical differentiation	-	--
6 radical	++++++	-----	trend reversal

+ increase

- decrease

v stable/not relevant

Scenario 1 has a modest effect on production cost, that hardly affect domestics supply. In fact, a marginal increase of the structural dynamics could restore the former level of supply. The global effect on competitiveness would be modest as well, and would simply rely on the variation of the production cost. Scenario 2 reveals the same trend but with enhanced effects.

Scenarios 4 and 5 show a general reduction of the production costs. The need for investment in these scenarios would create an economic selection among the pig farms, with some effect on the global pigmeat supply, that could slightly fall, and with it pigmeat exports.

Scenario 6 has a very hard effect on production costs, that combines with a strong reduction of the supply. This scenario would not simply result in a lower degree of competitiveness but even in the need to import pigmeat from third countries to satisfy the EU demand (which is a reversal of the export trend in comparison with the scenario 0).

## **Section C – Analysis and policy recommendations**

## **C.1 Comparative analysis between factors deriving from animal welfare requirements on space allowances and floor types and other factors affecting production costs**

According to what specified in chapter B2, the increase of the space allowance per pig determines an increase of the production cost per unit (kg) of pigmeat. This increase, though varying among countries and according to different typologies of RST, usually hovers around 2% (of the total cost) for each increase of 0,05 square metres of space allowance per pig.

To better assess the increase of production cost deriving from animal welfare requirements, versus the increase in production cost deriving from other factors, the former has been expressed:

- in absolute terms (variation of the total unit cost);
- in terms of cereal cost increase equivalent (increase of the cereals price which would have determined the same variation of the total unit cost);
- in terms of labour cost increase equivalent (increase of the price of labour which would have determined the same variation of the total unit cost);
- in terms of building and finance costs increase equivalent (increase of the cost of building and finance which would have determined the same variation of the total unit costs).

In the following paragraphs we will therefore determine, for each combination of RST-space allowance, the increase of the cost of labour, cost of cereals and cost of building and finance which would equal the increase of cost due to the improvement of animal welfare conditions. This will allow us to assess whether:

- 1) the increase in production costs deriving from animal welfare requirements in the different space allowance and floor type combinations might be equalled by an increase in the cost of cereals which – in the light of the past dynamics of cereal prices (see § B.1.2.2) – can be deemed as likely, or at least plausible, in the near future;
- 2) the increase in production costs deriving from animal welfare requirements in the different space allowance and floor type combinations might be equalled by an increase in the cost of labour which – in the light of the past dynamics of agricultural wages (see § B.1.2.3) – can be deemed as likely, or at least plausible, in the near future;
- 3) the increase in production costs deriving from animal welfare requirements in the different space allowance and floor type combinations might be equalled by an increase in the cost of building and finance.

In other words, this will be a way to assess how much a plausible evolution of feed, labour costs or building and finance costs – independently from animal welfare requirements - would affect the competitiveness of the EU pig sector compared to the production cost increases deriving from the animal welfare measures under study in the different space allowance and floor type combinations, therefore assessing whether improved animal welfare requirements would be major or lesser factors affecting the competitiveness of the sector in comparison with feed, or labour, or finance and building costs.

**C.1.1 Comparative analysis: increase of cost due to the animal welfare requirements vs increase of cereals price and labour price**

The following tables show, for different Member States<sup>35</sup> and different RSTs, the increase of the total unit cost due to the implementation of increasing space allowances for pigs. This increase is also expressed in variation of cereals cost, labour cost and building and finance costs which would equal the increase in production costs caused by improvement of animal welfare conditions.

**Table 92: Denmark**

RST	Costs	Space			
		0,65	0,75	0,80	1,00
<b>Fully slatted</b>	Total unit cost	144,00	151,28	154,92	169,47
	Variation total unit cost	-	5,05%	7,58%	17,69%
	Variation cereal costs	-	10,81%	16,21%	37,82%
	Variation labour costs	-	55,22%	82,82%	193,26%
	Variation building costs	-	22,27%	33,40%	77,93%
<b>Partly Slatted</b>	Total unit cost		134,98	137,60	148,06
	Variation total unit cost		-	1,94%	9,69%
	Variation cereal costs		-	3,96%	19,81%
	Variation labour costs		-	19,85%	99,26%
	Variation building costs		-	9,95%	49,75%
<b>Straw based</b>	Total unit cost				164,59
	Variation total unit cost				-
	Variation cereal costs				-
	Variation labour costs				-
	Variation building costs				-

		0,65	0,75	Partly Slatt. 0,80	Strow flow 1,00
<b>Fully slatted</b>	Total unit cost	144,00		153,96	
	Variation total unit cost	-		6,91%	
	Variation cereal costs	-		14,78%	
	Variation labour costs	-		75,53%	
	Variation building costs	-		30,46%	
<b>Fully slatted</b>	Total unit cost	144,00			164,59
	Variation total unit cost	-			14,30%
	Variation cereal costs	-			30,58%
	Variation labour costs	-			156,24%
	Variation building costs	-			63,01%
<b>Partly slatted</b>	Total unit cost		134,98		164,59
	Variation total unit cost		-		21,94%
	Variation cereal costs		-		44,85%
	Variation labour costs		-		210,64%
	Variation building costs		-		112,61%

**Table 93: Netherlands**

<sup>35</sup> Also for this analysis, the Member States selected are the ones where the bulk of the EU-25 pigmeat production is obtained.

RST	Costs	Space			
		0,65	0,75	0,80	1,00
<b>Fully slatted</b>	Total unit cost	148,51	155,99	159,72	174,67
	Variation total unit cost	-	5,03%	7,55%	17,62%
	Variation cereal costs	-	10,89%	16,33%	38,11%
	Variation labour costs	-	53,55%	80,32%	187,42%
	Variation building costs	-	22,63%	33,94%	79,19%
<b>Partly Slatted</b>	Total unit cost		139,54	142,24	153,02
	Variation total unit cost		-	1,93%	9,66%
	Variation cereal costs		-	4,00%	20,02%
	Variation labour costs		-	19,31%	96,54%
	Variation building costs		-	10,14%	50,72%
<b>Straw based</b>	Total unit cost				167,81
	Variation total unit cost				-
	Variation cereal costs				-
	Variation labour costs				-
	Variation building costs				-

		0,65	0,75	Partly Slatt. 0,80	Strow flow 1,00
<b>Fully slatted</b>	Total unit cost	148,51		158,91	
	Variation total unit cost	-		7,00%	
	Variation cereal costs	-		15,15%	
	Variation labour costs	-		74,52%	
	Variation building costs	-		31,49%	
<b>Fully slatted</b>	Total unit cost	148,51			167,81
	Variation total unit cost	-			13,00%
	Variation cereal costs	-			28,11%
	Variation labour costs	-			138,25%
	Variation building costs	-			58,41%
<b>Partly slatted</b>	Total unit cost		139,54		167,81
	Variation total unit cost		-		20,26%
	Variation cereal costs		-		41,99%
	Variation labour costs		-		189,85%
	Variation building costs		-		106,40%

**Table 94: Germany**

RST	Costs	Space			
		0,65	0,75	0,80	1,00
<b>Fully slatted</b>	Total unit cost	155,73	163,94	168,05	184,47
	Variation total unit cost	-	5,27%	7,91%	18,46%
	Variation cereal costs	-	11,91%	17,86%	41,68%
	Variation labour costs	-	51,36%	77,04%	179,76%
	Variation building costs	-	22,79%	34,19%	79,78%
<b>Partly Slatted</b>	Total unit cost		155,05	158,61	172,84
	Variation total unit cost		-	2,30%	11,48%
	Variation cereal costs		-	5,26%	26,32%
	Variation labour costs		-	22,26%	111,28%
	Variation building costs		-	9,26%	46,30%
<b>Straw based</b>	Total unit cost				177,81
	Variation total unit cost				-
	Variation cereal costs				-
	Variation labour costs				-
	Variation building costs				-

		0,65	0,75	Partly Slatt. 0,80	Strow flow 1,00
<b>Fully slatted</b>	Total unit cost	155,73		167,37	
	Variation total unit cost	-		7,47%	
	Variation cereal costs	-		16,88%	
	Variation labour costs	-		72,79%	
	Variation building costs	-		32,30%	
<b>Fully slatted</b>	Total unit cost	155,73			177,81
	Variation total unit cost	-			14,18%
	Variation cereal costs	-			32,01%
	Variation labour costs	-			138,07%
	Variation building costs	-			61,27%
<b>Partly slatted</b>	Total unit cost		155,05		177,81
	Variation total unit cost		-		14,68%
	Variation cereal costs		-		33,66%
	Variation labour costs		-		133,42%
	Variation building costs		-		59,21%

**Table 95: France**

RST	Costs	Space			
		0,65	0,75	0,80	1,00
<b>Fully slatted</b>	Total unit cost	141,73	149,16	152,87	167,73
	Variation total unit cost	-	5,24%	7,86%	18,34%
	Variation cereal costs	-	10,27%	15,41%	35,95%
	Variation labour costs	-	52,38%	78,57%	183,34%
	Variation building costs	-	22,19%	33,29%	77,67%
<b>Partly Slatted</b>	Total unit cost		132,75	135,42	146,09
	Variation total unit cost		-	2,01%	10,05%
	Variation cereal costs		-	3,76%	18,82%
	Variation labour costs		-	18,82%	94,10%
	Variation building costs		-	9,91%	49,56%
<b>Straw based</b>	Total unit cost				164,16
	Variation total unit cost				-
	Variation cereal costs				-
	Variation labour costs				-
	Variation building costs				-

		0,65	0,75	Partly Slatt. 0,80	Strow flow 1,00
<b>Fully slatted</b>	Total unit cost	141,73		152,14	
	Variation total unit cost	-		7,35%	
	Variation cereal costs	-		14,40%	
	Variation labour costs	-		73,42%	
	Variation building costs	-		31,11%	
<b>Fully slatted</b>	Total unit cost	141,73			164,16
	Variation total unit cost	-			15,83%
	Variation cereal costs	-			31,01%
	Variation labour costs	-			158,18%
	Variation building costs	-			67,02%
<b>Partly slatted</b>	Total unit cost		132,75		164,16
	Variation total unit cost		-		23,66%
	Variation cereal costs		-		44,30%
	Variation labour costs		-		207,66%
	Variation building costs		-		116,67%

**Table 96: United Kingdom**

RST	Costs	Space			
		0,65	0,75	0,80	1,00
<b>Fully slatted</b>	Total unit cost	164,60	171,58	175,07	189,02
	Variation total unit cost	-	4,24%	6,36%	14,84%
	Variation cereal costs	-	8,66%	12,99%	30,30%
	Variation labour costs	-	43,74%	65,61%	153,10%
	Variation building costs	-	25,61%	38,42%	89,64%
<b>Partly Slatted</b>	Total unit cost		156,49	159,06	169,36
	Variation total unit cost		-	1,64%	8,22%
	Variation cereal costs		-	3,26%	16,29%
	Variation labour costs		-	16,14%	80,69%
	Variation building costs		-	11,75%	58,74%
<b>Straw based</b>	Total unit cost				192,22
	Variation total unit cost				-
	Variation cereal costs				-
	Variation labour costs				-
	Variation building costs				-

		0,65	0,75	Partly Slatt. 0,80	Strow flow 1,00
<b>Fully slatted</b>	Total unit cost	164,60		173,70	
	Variation total unit cost	-		5,53%	
	Variation cereal costs	-		11,29%	
	Variation labour costs	-		57,02%	
	Variation building costs	-		33,39%	
<b>Fully slatted</b>	Total unit cost	164,60			192,22
	Variation total unit cost	-			16,78%
	Variation cereal costs	-			34,28%
	Variation labour costs	-			173,17%
	Variation building costs	-			101,40%
<b>Partly slatted</b>	Total unit cost		156,49		192,22
	Variation total unit cost		-		22,83%
	Variation cereal costs		-		45,22%
	Variation labour costs		-		210,01%
	Variation building costs		-		163,08%

**Table 97: Italy**

RST	Costs	Space			
		0,65	0,75	0,80	1,00
<b>Fully slatted</b>	Total unit cost	199,92	209,01	213,56	231,75
	Variation total unit cost	-	4,55%	6,82%	15,92%
	Variation cereal costs	-	7,84%	11,76%	27,44%
	Variation labour costs	-	64,91%	97,36%	227,18%
	Variation building costs	-	21,89%	32,84%	76,62%
<b>Partly Slatted</b>	Total unit cost		197,78	201,03	214,05
	Variation total unit cost		-	1,65%	8,23%
	Variation cereal costs		-	2,64%	13,18%
	Variation labour costs		-	23,23%	116,13%
	Variation building costs		-	9,74%	48,70%
<b>Straw based</b>	Total unit cost				232,71
	Variation total unit cost				-
	Variation cereal costs				-
	Variation labour costs				-
	Variation building costs				-

		0,65	0,75	Partly Slatt. 0,80	Strow flow 1,00
<b>Fully slatted</b>	Total unit cost	199,92		221,72	
	Variation total unit cost	-		10,90%	
	Variation cereal costs	-		18,79%	
	Variation labour costs	-		155,61%	
	Variation building costs	-		52,48%	
<b>Fully slatted</b>	Total unit cost	199,92			232,71
	Variation total unit cost	-			16,40%
	Variation cereal costs	-			28,26%
	Variation labour costs	-			234,02%
	Variation building costs	-			78,93%
<b>Partly slatted</b>	Total unit cost		197,78		232,71
	Variation total unit cost		-		17,66%
	Variation cereal costs		-		28,30%
	Variation labour costs		-		233,72%
	Variation building costs		-		104,55%

**Table 98: Austria**

RST	Costs	Space			
		0,65	0,75	0,80	1,00
<b>Fully slatted</b>	Total unit cost	165,46	173,94	178,18	195,15
	Variation total unit cost	-	5,13%	7,69%	17,94%
	Variation cereal costs	-	11,52%	17,27%	40,31%
	Variation labour costs	-	43,55%	65,32%	152,42%
	Variation building costs	-	24,79%	37,18%	86,76%
<b>Partly Slatted</b>	Total unit cost		156,37	159,48	171,94
	Variation total unit cost		-	1,99%	9,96%
	Variation cereal costs		-	4,31%	21,55%
	Variation labour costs		-	15,98%	79,91%
	Variation building costs		-	11,31%	56,54%
<b>Straw based</b>	Total unit cost				193,52
	Variation total unit cost				-
	Variation cereal costs				-
	Variation labour costs				-
	Variation building costs				-

		0,65	0,75	Partly Slatt. 0,80	Strow flow 1,00
<b>Fully slatted</b>	Total unit cost	165,46		177,53	
	Variation total unit cost	-		7,30%	
	Variation cereal costs	-		16,39%	
	Variation labour costs	-		61,98%	
	Variation building costs	-		35,29%	
<b>Fully slatted</b>	Total unit cost	165,46			193,52
	Variation total unit cost	-			16,96%
	Variation cereal costs	-			38,09%
	Variation labour costs	-			144,03%
	Variation building costs	-			81,99%
<b>Partly slatted</b>	Total unit cost		156,37		193,52
	Variation total unit cost		-		23,76%
	Variation cereal costs		-		51,44%
	Variation labour costs		-		178,77%
	Variation building costs		-		134,93%

**Table 99: Spain**

RST	Costs	Space			
		0,65	0,75	0,80	1,00
<b>Fully slatted</b>	Total unit cost	137,61	142,35	144,73	154,22
	Variation total unit cost	-	3,45%	5,17%	12,07%
	Variation cereal costs	-	5,86%	8,79%	20,50%
	Variation labour costs	-	47,68%	71,53%	166,90%
	Variation building costs	-	23,78%	35,67%	83,24%
<b>Partly Slatted</b>	Total unit cost		138,47	140,20	147,11
	Variation total unit cost		-	1,25%	6,24%
	Variation cereal costs		-	2,01%	10,05%
	Variation labour costs		-	17,37%	86,83%
	Variation building costs		-	10,77%	53,86%
<b>Straw based</b>	Total unit cost				160,11
	Variation total unit cost				-
	Variation cereal costs				-
	Variation labour costs				-
	Variation building costs				-

		0,65	0,75	Partly Slatt. 0,80	Strow flow 1,00
<b>Fully slatted</b>	Total unit cost	137,61		150,51	
	Variation total unit cost	-		9,37%	
	Variation cereal costs	-		15,92%	
	Variation labour costs	-		129,62%	
	Variation building costs	-		64,65%	
<b>Fully slatted</b>	Total unit cost	137,61			160,11
	Variation total unit cost	-			16,35%
	Variation cereal costs	-			27,78%
	Variation labour costs	-			226,16%
	Variation building costs	-			112,80%
<b>Partly slatted</b>	Total unit cost		138,47		160,11
	Variation total unit cost		-		15,63%
	Variation cereal costs		-		25,17%
	Variation labour costs		-		203,93%
	Variation building costs		-		134,91%

**Table 100: Ireland**

RST	Costs	Space			
		0,65	0,75	0,80	1,00
<b>Fully slatted</b>	Total unit cost	142,53	148,25	151,11	162,55
	Variation total unit cost	-	4,01%	6,02%	14,05%
	Variation cereal costs	-	6,67%	10,00%	23,34%
	Variation labour costs	-	53,36%	80,04%	186,75%
	Variation building costs	-	23,38%	35,06%	81,81%
<b>Partly Slatted</b>	Total unit cost		135,28	137,35	145,65
	Variation total unit cost		-	1,53%	7,67%
	Variation cereal costs		-	2,47%	12,34%
	Variation labour costs		-	19,35%	96,77%
	Variation building costs		-	10,54%	52,71%
<b>Straw based</b>	Total unit cost				160,88
	Variation total unit cost				-
	Variation cereal costs				-
	Variation labour costs				-
	Variation building costs				-

		0,65	0,75	Partly Slatt. 0,80	Strow flow 1,00
<b>Fully slatted</b>	Total unit cost	142,53		149,92	
	Variation total unit cost	-		5,18%	
	Variation cereal costs	-		8,62%	
	Variation labour costs	-		68,94%	
	Variation building costs	-		30,20%	
<b>Fully slatted</b>	Total unit cost	142,53			160,88
	Variation total unit cost	-			12,87%
	Variation cereal costs	-			21,39%
	Variation labour costs	-			171,18%
	Variation building costs	-			74,99%
<b>Partly slatted</b>	Total unit cost		135,28		160,88
	Variation total unit cost		-		18,92%
	Variation cereal costs		-		30,44%
	Variation labour costs		-		223,88%
	Variation building costs		-		130,08%

**Table 101: Sweden**

RST	Costs	Space			
		0,65	0,75	0,80	1,00
<b>Fully slatted</b>	Total unit cost	150,13	159,52	164,21	182,99
	Variation total unit cost	-	6,25%	9,38%	21,89%
	Variation cereal costs	-	14,07%	21,11%	49,25%
	Variation labour costs	-	62,21%	93,32%	217,74%
	Variation building costs	-	21,18%	31,77%	74,12%
<b>Partly Slatted</b>	Total unit cost		138,25	141,59	154,95
	Variation total unit cost		-	2,42%	12,08%
	Variation cereal costs		-	5,11%	25,53%
	Variation labour costs		-	22,13%	110,65%
	Variation building costs		-	9,36%	46,82%
<b>Straw based</b>	Total unit cost				171,68
	Variation total unit cost				-
	Variation cereal costs				-
	Variation labour costs				-
	Variation building costs				-

		0,65	0,75	Partly Slatt. 0,80	Strow flow 1,00
<b>Fully slatted</b>	Total unit cost	150,13		163,26	
	Variation total unit cost	-		8,75%	
	Variation cereal costs	-		19,68%	
	Variation labour costs	-		87,02%	
	Variation building costs	-		29,62%	
<b>Fully slatted</b>	Total unit cost	150,13			171,68
	Variation total unit cost	-			14,35%
	Variation cereal costs	-			32,30%
	Variation labour costs	-			142,81%
	Variation building costs	-			48,61%
<b>Partly slatted</b>	Total unit cost		138,25		171,68
	Variation total unit cost		-		24,18%
	Variation cereal costs		-		51,11%
	Variation labour costs		-		207,69%
	Variation building costs		-		93,75%

Generally speaking, the increases in the cereals' cost supposed to equal the increase of production costs due to animal welfare requirements, vary from a minimum of 5% to a maximum of about 51% with respect to the current price.

As for the labour cost, the increase supposed to equal the increase of production costs due to animal welfare requirements, generally vary between 15 and 230% depending on the RST and the "level" of the requirement (space allowance).

With respect to the building and finance cost, the increases which can equal the increases in production costs due to animal welfare requirements fall within a 9% - 163% range depending on the RST and the "level" of the requirement (space allowance).

**Table 102: Variation ranges of the increases in production costs (for cereals, labour or building) which would equal the increase of animal welfare related costs**

RST	Costs	Space			
		0,65	0,75	0,80	1,00
<b>Fully slatted</b>	Variation total unit cost		3-5%	5-8%	12-18%
	Variation cereal costs		6-12%	8-17%	20-41%
	Variation labour costs		43-64%	65-97%	152-227%
	Variation building costs		21-25%	32-38%	77-86%
<b>Partly Slatted</b>	Variation total unit cost			1-2%	6-11%
	Variation cereal costs			2-5%	10-26%
	Variation labour costs			15-23%	79-116%
	Variation building costs			9-11%	46-58%
<b>Straw based</b>	Variation total unit cost				
	Variation cereal costs				
	Variation labour costs				
	Variation building costs				

		0,65	0,75	Partly Slatt. 0,80	Strow flow 1,00
<b>Fully slatted</b>	Variation total unit cost			5-10%	
	Variation cereal costs			8-18%	
	Variation labour costs			57-155%	
	Variation building costs			30-64%	
<b>Fully slatted</b>	Variation total unit cost				12-16%
	Variation cereal costs				21-38%
	Variation labour costs				138-234%
	Variation building costs				58-112%
<b>Partly slatted</b>	Variation total unit cost				14-23%
	Variation cereal costs				28-51%
	Variation labour costs				133-233%
	Variation building costs				59-163%

As far as the increase in cereals' cost is concerned, in § B.1.2.2 we highlighted that in the 1996-2003 period the levels of cereals' prices in nominal terms were generally decreasing, albeit with some exceptions, particularly in the 2000-2003 period. While increases up to 25% in the price of determined types of cereals have occurred in specific markets in the recent past, it is not likely that such increases will occur for all the types of cereals in all the Member States in the foreseeable future. However, increases up to 10% cannot be deemed unlikely, as they have indeed occurred (see tables 53-57 in § B.1.2.2) in the 2000-2003 period in a good number of Member States. This is especially true for Member States - like Spain - with a substantial cereal deficit, which are also at a relevant distance from cereal surplus areas and/or from the main ports of entry for cereals in the EU.

Looking at the figures in the tables 92-101 above, it is plausible to think that animal-welfare related production cost increases within the 0-10% range, like the ones generally occurring in gradual transformations, could be of equal or lesser importance than production cost increases due to plausible increases in cereal prices.

In the case of more radical transformations, however, the impact on production costs deriving from improved animal welfare requirements would be of greater importance than the impact on production costs of a plausible increase in cereal prices.

Coming to the increases in the cost of labour, in § B.1.2.3 we have pointed out that in the 2000-2003 period the dynamics of the agricultural wages index have been characterized by increases up to 10% (see table 58 in § B.1.2.3). Therefore, it is plausible to think that increases of similar extent are going to occur in the foreseeable future. As the magnitude of a realistic increase in agricultural wages is the same as for a realistic increase in cereal prices (10%), the same considerations developed for cereals apply also in this case.

Finally, in the case of building and finance costs, no adequate data series are available to describe their dynamics over time. However, it can be deemed plausible that such costs are not affected, due to their very nature, by the volatility which characterises, for instance, cereal costs.

### ***C.1.2 Summary***

Summarising, it is plausible to think that the impact on the competitiveness of the EU pig sector by the introduction of animal welfare requirements causing increases in production cost within the 0-10% range would be of lesser importance, or at most equal, to the impact on production cost that might be caused by realistic increases in the price of cereals and/or in the level of agricultural wages in the foreseeable future. Should the improved animal welfare requirements imply more radical transformations, i.e. such that the increase in production costs would be higher than 10%, it is unlikely that an increase in the price of cereals and/or in the agricultural wages could cause on production costs more relevant effects than the new animal welfare requirements: in this case, the extent of the increase in the price of cereals and/or in the agricultural wages needed to equal the animal-welfare related increase in production costs would indeed be non plausible in the light of the past dynamics of cereals' prices and of agricultural wages.

## **C.2 Conclusions and policy recommendations**

### *1. Recall of the general plot*

Based on the results of the former chapters of the study, in the next pages we will put forward some ideas about the possible strategies to face the consequences of enhanced animal welfare standards that we will refer to as *policy innovation*. The aim of this chapter is to conclude on a clear and simple understanding of the measures that should go together with the implementation of the policy innovation, also with a view at minimizing the negative impacts on the sector. In this respect, each scenario should be considered an option of policy innovation in the field of animal welfare concerning space allowance and floor type.

To structure the reasoning, some preliminary steps are required to provide the basic elements for the identification of the strategies. Given the number and the complexity of the scenarios, we will firstly group them according to their basic characteristics. Secondly, we will identify the major issues that are at the core of the problem. Finally, we will define the basic elements to be taken into account for the strategies.

This general approach supplies the basic concepts for the next step, which focuses on the scenarios according to the level of intervention. The result of this step is the identification of the relevant measure to be applied at the different level of the socio-economic system involved (farm, supply chain, consumer, world market).

### *2. Basic elements for policy strategies related to the scenario's impacts*

In the next paragraphs, we will recall the relevant impacts of the scenarios. Impacts on farmers' revenue and employment, sector structure and supply, and international competitiveness will be examined in particular. A time perspective (short vs. long term effect) and farmers' behaviour will be taken into account.

Scenarios are grouped under three categories: adaptive, evolutionary and radical scenarios.

#### *2.1 Grouping the scenarios*

- a. **Adaptive scenarios** basically imply an increase of space allowance in fully slatted floor rearing systems. Production costs increase, resulting in a loss of margin for the farmers that can be counterbalanced by an increase in the dimension of the holding. Given the sector supply, this implies a reduction of the number of both farms and workers that adds to the current dynamics of the sector. The competitive position of the EU in the world market may worsen by a degree from slight to relevant with relation to the different scenarios. In the short term, the amount of farm investment needed to shift among adaptive scenarios is very low, as far as only space is involved and no heavy structural or organizational innovations are required. However, to achieve margin levels equal to the the ones gained before the introduction of stricter animal welfare requirements, investments are needed in the long term to achieve adequate scale economies.
- b. In the **evolutionary scenarios** fully slatted floor changes into partly slatted, with or without relevant increase of space allowance. Production costs change slightly.

Differences are relevant at geographical level. The same occurs for the gross margin. Structural adjustment takes place in any case due to the need to effect investments. Sector supply and EU competitiveness on the world market would face a slight decrease.

- c. **Radical scenario** implies the shift of all existing types of rearing system to the straw based (flow) one. In this case production costs increase significantly, with the most severe consequences on employment, sector supply and market price. Due to the reduction of domestic supply, export flows would decrease dramatically and even revert.

## 2.2 Problem identification

- a. This said, adaptive and evolutionary scenarios feature similar kinds of problems, that may be described according to a limited number of criteria:

### *a.1 Access to investment to improve animal welfare*

An increased level of animal welfare requires additional investment. The higher is the investment required to comply with scenario conditions, the higher is the portion of farmers that will exit the sector in the short and medium term and the lower is the number of farmers that will survive and will be able to compete in the long run<sup>36</sup>. In this view, the problems are: *how to deal with the increased structural dynamics induced by the policy innovation? What kind of farmers should be targeted by policy measures? By what means?*

### *a.2 Competitiveness in the world market*

The higher is the loss of supply and the increase of production cost, the stronger is the loss of competitiveness in the world market. Supply effects and cost effects should be considered separately in this case. A loss of supply simply means that a greater part of the final supply would be placed on the domestic market instead than on the world one. Higher production costs mean *a real loss of competitiveness* that would equally divert the EU production from the world market. If we consider specifically cost competitiveness the problems are: *Has EU production some comparative to compete in the world market? Who are the real competitors? What are the means to compete?*

- b. The radical scenario has quite different problems. The equilibrium of the whole sector would be set off balance and quite new dynamics would appear. As scale economies are hardly applicable to straw based rearing systems, a structural adjustment would take place anyway. In this case the key criterion for farm selection would not be primarily the access to investment to apply scale economies, but the comparative advantage stemming from farm organization and labour cost.

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<sup>36</sup> - It should be remembered that the level of investments needed varies among the scenarios. Generally speaking, we can assume that enlarging the stable to increase space allowance is less costly than changing the type of floor; and that the change from fully to partly slatted floor costs less than the change from those types of floor to straw based one.

Given the relative higher intensity of labour in straw based rearing systems, low labour costs and the employment of non-hired/familiar work would be favoured; industrial and capital-intensive holdings would be hit hardly. In this case the problems are: *how to manage with a radical structural change of the sector combined with the decline of the domestic supply? How to deal with the potential entry of international competitors in the domestic market?*

### *3. Paths of policy strategies*

The design of policy strategies to mitigate the negative impacts of enhanced animal welfare standards should take into account the following criteria:

- the time horizon of the structural adaptation, i.e. the time that any technical innovation requires for a broad application at sector level;
- the target of the policy strategies, i.e. the subjects and the system level at which policy measures should be applied (farm, supply chain, society).

These criteria especially apply to socio-economic impacts in the domestic market. Adaptive and evolutionary scenarios are examined<sup>37</sup> in particular.

As far as world competitiveness is concerned, other criteria will be considered.

#### *3.1 The time horizon*

Structural adjustment in the pig meat sector (as in almost any economic sector) is normal, and generally requires technical and/or organizational innovations. New policy measures imposing enhanced parameters for space allowance and/or floor type require technical innovations at farm level that mainly concern the fixed factors of production. Economic rationality in the management of the farm implies that farmers evaluate the opportunity for the introduction of technical innovations according to a cost/revenue criterion. In this respect, the depreciation of the existing fixed capital is crucial. In other words, older investments generally survive even when a technical innovation is available and the diffusion of technical innovations generally requires time to spread over a sector.

The implementation of policy innovations concerning animal welfare should primarily take into account this problem to avoid additional social and economic shocks in the pigmeat sector and also in the related ones along the supply chain. This aspect refers to

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<sup>37</sup> - The outcome of the radical scenario poses quite different problems in comparison with adaptive and evolutive ones. Socio-economic situations which are generally considered critical in the consolidated structural trend (e.g. small family holdings) might be at an advantage in the radical scenario, and vice versa. As scale economies and an increase in the use of technical means would not be effective in the radical scenario, aid to investment would not be an efficient mean of intervention. On the other hand, a dramatic reduction of supply and a definitive loss of competitiveness in the world market could not be avoided in any case. A relevant amount of resources (both human and material) should be re-allocated. The self-sufficiency degree of the EU in the pig meat sector might be put at serious risk. Assuming that the technical parameters imposed in the radical scenario assure a very high level of animal welfare, a quality policy based on animal welfare standards should be developed at any level within the supply chain, together with a strong communication policy among the consumers, in both the domestic and world markets, in order to reach a significant premium price for pig meat. In any case, the increase of the selling price required to counterbalance the effect of the increase in production cost should be relevant. On the opposite, providing economic sustainability for the farmers, also with a view at avoiding the loss of competitiveness at international level, would be possible only at very high cost for the community (direct aids or market price control should be restored, together with strong tariff barriers in the international trade) and in open conflict with the affirmed rules of the international trade.

the problem of the *transitional period* (developed in Annex III to Chapter C”). The transitional period is the period required to apply the policy innovation to the sector with a view at minimizing the structural impact. The basis for the definition of the transitional period is the evaluation of the time required to reach a size of the holding that allow to re-establish the economic margin, compared with the situation without policy innovation. This time has been calculated according to two hypothesis: (i) hypothesis A, consisting in an acceleration of the normal structural dynamics equal to 5% per year; (ii) hypothesis B, consisting in an acceleration of the normal structural dynamics equal to 50% per year.

During the period 1995-2003 the sector has shown an important variation in the structural dynamics<sup>38</sup>. Compared to this variation, hypothesis A represents a very low (even if significant) structural impact of the policy innovation for the sector, while hypothesis B describes a stronger structural impact. The scheme below compares the normal rate of the structural dynamics during the above mentioned periodo (that is the real rate) with the rate adopted for the calculation.

Normal rate of the structural dynamics (*) (real annual rate of variation)		Rate of structural dynamics adopted under:	
		Hypothesis A	Hypothesis B
1995-2000	7,6 %	<b>8,6%</b>	<b>12,4%</b>
2000-2003	9,4%		
<b>1995-2003</b>	<b>8,2%</b>		

(\*) Average values calculated for Denmark, Germany, Spain, France, Netherlands, United Kingdom (for details, see Annexe III to Chapter 2).

Table 103 reports on the result of the calculation.

The column *Normal rate* shows the time required to reach the dimension of the holding imposed by each scenario in absence of any acceleration rate (that is according to the normal rate of the structural dynamics during the period 1995-2003). The following columns (*Hypothesis A* and *Hypothesis B*) show the time required when the normal rate is accelerated according to Hypothesis A and B respectively, as a consequence of the policy innovation imposed by each scenario. The results of Table 102 are in fact benchmarks values, that is the least period of time needed to comply with scenarios' assumptions. The evaluation of the transitional period also requires a further step, to take into account the time that the investments related to the policy innovation need to be adopted by the farmers, given the technical and financial constraints.

<sup>38</sup> Technical constraints notwithstanding, the normal rate of structural dynamics is about 8,2% (average annual value). In most scenarios (1, 2, 4 and 5) the structural push is not much higher than this normal rate. Technical constraints to enlarge space allowance in a farm (which influence the feasibility of increasing the dimension of the holding) are indeed a relevant factor; nevertheless, being such constraints specific to each particular farm situation, it is impossible to properly introduce them in the scenarios by means of a synthetic coefficient. The same consideration apply for the sustainability of environment related costs in the farms concerned.

**Table 103: Duration of the transitional period (all Member States, years)**

Scenario	Normal rate	Hypothesis A	Hypothesis B
1	0.9	0.9	0.6
2	1.3	1.3	0.9
3	2.9	2.8	1.9
4	0.2	0.2	0.1
5	1.0	1.0	0.7
6	4.5	4.2	3.0

In this view, two aspects should be considered.

Firstly, if we assume that *farmers are free to choose their optimization schemes*, in particular concerning the depreciation of the existing investments of the holding, then they will try to comply with the policy innovation requirements when the depreciation period of the older investments is close to the end. This means that if a farmer has applied some investments to the stable in the recent years, he won't replace them when the policy innovation occurs, but he will try to delay them<sup>39</sup>. Beside this, farmers need time to plan new investments according to the development path and to the specific constraints of the holding (e.g work or financial availability).

Secondly, the complexity (technical and financial) of the investments required by each scenario should be considered. The figure below (Figure 1) compares the technical and financial complexity associated to the shift among scenarios .

<sup>39</sup> - Generally speaking, investments are financial resources to be applied in view of some technical and economic result, concerning inputs productivity (mainly work productivity) and/or holding organization. Once an investment is applied, the *depreciation cost* of the investment is the cost that the farmer has to face during some years (*depreciation period*) to obtain durable economic advantages. If a policy innovation, requiring investments, occurs during the depreciation period of the former investment, farmers could face to one or both of the following situations: (i) The investment required by the policy innovations technically overlaps (or conflicts with or even substitutes) the former investment. In that case, farmers will try to apply the new investment at least at the end of the depreciation period of the former investment; otherwise, they would bear extra costs for the same result. This would translate into financial overload for the individuals and into economic loss for the sector and the society. (ii) The investment required by the policy innovations doesn't technically overlap with the former investment. In that case farmers would try to delay new investments just to avoid financial stress, depending in this case on the financial capability of the holding (marginal holdings would be hit while profitable holdings could face the situation).

Figure 23: Comparison of the complexity among scenarios

Space (m <sup>2</sup> /head) Floor	0,65	0,75	0,80	1,00
<b>Fully slatted</b>		.....→ Sc. 1	.....→ Sc. 2	.....→ Sc. 3
<b>Partly slatted</b>		↓ Sc. 4	↓ Sc. 5	
<b>Straw based</b>				↘ Sc. 6
<b>Legenda:</b>	.....→ Stable enlargement (adaptive scenarios)		- - - - -→ Stable enlargement Partial floor change (evolutionary scenarios)	————→ Stable enlargement Slurry removal system change (radical scenario)

The scheme underlines that shifting among adaptive scenarios (1 to 2 to 3) only requires stable enlargement (the same for partly slatted typology when shifting from scenario 4 to 5). The passage from adaptive to evolutionary scenarios (that is the passage from fully to partly slatted floor) implies both holding enlargement and floor modification. In this case, fully slatted floor can be easily adapted to partly slatted by partially covering the slatted area, and no substantial change of the slurry removal system is needed. The passage to scenario 6 from partly and fully slatted floor implies both floor and space change, but in addition it implies a radical change of the removal system. In technical and financial terms, this means that the complexity of the investments increases from adaptive to evolutionary and radical scenarios; and, within the similar scenarios, from lower to higher space allowance<sup>40</sup>. Applying these concepts to the evaluation of the transitional period, its duration should be increased when passing:

- from adaptive to evolutionary and radical scenarios,
- from lower to higher space allowance, within the same group of scenarios.

In conclusion, given the above mentioned criteria, the result of the calculation based on the structural push (as reported in Table 103) should be consistently delayed. The conclusive evaluation of the transitional period is summarized in the scheme below. As a result, the duration of the transitional period should be delayed in practice to the medium term for most of the scenarios. Only scenario 6 would require a long term

<sup>40</sup> - In this context, it's worth to recall the strategy of the farmers facing the adaptation of the holding to the new policy requirements as dewcribed under § B.3.1.3, last sentences.

perspective. This is because it is out of the logic of the adaptation of the existing investment, has heavy technical and financial constraints and requires in practice to set aside the existing investment to adopt quite new investment and holding organization.

Any reduction of the transitional period would expose the sector to the consequences of a more intense structural dynamic. In other words, this means that the farmers are obliged to shorten the duration of the depreciation period of the existing investments; as a consequence, production costs rise and the margins decline (fixed costs would indeed rise suddenly) while new investments must be initiated to comply with policy requirements (including the enlargement of the holding to maintain even the economic margin compared to the ex ante situation). The combination of the aforementioned situations results in additional financial problems and in a more difficult access to investment for a greater number of farmers: some farmers shift backward in their strategy, respectively from pro-active to fence sitter and from here back to regressive. In other words, a more intensive marginalization process would take place resulting in a greater number of exits from the sector. In general the non-optimization of older investments would also imply a lower degree of efficiency for the sector.

**Figure 24: Duration of the transitional period. Overall evaluation**

Scenarios		Investment requirements	Transitional period duration
Adaptive	1	For fully slatted typology: - stable enlargement from 0,65 to 0,75 m <sup>2</sup> /head	The medium term (2 to 5 years) should be adopted as time horizon for the adaptation, with increasing time passing from scenario 1 to 3, e.g. - scenario 1 → 2-3 years - scenario 2 → 3-4 years - scenario 3 → 4-5 years
	2	For fully slatted typology: - stable enlargement from 0,65 to 0,80 m <sup>2</sup> /head	
	3	For fully slatted typology: - stable enlargement from 0,65 to 1,00 m <sup>2</sup> /head	
Evolutionary	4	For fully slatted typology: - stable enlargement from 0,65 to 0,75 m <sup>2</sup> /head - change of floor type (partial covering of existing floor)	The medium term should be considered at least (3 to 4 years).  - Fully slatted typology faces the heaviest adaptation (both space and floor type). A transitional period of 3 to 4 years should be considered. - Partly slatted typology faces lower technical and financial complexity (comparable to scenario 1 and 2). A transitional period of 2 to 3 years should be considered.
	5	For fully slatted typology: - stable enlargement from 0,65 to 0,80 m <sup>2</sup> /head - change of floor type (partial covering of existing floor) For partly slatted typology: - stable enlargement from 0,75 to 0,80 m <sup>2</sup> /head	
Radical	6	For fully slatted typology: - Stable enlargement from 0,65 to 1,00 m <sup>2</sup> /head For partly slatted typology: - stable enlargement from 0,75 to 1,00 m <sup>2</sup> /head For both: - change of floor type radical change of the slurry removal system	This scenario implies in practice the re-building of the stable, that is out of the adaptation concept applied in the former scenarios. Farmers should be given time enough to fully complete the depreciation period and find new financial resources to apply new heavy investments. The long term should be considered for this kind of scenario (5 to 8 years).

### 3.2 Socio-economic targeting

Given the time horizon and the criteria for technical innovation, farmers could apply different strategies to face the policy innovation (strategies that we called regressive, fence sitter or pro-active). This happens almost daily in any sector, and especially in the pigmeat sector, where a strong structural dynamic has been at work for years. Policy innovation in the field of animal welfare puts an additional pressure on this process, due to production cost increase. This means that a greater number of farmers will exit the sector (the structural push index of each scenario shows the intensity of the additional pressure). Besides the adoption of an adequate time horizon, the attenuation of the socio-economic impacts of the policy innovation may come from an adequate assistance to the farmers during the structural adjustment of the sector. The assistance could be aimed at mitigating the additional pressure (in terms of higher production costs) that the policy innovation puts on farmers who are in critical situations.

On the other side, it should also be considered the possibility to support marginal farmers (“regressive” ones, and also part of the “fence sitters”), operating in specific rural areas, to continue their activity if the possibility does exist to couple improved animal welfare standards (even very high standards) with local specificities that are relevant for the local development. This kind of strategy would integrate some elements

of the rural development intervention logic, and the improved animal welfare standards could be an additional tool for niche, value added production. Even if not relevant in a global context, this issue might be relevant at local or regional level. Aims and means of intervention may vary according to the economic position of the farmers and to their strategies, as summarized in the table below (Table 103).

**Table 104: Possible policy strategies**

<i>Farmers' strategy<sup>1</sup></i>	Farmers' situation after policy innovation	Possible policy strategy		
		Objective(s)	Mean(s)	Results
<i>Regressive</i>	Most farmers would quit the sector at normal conditions. Policy innovation contributes to a faster economic marginalization of the holdings.	- Exit from the sector	- (Indemnity)	- Mitigate the negative effects of the exit from the sector
		- <i>Stay in the sector with high animal welfare standards</i>	- <i>See box below</i>	- <i>Support rural development</i>
<i>Fence sitter</i>	Most farmers would continue their activity at normal conditions, even if in a critical position. The access to investment may be a decisive point to decide whether to stay or not in the sector, given the policy innovation.	<ul style="list-style-type: none"> <li>- Help efficient holdings to stay in</li> <li>- Promote quality schemes</li> </ul>	<ul style="list-style-type: none"> <li>- Facilitate selected access to investment</li> <li>- Support organizational innovation within the supply chain</li> <li>- Support quality schemes at supply chain level</li> <li>- Promote animal welfare standards among consumers</li> </ul>	<ul style="list-style-type: none"> <li>- Maintain potentially efficient holdings in the sector</li> <li>- Limit loss of sector supply</li> <li>- Enhance consumer willingness to pay for high animal welfare standards</li> <li>- Get premium price for meat produced within animal welfare schemes</li> <li>- Support farmers' revenue</li> </ul>
<i>Pro-active</i>	Farmers have economic margin and can face technical innovation to go ahead	- Promote quality schemes	<ul style="list-style-type: none"> <li>- Support quality schemes at supply chain level</li> <li>- <i>(Promote animal welfare standards among consumers)</i></li> </ul>	<ul style="list-style-type: none"> <li>- <i>(Enhance consumer willingness to pay for high animal welfare standards)</i></li> <li>- Get premium price for meat produced within animal welfare schemes</li> <li>- Support farmers' revenue</li> </ul>

### *3.2.1 Farm level*

Regressive farmers are close to the threshold of economic survival. Following the consolidated structural dynamic, most of them would exit the sector in a few years for lack of economic efficiency. In this respect, the contribution of policy innovation to this process is not relevant. Only marginal measures of assistance, if any, could be provided, and they would be aimed at mitigating the negative effects of the exit from the sector, in any case.

Fence sitter farmers are in a different position. In the current situation some of them would stay in the sector with a medium-long term horizon (some others would probably quit, like in the former case, albeit with a larger time horizon). We can assume that, given the thin economic margin, the major problem for these farmers is the financial capability to access the investment that is required to comply with policy innovation.

Pro-active farmers have enough economic margin to face the change and to compete in the years to come, at the cost of a temporary reduction of the margin (the time needed to pay back the investment).

Fence sitters are the critical targets of the policy strategy: they still have efficient organization and resources (in terms of labour, land and capital) but cannot afford investment to overcome the bottleneck of the structural change. In our opinion, the strategy to reduce the socio-economic impacts of policy innovation should be primarily targeted at this category of farmers, facilitating the access to farm investment.

### *3.2.2 Supply chain level*

To increase the effectiveness of the policy measures, some additional criteria should be taken into account. They are *conditionality* and *chain integration*, strictly linked with each other and both aimed at the affirmation of the quality attribute of animal welfare content of pig meat in the domestic market (at least as a first step).

Conditionality means that farmers would receive a facilitated access to investment at the condition that they engage themselves in the affirmation of the quality standards related to animal welfare within the supply system. As the affirmation of quality standards is the result of co-ordinated actions within the supply system, any incentive to the integration is effective if it contributes to the transmission of information about animal welfare standards along the supply chain and to the final market<sup>41</sup>.

In this respect, also pro-active farmers could benefit from these incentives, limited to the supply chain integration.

The supply chain is also the context where a rural development approach (see above § 3.2, last paragraph) could be applied to support marginal farmers in a local development framework.

### *3.2.3 Consumer level*

Strategies at farm and supply chain levels should be completed by an adequate communication strategy to inform potential consumers about the additional quality attributes stemming from methods of production based on animal welfare. This strategy

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<sup>41</sup> - This strategy working at farm and supply chain level, should be balanced by adequate measures on the demand side, whose target is the consumer (see ahead § 3.2.3).

has particular relevance because at present quality attributes (and quality schemes) directly related to animal welfare have limited diffusion within the society and the market, even if the trend is positive. A focus on this kind of attributes should be developed.

At the same time, the willingness to pay for it should be carefully studied, also at regional level, for the best targeting of the strategies. In this case, the existing differences among Member States in terms of social sensibilities and willingness to pay for additional quality attributes should be taken into account for a better targeting of the policy.

### *3.3 Competitiveness in the world market*

Supply effects and, in particular, cost effects are negative impacts of almost all the scenarios, even if with different intensity. The analysis of the competitive position of the EU in the world market should be taken into account to draw consistent strategies aimed at limiting negative impacts at this level. According to this analysis, the EU product mix on export markets especially concerns frozen pig meat, and to a lesser extent frozen offals. At geographical level, some western-style exporting countries (namely USA, Canada, Australia) are strong competitors of the EU, especially considering that quality standards are comparable and that few relevant destination markets among the high-income countries (firstly Japan and USA) are concerned. Low-income countries of destination hold less important positions.

New competitors are indeed becoming more and more aggressive, but their competitiveness is mainly based on price (Brasil in particular, as cited in Chapter A.4 and A.5) and still features a lower quality level. In a few words, we can assume that quality is the key factor to think of consistent strategies to attenuate negative effects of policy innovation on EU international competitiveness.

Applying policy innovation, EU exports will necessarily suffer from the competition by western-style exporters (i.e. USA, Canada, etc.), because of the comparability of cost and quality (in general terms).

In the long run, if no counter measures are adopted by the EU, also emerging exporters could rise as relevant competitors, due to unavoidable progress in quality and service.

On the other side, adopting the pure cost competition as a perspective for policy strategy could be misleading and ineffective. Besides animal welfare, other structural factors put at disadvantage in terms of production costs the EU exporters in comparison with traditional and emerging competitors. Without considering tariff barriers in the international market, EU strategy to counterbalance cost effects should adopt quality as a strategic factor of competition in the world market. Quality in an international context should be intended as a general attribute (intrinsic attributes of the meat as well as services in marketing and delivery). Animal welfare could be a component of quality. Marketing and communication in the international markets are the key means to affirm this attribute. The major exporting Member States (Denmark above all) would be especially concerned by this strategy that would be effective in the medium-long term.

#### *4. A global view (scenarios, strategies, intervention levels)*

Given the impacts described in the study, and with respect to the general criteria of intervention, table 105 below puts the different kinds of strategies in the context of the scenarios and of the intervention levels. It should be underlined that the table focuses specifically on the measures aimed at mitigating the additional negative impact of each scenario in relation to the actual situation of the sector.<sup>42</sup>

##### *a. Adaptive scenarios*

The risk of economic loss for the farmers increases from scenario 1 to 3, due to the increase in production costs. The same for the structural and social impact. The intensification of these scenarios (from 1 to 3, and especially 2 and 3) creates increasingly critical situations, raising the number of potentially regressive and fence sitter farmers. The intensity of the measures to be applied increases consistently: the indemnities (for the out goers) and the means to facilitate the access to investment (for the fence sitters) become crucial, including the selection criteria for an adequate targeting of the measures.

The measures to be applied at the supply chain level and at the consumer level have to go in the same sense. As far as the geographical differentiation of the impact is relevant, a geographical differentiation of the targeting should be considered. Besides this, a rural development approach might be relevant at local level.

##### *b. Evolutionary scenario*

The risk of economic loss in this case is low, if any, given the reduction of the production cost. Access to investment becomes crucial to facilitate the shift among different types of floor. If this action is effective and well managed, the sector should not suffer because of the structural adjustment. In this case, the measures for the out goers are less important.

The measures on the demand side (aimed at the affirmation of the quality attribute of animal welfare) are not crucial in this case, as demand should not suffer from the application of policy innovation (final price should not rise). The same considerations apply with respect to the international competition.

##### *c. Radical scenario*

Economic loss at farm level is dramatic in this case. Policy strategies and related measures require a radical change of objectives, means and targeting.

The re-allocation of human and material resources and the substantial loss of competitiveness are the main problems to deal with. All of the measures described in the Table 105 would not mitigate or even resolve these problems. A decline of the sector should be accepted as a consequence of this scenario.

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<sup>42</sup> - For example, when we write that in the evolutionary scenario no relevant actions are foreseen at the consumer level (see "not relevant" at the cross line between "consumer level" and "evolutionary scenarios" in the table) we do not mean that an action targeted at the consumer is not relevant for the problem of the animal welfare *in absolute*. We mean that an action on the consumer is not at the core of the strategy in this scenario, as in this case the production cost decreases, and the consumer will not suffer due to the application of this scenario.

**Table 105: Possible policy strategies complementing policy innovation**

	Scenarios		
Intervention levels	Adaptive (1, 2, 3)	Evolutionary (4, 5)	Radical (6)
Farm	<ul style="list-style-type: none"> <li>- Indemnity (regressive farmers)</li> <li>- Join rural development schemes (regressive farmers and fence sitters in specific areas)</li> <li>- Selected access to investment (fence sitters)</li> </ul>	<ul style="list-style-type: none"> <li>- Selected access to investment (fence sitters)</li> </ul>	<ul style="list-style-type: none"> <li>- Join rural development schemes (regressive farmers and fence sitters in specific areas)</li> <li>- Financial assistance to out goers</li> <li>- Provide means of re-allocation of human and material resources</li> <li>- Focus on regional problems (e.g. former exporting countries; new importing countries)</li> </ul>
Supply chain	<ul style="list-style-type: none"> <li>- Support supply chain organization targeted at improved animal welfare standards</li> <li>- Support quality schemes along the chain targeted at improved animal welfare standards</li> </ul>	<ul style="list-style-type: none"> <li>- Support supply chain organization targeted at improved animal welfare standards</li> </ul>	<ul style="list-style-type: none"> <li>- Support the radical re-shaping of the supply chain</li> <li>- Support supply chain organization targeted at improved animal welfare standards</li> <li>- Support quality schemes along the chain targeted at improved animal welfare standards</li> </ul>
Consumer	<ul style="list-style-type: none"> <li>- Promote animal welfare</li> <li>- Improve heightening of social awareness and communication, according to geographical specificity</li> </ul>	<ul style="list-style-type: none"> <li>- Not relevant</li> </ul>	<ul style="list-style-type: none"> <li>- Promote animal welfare</li> <li>- Improve heightening of social awareness and communication, according to geographical specificity</li> </ul>
Competitiveness	<ul style="list-style-type: none"> <li>- Promote EU quality schemes in leading export markets</li> </ul>	<ul style="list-style-type: none"> <li>- Not relevant</li> </ul>	<ul style="list-style-type: none"> <li>- Quality barriers for import, based on animal welfare</li> </ul>

Evolutionary scenarios (scenario 4 and 5) seem to be the most sustainable ones due to:

- the lower social and economic impacts at the holding and sector levels
- the duration of the transitional period
- the lower complexity of the policy measures.

Concerning the last point, attention should be firstly paid to the measures to be applied at the supply chain level. The intervention at this level should be mainly based on structural measures for the orientation of the supply chain toward a stronger affirmation of animal welfare among the other quality attributes. In fact, up to present, quality in the meat sector is mainly based on a set of attributes where animal welfare is hardly considered, even if marked by a quite positive trend. In this sense, demand side policies (otherwise not relevant as far as production cost and meat price are not hit in evolutionary scenarios) would rise as important complement of the policy measures applied at the supply chain level.

## **Annexes**

## Annex I to Chapter B.3 Assessment of the impacts resulting from different scenarios

### Main assumptions behind the impact analysis

Differences in production cost rise both among rearing system typologies, and according to the variation of the space allowance per head.

The increase of space per head will reduce the number of pigs reared and the volume of the output (in terms of pig meat). The gross margin of the farmer falls consequently. The first approach to the impact analysis will assume that the holding adapts to the increase in space allowance without increasing the number of pigs reared.

One step ahead, we assume that farmers will try to react to the economic loss by increasing the number of reared pigs, at least until the former level of gross margin is re-established. Compared with the former assumption, this will translate into a different impact on the sector (for instance, in terms of pigmeat production).

In both cases, we will approach the analysis of the impact in terms of *final equilibrium*, that is the situation that occurs after the adjustment of the holding.<sup>43</sup>

### 1. The evaluation of the impact

The impacts of each scenarios:

- are calculated by Member State, taking into account the diffusion of each rearing system in the different Member States;
- are analysed in terms of:
  - production cost variation, at farm level;
  - gross margin variation, at farm level;
  - structural adjustment;
  - sector supply.

The variation of the production cost at farm level, and the consequent variation of gross margin, are calculated on the base of the production cost per weight unit (see chapter B.2), and then projected at farm level for a holding of average dimension in the national context. The variation will be expressed in both absolute and relative terms.

The percent variation of the gross margin has been taken as an indicator of the *structural push* at both farm and sector level (see Box A.1).

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<sup>43</sup> - Obviously, the level of investment, that is required to shift from the current situation (that we will call *Scenario 0*) to any of the scenarios mentioned in the table, influences the farmers' decision to apply or not to apply the investment (that may coincide with the decision to stay or leave). Analytical consideration or quantitative calculation based on the financial affordability of the investment are not foreseen in this study. Nevertheless, we will take into account this aspect of the problem by way of simple considerations based on the level of income of the farm. This will allow us to evaluate in a more detailed way the impact of the scenarios on the sector.

**Box A.1 – The rationale of the structural push indicator**

The structural push is an indicator of the effect that the variation of the production cost (and the subsequent variation of gross margin) has on the structural dynamic of the sector.

In detail, the rationale behind this concept stems from this reasoning :

- For an average holding, from the variation of the gross margin we derive the measure of the holding enlargement that is required to re-establish the former level of margin.
- The structure of the sector shows a long period trend towards the enlargement of the average dimension of the holdings (this designs the structural trend, that is mainly determined by the need to maintain the gross margin equilibrium when on farm and system factors change -e.g. production cost, selling price, etc.).
- The application of animal welfare standards alters the normal, long period, structural trend, by reducing the number of reared pigs and, subsequently, pushing the farmers to increase that number again, to re-establish the economic equilibrium of the farm.
- Summed at sector level, this makes an *additional* push to structural adjustment, in the sense that it adds to the structural trend that would take place in absence of any increase of animal welfare standards.

In simple words, the effect of increased animal welfare standards is an acceleration of the structural trend, more or less important according to the scenario, that we quantify on the basis of the structural push indicator. The concept of structural push indicator is applied to evaluate the transition period for the implementation of the policy innovation. The methodology for this step and the related evaluation exercise are described in Annex III.

Applying the concept of structural push, we will judge the relevance of the structural adjustment determined by each scenario.

To better define the consequences of the structural adjustment, we will try to analyse the distribution of the adjustment among dimensional classes. This brings into question the sustainability of the investment required to comply with the animal welfare standards, and, consequently, the farmers' decision to stay or leave.

## **2. Who stays and who leaves**

In a very schematic way, the alternatives for a farmer, facing a production cost increase and a consequent reduction of the gross margin, are:

- a) giving up pig rearing (regressive strategy);
- b) trying to survive, by playing on the economic flexibility as much as possible (fence sitter strategy);
- c) going ahead to re-establish economic sustainability (pro-active strategy);

The next scheme gives a more detailed description of the above listed strategies.

**Table 106– Strategy choice**

<b>Strategy</b>	<b>Objective</b>	<b>Strategic tool</b>	<b>Result</b>
<i>regressive</i>	avoid further loss	change activity	give up pigmeat production (short term)
<i>fence sitter</i>	survive as long as possible	use economic flexibility	stay in (medium term)
<i>Pro-active</i>	develop activity	use economic margin to finance scale expansions	go ahead (long term)

The decision among the above mentioned strategies basically depends on the sustainability of the investment that are required. We assume that the financial sustainability depends:

On the level of income of the holding: the greater the income, the greater the possibility to sustain the investment.

On the economic flexibility of the holding: the greater the dependency of the farm from input market, the lower is the economic flexibility.

**Box A.2- Farm income, economic flexibility and scale economies**

FADN data shows that family farm income (FFI, that is a measure of the remuneration of the farmer for the inputs he/she brings to the production activities) rises meaningfully from smaller to larger holdings. We assume the level of FFI (global and per work unit) as an indicator of the financial sustainability. In fact, financial resources to pay back investment would be diverted from this amount.

Feed and labour are factors of major concern for the economic flexibility. Most of the holdings are largely depending on input market for feed, which accounts for a relevant part of the production cost. Family/unpaid labour is another important factor of flexibility, whose cost rises in the long run. High income and family holdings would be favoured in facing the financial burden of the investment.

The differences in income among classes demonstrate the importance of scale economies to overcome cost constraints and to maintain economic margin, also in accordance with structural trend of the sector in the long run.

In other words, the structural adjustment would be actually applied by: (i) the farmers that have sufficient economic margin to afford investment to improve space allowance or change rearing system. In this case, a part of the gross margin would be destined to pay the financial cost of structural adjustment without putting farmers in a critical position in financial terms. (ii) The farmers that have sufficient economic and organisational flexibility for some inputs, and can accept a reduction of the gross margin in view of the continuation of the activity. Economic flexibility, especially for labour, actually plays in different ways among the various rearing systems, given the different role of labour in the different rearing typologies.<sup>44</sup>

On the opposite, farmers that do not possess the above mentioned requirements are likely to decide to give up. Hired workers would not accept a lower remuneration for more than a very short time span and would quickly revert to alternative jobs; scale economies are the core of the structural dynamic of the sector and require not only financial capability but also time to pay back investments. This means that a number of

<sup>44</sup> - Straw based rearing system is more labour intensive if compared with fully and partly slatted rearing systems.

holdings may lack economic flexibility and may not have already applied sufficient scale economies. They are actually *marginal holdings* and a further reduction of the economic margin would lead them to leave the sector.

Translating the above mentioned situations into a sector impact would need to place them in the structural context of the sector itself.

#### **Box A.3: Distribution of structural push among holding typologies**

Given the relation between the level of the income and the dimension of the holding, larger holdings are likely to adopt a pro-active behaviour to face the enhancement of the animal welfare standards, either through holding enlargement or through the shifting among rearing systems. In this case, scale economies will play an important role. Family holdings have some chance to survive, applying economic flexibility, especially for labour. It's difficult to couple the type of the holding (familiar, non familiar, etc.) with the dimension of the holdings (due to the lack of data on this aspect). It make sense to assume that small-medium holdings are generally family holdings (with greater economic flexibility); and that, as the holding dimension rises, the family labour decreases (together with the economic flexibility). In that case, pure scale economies become the critical factor that actually favours the very large holdings but not necessarily the medium ones.

On the other side, the critical dimension of the holding changes by country for a number of factors (available technology, system factors, natural resources, etc.) in a way that any conclusion based on these assumptions would be hardly sustainable.

A further consideration concerns the role of the economic flexibility for the adoption of rearing system typologies that are more labour intensive (it's the case of straw based rearing system in comparison with the slatted ones). The case of the UK shows that the diffusion of this rearing system combines with a peculiar structural trend that seems to favour small holdings (also likely familiar ones).

### **3. Impact on production and market equilibrium**

The trend of the sector supply is rather stable during the last decade, while the structure of the sector has changed very much in favour of larger holdings. In general terms, this means that the sector is able to react to critical situations that influence production costs and farm income, at the cost of a deep structural adjustment.

The impact on supply will be judged considering:

- the impact on the structure of the sector (as described in the former paragraph)<sup>45</sup>
- the relevance of the structural push (lying on the assumption that a limited structural push may be compensated by an acceleration of the structural trend).

Depending on the impact on supply, the EU market equilibrium may change, influencing the selling price. The type of impact will be quite different according to the assumptions about the degree of integration between the domestic and the world market. In a *closed market*, the fall of the supply will result in a rise of the selling price.

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<sup>45</sup> - If the structural adjustment is mainly due to scale economies, the sector is likely to re-establish the normal levels of supply, at least in the medium term. If the structural adjustment mainly recurs to economic flexibility, family/small holdings will be favoured, and the supply levels might fall.

Conversely, in an *open market*, the fall of the domestic supply will result in a variation of the competitive position of EU pigmeat in the world market.

In relation to the domestic market equilibrium, we will consider the possibility of a selling price increase due to affirmation of quality schemes based on animal welfare. We will approach this problem firstly considering the theoretical rise of selling price that would counteract the cost-income dynamic, due to animal welfare (applying a break-even point approach). This value will be taken as a benchmark for further consideration about the real possibility to get such premium price in the real market.

#### **4. The impact on the competitive position of the EU pigmeat**

The competitive position of the EU pigmeat in the world market is determined:

- by the variation of the production cost;
- by the variation of the equilibrium of the EU market (as described above);

Both aspects will be taken into account, together with the notion of the actual position of the competitors of the EU in the world market.

## Annex II to Chapter B.3 Assessment of the impacts resulting from different scenarios

**Table 107: Denmark**

	adaptive			evolutionary		radical
	scenario 1	scenario 2	scenario 3	scenario 4	scenario 5	scenario 6
	Fully Slatted, from 0,65 to 0,75. The others RST do not change	Fully Slatted, from 0,65 to 0,80. The others RST do not change	Fully Slatted, from 0,65 to 1,00. The others RST do not change	From Fully Slatted 0,65 to Partly 0,75. The others RST do not change	From Fully slatted 0,65 to Partly slatted 0,80; from Partly slatted 0,75 to Partly slatted 0,80	From Fully 0,65 and from Partly 0,75 to Straw based 1,00. The others RST do not change
Gross Margin	-7,60%	-10,69%	-19,95%	2,6%	-3,34%	-28,70%
Gross Margin/Labour	140,05%	131,30%	105,04%	168,9%	158,34%	52,78%
Total Unit Costs	2,88%	4,32%	10,08%	-3,57%	-1,86%	13,47%
Production structure	8,77%	13,2%	30,69%	-2,5%	3,51%	42,36%
Employment	-9%	-11%	-20%	2%	-4%	
Investement	no	no	no	yes/no	yes/no	yes

**Table 108: The Netherland**

	adaptive			evolutionary		radical
	scenario 1	scenario 2	scenario 3	scenario 4	scenario 5	scenario 6
	Fully Slatted, from 0,65 to 0,75. The others RST do not change	Fully Slatted, from 0,65 to 0,80. The others RST do not change	Fully Slatted, from 0,65 to 1,00. The others RST do not change	From Fully Slatted 0,65 to Partly 0,75. The others RST do not change	From Fully slatted 0,65 to Partly slatted 0,80; from Partly slatted 0,75 to Partly slatted 0,80	From Fully 0,65 and from Partly 0,75 to Straw based 1,00. The others RST do not change
Gross Margin	-2,00%	-2,81%	-5,25%	0,6%	-5,61%	-26,00%
Gross Margin/Labour	137,08%	128,51%	102,81%	164,0%	153,72%	58,94%
Total Unit Costs	0,76%	1,13%	2,64%	-0,91%	0,97%	10,66%
Production structure	2,31%	3,5%	8,08%	-0,5%	5,97%	35,74%
Employment	-2%	-11%	-20%	1%	-6%	
Investement	no	no	no	yes/no	yes/no	yes

**Table 109: Germany**

	adaptive			evolutionary		radical
	scenario 1	scenario 2	scenario 3	scenario 4	scenario 5	scenario 6
	Fully Slatted, from 0,65 to 0,75. The others RST do not change	Fully Slatted, from 0,65 to 0,80. The others RST do not change	Fully Slatted, from 0,65 to 1,00. The others RST do not change	From Fully Slatted 0,65 to Partly 0,75. The others RST do not change	From Fully slatted 0,65 to Partly slatted 0,80; from Partly slatted 0,75 to Partly slatted 0,80	From Fully 0,65 and from Partly 0,75 to Strow based 1,00. The others RST do not change
Gross Margin	-4,00%	-5,62%	-10,50%	0,8%	-4,89%	-25,50%
Gross Margin/Labour	141,79%	132,93%	106,34%	167,9%	157,36%	61,11%
Total Unit Costs	1,58%	2,37%	5,54%	-0,13%	1,93%	12,42%
Production structure	4,62%	6,9%	16,15%	-0,8%	5,19%	36,15%
Employment	-5%	-6%	-11%	0%	-5%	-30%
Investement	no	no	no	yes/no	yes/no	yes

**Table 110: France**

	adaptive			evolutionary		radical
	scenario 1	scenario 2	scenario 3	scenario 4	scenario 5	scenario 6
	Fully Slatted, from 0,65 to 0,75. The others RST do not change	Fully Slatted, from 0,65 to 0,80. The others RST do not change	Fully Slatted, from 0,65 to 1,00. The others RST do not change	From Fully Slatted 0,65 to Partly 0,75. The others RST do not change	From Fully slatted 0,65 to Partly slatted 0,80; from Partly slatted 0,75 to Partly slatted 0,80	From Fully 0,65 and from Partly 0,75 to Strow based 1,00. The others RST do not change
Gross Margin	-10,67%	-15,00%	-28,00%	2,0%	-3,81%	-30,75%
Gross Margin/Labour	177,86%	166,74%	133,39%	210,4%	197,22%	67,89%
Total Unit Costs	4,19%	6,29%	14,67%	-5,07%	-3,34%	15,78%
Production structure	12,31%	18,5%	43,08%	-2,0%	3,98%	46,74%
Employment	-12%	-15%	-28%	0%	-4%	
Investement	no	no	no	yes/no	yes/no	yes

**Table 111: The United Kingdom**

	adaptive			evolutionary		radical
	scenario 1	scenario 2	scenario 3	scenario 4	scenario 5	scenario 6
	Fully Slatted, from 0,65 to 0,75. The others RST do not change	Fully Slatted, from 0,65 to 0,80. The others RST do not change	Fully Slatted, from 0,65 to 1,00. The others RST do not change	From Fully Slatted 0,65 to Partly 0,75. The others RST do not change	From Fully slatted 0,65 to Partly slatted 0,80; from Partly slatted 0,75 to Partly slatted 0,80	From Fully 0,65 and from Partly 0,75 to Strow based 1,00. The others RST do not change
Gross Margin	-5,07%	-7,13%	-13,30%	1,7%	-3,08%	-22,55%
Gross Margin/Labour	165,02%	154,71%	123,76%	199,0%	186,56%	61,97%
Total Unit Costs	1,61%	2,42%	5,64%	-1,87%	-0,67%	8,68%
Production structure	5,85%	8,8%	20,46%	-1,6%	3,25%	32,79%
Employment	-6%	-8%	-14%	2%	-3%	
Investement	no	no	no	yes/no	yes/no	yes

**Table 112: Spain**

	adaptive			evolutionary		radical
	scenario 1	scenario 2	scenario 3	scenario 4	scenario 5	scenario 6
	Fully Slatted, from 0,65 to 0,75. The others RST do not change	Fully Slatted, from 0,65 to 0,80. The others RST do not change	Fully Slatted, from 0,65 to 1,00. The others RST do not change	From Fully Slatted 0,65 to Partly 0,75. The others RST do not change	From Fully slatted 0,65 to Partly slatted 0,80; from Partly slatted 0,75 to Partly slatted 0,80	From Fully 0,65 and from Partly 0,75 to Strow based 1,00. The others RST do not change
Gross Margin	-6,67%	-9,37%	-17,50%	-12,9%	-18,36%	-30,00%
Gross Margin/Labour	194,85%	182,67%	146,14%	166,7%	156,31%	52,61%
Total Unit Costs	1,72%	2,59%	6,03%	0,31%	1,56%	9,15%
Production structure	7,69%	11,5%	26,92%	17,4%	25,25%	43,59%
Employment	-8%	-11%	-26%	-17%	-25%	-40%
Investement	no	no	no	yes/no	yes/no	yes

**Table 113: Ireland**

	adaptive			evolutionary		radical
	scenario 1	scenario 2	scenario 3	scenario 4	scenario 5	scenario 6
	Fully Slatted, from 0,65 to 0,75. The others RST do not change	Fully Slatted, from 0,65 to 0,80. The others RST do not change	Fully Slatted, from 0,65 to 1,00. The others RST do not change	From Fully Slatted 0,65 to Partly 0,75. The others RST do not change	From Fully slatted 0,65 to Partly slatted 0,80; from Partly slatted 0,75 to Partly slatted 0,80	From Fully 0,65 and from Partly 0,75 to Strow based 1,00. The others RST do not change
Gross Margin	-8,00%	-11,25%	-21,00%	4,0%	-2,16%	-29,75%
Gross Margin/Labour	143,42%	134,46%	107,57%	176,6%	165,55%	51,11%
Total Unit Costs	2,41%	3,61%	8,43%	-3,05%	-1,64%	11,11%
Production structure	9,23%	13,8%	32,31%	-3,8%	2,31%	43,97%
Employment	-9%	-12%	-21%	0%	-2%	-40%
Investement	no	no	no	yes/no	yes/no	yes

**Table 114: Italy**

	adaptive			evolutionary		radical
	scenario 1	scenario 2	scenario 3	scenario 4	scenario 5	scenario 6
	Fully Slatted, from 0,65 to 0,75. The others RST do not change	Fully Slatted, from 0,65 to 0,80. The others RST do not change	Fully Slatted, from 0,65 to 1,00. The others RST do not change	From Fully Slatted 0,65 to Partly 0,75. The others RST do not change	From Fully slatted 0,65 to Partly slatted 0,80; from Partly slatted 0,75 to Partly slatted 0,80	From Fully 0,65 and from Partly 0,75 to Strow based 1,00. The others RST do not change
Gross Margin	-8,00%	-11,25%	-21,00%	-29,2%	-32,70%	-27,25%
Gross Margin/Labour	103,68%	97,20%	77,76%	61,4%	57,55%	7,74%
Total Unit Costs	2,73%	4,09%	9,55%	-0,64%	0,75%	11,61%
Production structure	9,23%	13,8%	32,31%	56,9%	66,39%	40,64%
Employment	-9%	-12%	-22%	-50%	-60%	-40%
Investement	no	no	no	yes/no	yes/no	yes

## Annex III to Chapter C.2 Conclusions and policy recommendations

### Duration of the transitional period. Evaluation methodology and exercise

The application of technical innovation to the pig fattening sector (i.e. the modification of floor type and the increase in the space allowance per pig) requires a time period to make it possible for the holdings of the sector to modify their structure and organization. The duration of such *transitional period* has to be determined. The related methodology proposed to this purpose is based on the *structural push index*.

#### a) *Structural push index*

We recall that the structural push index is an indicator of the effect that the variation of the production cost (and the consequent variation of gross margin) has on the structural dynamic of the sector (see also Box A.1 in Annex I to Chapter B.3). It indicates the variation (in percentage) of the average dimension of the holdings (nr. pigs per holding) that would counterbalance the effect of the cost variation, in order to maintain the economic sustainability of the holding.

Table 113 below summarizes the values of the structural push index in some countries. The rationale behind it is that the application of the policy innovation<sup>46</sup> implies an increase of the production cost and a reduction of the number of pigs in the holding (due to the increase of space allowance per pig). To counterbalance these effects the dimension of the holding (in terms of number of pigs) should increase<sup>47</sup>. The structural push index is the measure of such increase.

The structural push index varies among Member States within a large range of values, depending on the measure of the variation of the production cost (in general, the greater is the variation of the production cost, the greater is the value of the structural push index, according to the situation of each country). In scenario 4 the structural push is negative. This is due to the fact that the policy innovation indicated by that scenario implies a reduction of the production cost. This means that the holding could even face a reduction in its size without loss of economic margin.

**Table 114: Structural push index by scenario**

Countries	Structural push by scenario (%)					
	1	2	3	4	5	6
Denmark	8,8	13,2	30,7	-2,5	3,5	42,4
Germany	4,6	6,9	16,2	-0,8	5,2	36,2
Spain	7,7	11,5	26,9	17,4	25,3	43,6
France	12,3	18,5	43,1	-2,0	4,0	46,7
The Netherlands	2,3	3,5	8,1	-0,5	6,0	35,7
United Kingdom	5,9	8,8	20,5	-1,6	3,3	32,8
All Member States (average)	6,9	10,4	24,2	1,7	7,9	39,6

<sup>46</sup> We call *policy innovations* the different combinations of floor type and space allowance, as described by the scenarios. Each scenario represents in itself a possible policy innovation.

<sup>47</sup> For instance, the value of 8.8% in scenario 1 for Denmark indicates that the average dimension of the holding should increase of that amount (8.8%) to re-establish the economic margin of the farmer.

Applying the value of the structural push index to the current average size of the holding we have a measure of the increase of the holding size required by each scenario to face the negative effect of the policy innovation (Table 114).

**Table 115: Average dimensions of the holdings: real data and scenario result**

Countries	Average dimension of the holdings (pigs per holding)									
	Real (2003)	According to scenarios								
		1	2	3	4	5	6			
Denmark	691	751	782	903	673	715	983			
Germany	178	187	191	207	177	188	243			
Spain	110	119	123	140	130	138	159			
France	171	192	203	245	168	178	251			
The Netherlands	523	535	541	565	520	554	710			
United Kingdom	344	364	374	414	338	355	457			
All Member States	188	201	207	233	191	203	262			

Note to Table 114: The column entitled *Real (2003)* shows the average dimensions of the holding according to the last available statistical data (2003). The following columns show the average size of the holding when the structural push index (see Table 1) is applied. These values are in practice the theoretical average size that the holdings should reach to counterbalance the variation of the production cost imposed by each scenario (italic characters outline the values of the average size of the holding which are lower in comparison with the real situation in 2003).

The determination of the transitional period starts from this result by applying the methodology described in the next paragraph..

### ***b) Methodology***

Some statements and assumptions are behind the evaluation methodology.

The pig fattening sector has experienced a strong structural dynamic in the last decade. This process resulted in a significant variation (in general, a very important increase) of the average size of the holdings. This is what we call the *normal* structural trend. The structural push due to the policy innovation adds to the normal structural trend as an *acceleration factor*. Assuming that the normal structural trend continues in the future at the same rate than in the past, the minimization of the impacts of the policy innovation implies that this rate accelerates in a way that does not imply a strong shock for the sector, i.e. a *sustainable* acceleration rate.

The evaluation of the sustainable acceleration factor stems in turn from the observation of the normal structural trend.

Data analysis shows that the normal rate of variation of the average size of the holdings over the period 1995-2003 was of 8.2% per year, varying from 7.6% during 1995-2000, to 9.4% during 2000-2003. This means that from the first to the second period the sector faced an acceleration of the structural dynamic of about 24%.<sup>48</sup> Table 115 shows the real variation of the average size of the holdings and the related annual variation, over the whole period and during the two sub-periods.

<sup>48</sup> - In detail: referring to Table C, the normal structural trend for all the Countries listed in the Table is respectively 7.6% during 1995-2000, 9.4% during 2000-2003 and 8.2% over the whole period (1995-2003). The annual variation rate has risen 7.6 to 9.4% from the first to the second period. This is an increase of 23.7% from the first to the second period ( $9.4\% - 7.6\% = 1.8\%$ ;  $1.8\% / 7.6\% = 23.7\%$ ).

**Table 116: Average size of the holdings and related variations**

Country	Average size (n. pigs)			Total variation by period (%)			Annual variation by period (%)		
	1995	2000	2003	1995-2000	2000-2003	1995-2003	1995-2000	2000-2003	1995-2003
Denmark	316	449	691	42	54	119	7,5	15,6	10,5
Germany	100	125	178	25	42	78	5,5	13,2	8,3
Spain	42	88	110	107	26	161	17,5	9,1	14,4
France	99	141	171	42	21	73	8,2	7,3	7,9
Netherlands	363	430	523	19	21	44	3,7	6,9	4,9
United Kingdom	438	439	344	0	-22	-22	0,3	-7,6	-2,7
All Member States	105	146	188	38	29	78	7,6	9,4	8,2

Note to Table 115: annual variation is calculated according to a financial methodology (compound rate)

Based on this data, we calculated the transitional period according to two hypothesis of acceleration rate, namely:

- **Hypothesis A:** acceleration rate of 5% of the normal structural trend. This hypothesis can be assumed as a very low structural impact if compared to the normal situation of the sector;
- **Hypothesis B:** acceleration rate of 50% of the normal structural trend. This hypothesis can be assumed as a stronger variation of the normal structural dynamics of the sector.

We then calculated the time required to shift from the real average size of the holdings (2003) to the size imposed by each scenario, according to the conditions of hypothesis A and B respectively (the time is calculated according to a financial methodology).

**c) Exercise**

Table 116 and 117 report the results of the application of the above described methodology, under hypothesis A and B respectively. Table 118 shows the transitional periods needed to reach the average size of the holdings imposed by the scenario when no variation is applied to the normal structural trend.

**Table 117: Duration of the transitional periods in the different scenarios under hypothesis A**

	Real average rate	Estimated rate	Transitional period (years) according to scenarios					
	(1995-2003)	(Hypothesis A)	1	2	3	4	5	6
Denmark	10,5	11,0	0,8	1,2	2,6	-0,2	0,3	3,4
Germany	8,3	8,7	0,6	0,9	1,9	-0,1	0,6	3,9
Spain	14,4	15,1	0,6	0,8	1,8	1,2	1,7	2,7
France	7,9	8,3	1,6	2,3	4,8	-0,3	0,5	5,1
Netherlands	4,9	5,2	0,5	0,7	1,6	-0,1	1,2	6,3
United Kingdom	-2,7	-2,9	-1,8	-2,6	-5,9	0,5	-1,0	-9,0
All Member States	8,2	8,7	0,9	1,3	2,8	0,2	1,0	4,2

Notes to Tables 116 and 117 : Real average rate: is the rate of variation of the average size of the holding according to the normal structural trend. Estimated rate: is the rate of variation of the average size of the holding according to Hypothesis A and B, that is respectively an increase of 5% and 50% of the real average rate. Transitional periods: they are calculated according to the acceleration rate considered under Hypothesis A and B.

**Table 118: Duration of the transitional periods in the different scenarios under hypothesis B**

	Real average rate	Estimated rate	Transitional period (years) according to scenarios					
	(1995-2003)	(Hypothesis B)	1	2	3	4	5	6
Denmark	10,5	15,7	0,6	0,9	1,8	-0,2	0,2	2,4
Germany	8,3	12,4	0,4	0,6	1,3	-0,1	0,5	2,7
Spain	14,4	21,6	0,4	0,6	1,3	0,9	1,2	1,9
France	7,9	11,8	1,1	1,6	3,3	-0,2	0,4	3,6
Netherlands	4,9	7,4	0,3	0,5	1,1	-0,1	0,8	4,4
United Kingdom	-2,7	-4,1	-1,3	-1,9	-4,2	0,4	-0,7	-6,4
<b>All Member States</b>	<b>8,2</b>	<b>12,4</b>	<b>0,6</b>	<b>0,9</b>	<b>1,9</b>	<b>0,1</b>	<b>0,7</b>	<b>3,0</b>

The transitional periods vary widely among scenarios and Member States. The values of the transitional periods are directly influenced by the structural push, which is in turn influenced by the variation of the production cost and of the economic margins that characterises each scenario. Thus it is not surprising that in scenario 4 transitional periods are negative. Negative values mean in that case that the production cost in this scenario is lower than in the reference situation; holdings are not obliged to increase the number of pigs to re-establish their margins, but might even opt for a reduction of the average size. In this case, investments are only required to adapt the type of floor and the space allowance, but not to increase the size of the holding.<sup>49</sup>

Looking at the general results (*All Member States*), under hypothesis A (Table 116) transitional periods differ very slightly from the time period that would be needed with a normal structural dynamic (Table 118), thus confirming that hypothesis A can be considered a “minimal impact” situation. Under hypothesis A, transitional periods increase for adaptive scenarios (1 to 3) - where an increase in space allowance is imposed - nevertheless remaining always below 3 years; an increase also marks the shift among evolutionary scenarios, within the limit of 1 year; the radical scenario features the highest transitional period, i.e. around 4 years.

The same trend is shown under hypothesis B, but with reduced duration of the transitional periods: the duration of the transitional periods for adaptive scenarios is lower than 2 years, for evolutionary scenarios it decreases to less than 1 year, and in the case of the radical scenario it amounts to 3 years.

<sup>49</sup> - The case of the United Kingdom is a very particular situation. Unlike other countries, UK shows a reverted structural trend in the sense that the average size of the holding has reduced during the period under examination. Nevertheless, structural push indexes show that the average size should increase in almost all the scenarios (see Table 114). This means that, to comply with scenario conditions, the UK pig meat sector should revert the trend of variation of the average size from negative to positive. Our methodology does not fit to this specific case, thus the result reported in the table for the UK row is not realistic.

**Table 119: Duration of the transitional periods with no acceleration factor**

	Real average rate (1995-2003)	Time to reach average holding size of each scenario adopting the real average rate					
		1	2	3	4	5	6
Denmark	10,5	0,9	1,3	2,7	-0,3	0,4	3,6
Germany	8,3	0,6	0,9	2,0	-0,1	0,7	4,1
Spain	14,4	0,6	0,9	1,9	1,3	1,8	2,8
France	7,9	1,6	2,4	5,0	-0,3	0,6	5,4
Netherlands	4,9	0,5	0,7	1,7	-0,1	1,3	6,6
United Kingdom	-2,7	-1,9	-2,8	-6,1	0,5	-1,0	-9,4
<b>All Member States</b>	<b>8,2</b>	<b>0,9</b>	<b>1,3</b>	<b>2,9</b>	<b>0,2</b>	<b>1,0</b>	<b>4,5</b>

Note to Table 6: This table shows the time period that would be required to reach the average dimension imposed by the scenario if no acceleration rate is applied at the current structural dynamic. In other words it shows the time that would be required to reach the size of the holdings indicated in Table 114 if the normal structural dynamics are at work, with no additional structural push. The periods shown in this table are reference values to judge about the effects of hypothesis A and B.

Some additional considerations should be applied to the reasoning developed above. The behaviour of the operators of the sector should be taken into account. Farmers are constrained by the trade-off between two opposite needs:

- a) on one side, the depreciation of the fixed assets and the need for optimization,
- b) on the other side, the obligation to apply policy innovations that require additional investments to reshape the stables (and, in most cases, to enlarge the holding).

This translates into a possible additional delay in applying policy innovations in some scenarios. This is because farmers will try to comply with policy scenario requirements when the depreciation of the older investments of the holdings is close to its end. This aspect will likely concern the scenarios or situations where the transitional period falls - theoretically speaking - within the short term. In the medium-long term, indeed, the two needs a) and b) cited above would not be in conflict and the need of new investments will appear anyway for the majority of the holdings.

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### ***Australia***

Australian Pork Limited: <http://www.apl.au.com/>

### ***Brazil***

Associação Brasileira da Indústria Produtora e Exportadora de Carne Suína (ABIPECS): <http://www.abipecs.com.br/ingles/index.php>

Brazilian Pork Meat Industry Exporters: <http://www.abiec.com.br/abiec/>

### ***Canada***

Canadian Pork Council: <http://www.cpc-ccp.com/>

Canada Pork International: <http://www.canadapork.com/>

### ***Chile***

Asociacion de Productores de Cerdos de Chile:

<http://www.asprocer.cl/index.php?mod=login>

### ***United States***

Livestock Marketing Information Centre: <http://www.lmic.info/>

National Pork Board: <http://www.porkboard.org/home/>

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(ABIPECS): <http://www.abipecs.com.br/ingles/index.php>

Brazilian Pork Meat Industry Exporters: <http://www.abiec.com.br/abiec/>

#### ***Canada***

Agriculture and Agri-Food Canada (Canada Ministry of Agriculture) – Red meat market information: <http://www.agr.gc.ca/redmeat/mimain.htm>

Canadian Pork Council: <http://www.cpc-ccp.com/>

Canada Pork International: <http://www.canadapork.com/>

***Chile***

Asociacion de Productores de Cerdos de Chile:

<http://www.asprocer.cl/index.php?mod=login>

***United States***

Economic Research Service of the U.S. Department of Agriculture (USDA-ERS) –

Hogs briefing room: <http://www.ers.usda.gov/briefing/hogs/>

Foreign Agricultural Service of the U.S. Department of Agriculture (USDA-FAS):

<http://www.fas.usda.gov/>

Livestock Marketing Information Centre: <http://www.lmic.info/>

National Pork Board: <http://www.porkboard.org/home/>