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Economic and Operational Impacts of the Proposed EU Directive laying down Minimum Standards for the Protection of Chickens kept for Meat Production

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Research undertaken for Defra by the University of Exeter Centre for Rural Research and ADAS

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This study was commissioned by the Department for Environment, Food and Rural Affairs Defra (Defra) for the purpose of providing information to assist in compilation of a Regulatory Impact Assessment (RIA) for the possible introduction of an EU wide Council Directive relating to the welfare of broiler chickens, in particular by estimating costs to the broiler industry in England.

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Responsibility for the contents of the report rests with the authors, and the views expressed are those of the authors and are not necessarily shared by other members of the University of Exeter or by the University as a whole, other members of ADAS or ADAS as a whole, or by Defra.

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1. Introduction and background

This study was commissioned by the Department for Environment, Food and Rural Affairs Defra (Defra) for the purpose of providing information to assist in compilation of a Regulatory Impact Assessment (RIA) for the possible introduction of an EU-wide Council Directive relating to the welfare of broiler chickens, in particular by estimating costs to the broiler industry in England.

The European Commission on 30th May 2005 published a draft EU Directive laying down enhanced standards for the protection of chickens kept for meat production. It is intended that the Directive will apply to all establishments with 100 birds or more. Amongst other measures, the draft proposes standards covering maximum stocking densities, minimum levels of lighting intensity and periods of darkness, maximum levels for various measures of air quality and temperature, a requirement for staff training, and specifies a comprehensive set of records relevant to livestock welfare and monitoring of compliance with the proposed standards.

Article 3 of the Directive requires that 'all single units and establishments' meet a series of minimum standards relating to levels of equipment, lighting, inspection and record keeping. These are specified in detail in Annex 1 of the Directive. Subject to these standards being met, the Directive allows a maximum stocking density of 30kg liveweight per square metre. By way of a derogation however, the Directive does allow Member States to permit a higher maximum stocking density of 38kg liveweight per square metre, subject to the owner or keeper meeting a set of more stringent requirements, entailing additional documentation, monitoring and environmental control. These are set out in Annex 2 of the Directive.

At the present time, there is no EU legislation which sets a maximum stocking density for broiler chickens. Denmark and Sweden have national legislation, whilst a number of other Member States have voluntary production schemes and welfare codes which specify maximum stocking densities. The United Kingdom welfare codes recommend a maximum stocking density of 34 kg liveweight per square metre of production space, but also note that a variety of factors need to be taken into account when setting up and monitoring stocking densities at levels which promote good welfare. Most chickens are

produced to the standards set within the industry's own Assured Chicken Production (ACP) scheme. This includes a maximum stocking density of 38 kg liveweight per square metre.

2. Methodology

With a view to assessing the possible economic impact of the proposed Directive on the broiler production industry in England, it was determined to update data collected in the course of a study undertaken in 2002 by the University of Exeter. Physical and financial output data on the most recent broiler crop was collected, along with chick, feed and veterinary costs (which together compose 79 per cent of total costs). Producers were asked about aspects of their physical plant and management pertaining to the proposed legislation and, in particular, in what ways and to what extent the terms of the draft Directive would impact on their cost of production.

The update was concentrated on 89 conventional controlled-environment flocks from the 2002 sample of 106. Thirty were interviewed on farm, the rest by telephone. The telephone questionnaire was a shortened version of the on-farm questionnaire. Questions relating to the key measures in the proposed Directive were presented in an identical manner in both questionnaires. The on-farm questionnaire further explored how performance factors such as bird mortality, feed conversion ratio or downgrading might be affected by each proposed standard, the likely costs involved, and invited any further comments.

The response to the survey was good, with 30 on-farm interviews and 52 telephone interviews completed. The telephone interviews included 14 producers no longer in broiler production; they were asked for the date of their last broiler crop and their reasons for ceasing production.

3. Current production costs and initial observations

Information on the most recent broiler crop was collected from 67 holdings. In most cases the chicks, more than seven million in total, were placed in March or April 2005. Growth rates were found to have improved slightly on 2002 data, producing an average 2.44kg liveweight bird in an unchanged 47 days to slaughter. Chick costs were collected from 55 farms (many telephone interviewees volunteered the information), feed details from 34 and vaccine and other veterinary costs from 32 flocks. Other elements of the cost

structure of broiler production were updated by applying published indices to the 2002 data.

The cost of producing a broiler chicken in early summer 2005 was thereby estimated at 122.0 pence. The average return was 123.9 pence, leaving a margin of 1.9 pence. The corresponding figure in 2002 was 3.0 pence.

The section of the questionnaires relating to the proposed new standards found that, on the whole, producers were not too concerned by the technical requirements of the draft Directive, but few had so far gained sufficient information to take a measured view of economic aspects. Most believed that the standard to which they currently produce (85 per cent to ACP) was similar in most respects, or that their current husbandry practices, particularly with respect to litter quality, would ensure compliance with the proposed ammonia concentration and relative humidity standards. Lighting periods, and in many cases light intensity, were not currently aligned with the proposed new standards. Many producers had reservations about the merits of the light regime proposals, but few saw any significant problem with complying in terms of available equipment or the capital cost of gearing-up for compliance.

Only the proposed temperature-lift requirement caused widespread concern, and that not so great as anticipated. The proposed new standard specifies that when outside shade temperature is greater than 30 degrees Celsius, the temperature inside the house must not exceed outside temperature by more than 3 degrees Celsius (the so-called "three degree temperature lift"). Many interviewees thought that they do not at present exceed that limit very often, if at all, but in conversation, even those with evaporative cooling installed, conceded that complying with this requirement could be a problem.

The phenomenon of respondents being less concerned than might have been expected, and of producers in many cases indicating that they thought the cost of upgrading to meet the new standards would be minimal, suggests that producers had not given much thought to the issue up to that point. This view was somewhat strengthened by the observation that a number of producers began to have 'second thoughts' on some of the issues as the interview proceeded. Very few had obtained specifications or quotes for any modifications or new equipment required. Where respondents minimised the likely impact on their business of the proposed Directive, their estimates should therefore be accepted with a degree of caution.

4. Implications of changes in stocking density

Excluding those producers reporting that they did not know what their stocking density was, 80 per cent of respondents declared their maximum stocking density to be less than or equal to 38kg liveweight per square metre. The balance indicated that their maximum figure was greater than 40kg liveweight per square metre.

The apparent high level of compliance to a maximum of 38kg has to be tempered, however, by a significant proportion of producers indicating that they would nevertheless have to reduce stocking below that figure. The apparent inconsistency is explained, at least in part, by the recognition by many producers that in order to provide a 'safety net' to allow for possible delays in removal of birds for slaughter, they would have to operate at maximum stocking rates *below* the Directive figure of 38kg liveweight per square metre. One producer suggested a figure of 200g as being a reasonable allowance – which equates to approximately 2.5 days growth at the rates achieved in the last days before slaughter. The authors conclude, however, that where a safety margin was allowed, to minimise financial loss most producers would aim to get much closer to target maximum stocking density – probably to within one day's growth (approx. 85g).

With the introduction of a *statutory* upper limit of stocking density and the recognition that in future it will be an offence to exceed that limit, it is entirely realistic of producers if they are now considering a more cautious approach to stocking density than hitherto.

Some producers indicated that they would maintain total volume of output either by extending existing houses or by adding houses. The capital cost of provision of each new chick place at current levels of stocking is estimated at £7.50 (range £6 to £9). However, in a situation where stocking density is reduced, the capital cost per bird increases because the fixed costs of groundworks, house structure and most other building costs have to be spread across fewer birds. Capital cost per bird could therefore increase by as much as £2 per bird, depending on the degree of stocking density reduction.

Of those producers who recognised that their present buildings might fall short of the requirements of the Directive, most were prepared to consider upgrading or replacing houses as necessary. However, at the time of the interview, few had any definite plans to upgrade, and few anticipated being obliged to make more than relatively minor adjustments to their plant and management.

5. Lighting requirement

The draft Directive proposes a minimum of 20 lux during the lighting period and a total of eight hours in 24 of darkness, of which at least four hours must be continuous. Most producers were providing less than 20 lux during the lighting period and a period of darkness of no more than the minimum of four hours stipulated by ACP.

The ACP standard allows seven days at the beginning of the growing cycle and ten days at the end when no period of darkness need be provided. Annex 1 part 7 of the EU draft Directive says that the lighting cycle must include the specified periods of darkness from "within three days from the time when chickens are placed in the building until three days before the foreseen time of slaughter".

Producers were particularly concerned that management and welfare challenges would be presented when birds scrambled for the feeders and drinkers when the lights came back on after an extended dark period and that, through continuing the regular cycle of dark periods up to three days before the end of the growing period, birds would be more "flighty" during catching.

Forty-six per cent of those interviewed said that they would not be able to comply with the lighting requirement of the draft Directive using their present equipment. From those able to provide an estimate of the possible cost of upgrading to comply, figures ranged from 21 pence to £5.66 per square metre of production area, with a mean of 71 pence.

On-farm interviewees were further asked about costs of the measure in terms of mortality, feed conversion and downgrading. Two thirds thought that there would be a cost, but that for mortality and downgrading it was an unknown. Estimates of additional time to reach crop maturity, through eating less per day and growing more slowly (the objective of the darkness requirement), ranged from half a day to two days.

6. Ammonia concentration requirement

Producers wishing to stock to 38 kg liveweight per square metre will be required to ensure that ammonia concentrations in the house never exceed 20ppm. Most respondents were not very concerned by this proposed measure, saying that they already used extra heat in winter (and, by implication, ventilation) to maintain litter quality. It is noted, however, that at a series of workshops organised by ADAS in 2004, one-third of producers thought that "averaging" of the measure would be required, with ammonia

levels inevitably rising above 20ppm on an occasional or short-term basis. In many cases the long-term solution would be to upgrade insulation and improve heating and ventilation controls. Twenty per cent of interviewees thought that their facilities would need upgrading to meet this requirement, providing estimates with a mean of £1.94 per square metre. Where upgrading of older houses was not considered feasible, additional heat input and ventilation would be the main way of minimising ammonia levels. That being the case, if heating and electricity costs were (for example) to rise by 10 per cent, the ADAS estimate for the additional running costs would be £3,150 a year for an average site rearing 100,000 per crop.

7. Temperature-lift requirement

A maximum three degree Celsius temperature-lift between outdoor shaded temperature and indoor temperature is proposed. Notwithstanding the limited number of days each year when outdoor shaded temperatures are likely to rise above 30 degrees Celsius, this requirement is seen as a significant technical challenge to many producers, especially as many houses were designed and equipped to keep within the confines of a maximum five degree temperature-lift. Whilst two-thirds of interviewees considered that they already achieve this standard with their existing facilities, that is thought by the authors to be somewhat over-optimistic and may not reflect the true position in practice. ADAS estimates the cost of upgrading older houses could be as high as £30 to £50 a square metre, equivalent to 25 to 40 per cent of the cost of a new house. Installation of evaporative cooling is cheaper at £3.77 to £7.55 per square metre, but the full benefit of evaporative cooling depends on insulation already being adequate. Producers estimated that electricity and water costs would be increased by this requirement, but they were unable to say by how much.

8. Relative humidity and recording of relative humidity, temperature and water consumption requirement

The Directive requires relative humidity inside a broiler house not to exceed 70 per cent when outside temperatures are below ten degrees Celsius and relative humidity and temperature are to be recorded on a continuous basis and water on a daily basis. The ability to meet the relative humidity requirement necessitates similar standards of insulation, ventilation, heating and management skills to those required to meet the ammonia target. As with the ammonia requirement, many producers felt they already met the standard by the way they managed their litter.

Sixty per cent of respondents thought they were not at present meeting the proposed requirements because they were not recording temperature and humidity on a continuous basis and water consumption on a daily basis. Estimates of capital costs to achieve compliance averaged 99 pence per square metre. Electricity, repairs and labour for monitoring were identified as increased operating costs, but most producers were not able to say by how much they thought they would be increased. In practice, if steps were already being taken in older houses to minimise ammonia emissions (by additional heat and ventilation), these measures would also go a long way towards meeting the relative humidity target set in the Directive.

9. Documentation requirement

The Directive proposes that sixteen items of documentation, falling into the categories of i) technical details of the establishment and its equipment, ii) production targets, iii) management and iv) technical inspections of the ventilation and alarm system, should be kept up to date and available for inspection. The great majority of producers were found to already keep most of the records specified and would have few problems with compliance. Those with some shortfall on documentation estimated the cost of full compliance at £100 to £3000, two pence to 57 pence per square metre, with a mean of 17 pence.

10. Impact of stocking density changes on costs

For the purpose of considering economic impacts of the Directive, the status quo in terms of stocking density was taken as 38kg liveweight per square metre, which is the current ACP standard, and the level declared by the majority of producers. The range of densities considered in the main body of the report however is 25kg to 42kg liveweight per square metre. Although both thinned and non-thinned methods of rearing were considered, the majority of English broiler producers thin crops as they approach maturity, and therefore the main focus of this report is on thinned flocks.

Four key aspects of the impact of the Directive on the economics of production were examined. These were production (operating) costs, capital costs, turnover and net margin. In assessing the potential change under each of those heads, two alternative scenarios were considered:- i) a “worst-case” scenario whereby all broiler growers would be forced to operate at lower levels of stocking and ii) an assessment of what the impact

on costs might be in practice, based on information on current production practices gleaned from producers by way of the survey.

a) Impact on production costs

The following calculations seek to determine the impact on operating costs *per se* arising from a forced reduction in stocking density. It must be remembered, however, that the increased operating costs will **always** be associated with *either* a fall in net revenue (reflecting the reduced number of birds reared in the house), or with a requirement to invest capital to replace lost bird spaces. This must be taken into account when seeking to calculate the overall financial impact of the Directive's stocking density requirements.

i) "Worst-case" scenario

The "worst case" scenario is that all broiler producers would have to reduce stocking density to 30kg liveweight per square metre. When, in the course of the present survey, producers were asked their present maximum stocking density, 98 per cent indicated that they stocked at levels above 30kg liveweight per square metre, with a majority (63%) indicating that they currently stock to a maximum of 38kg liveweight per square metre.

If it were assumed that the *average* stocking density is 38kg, then a forced reduction to 30kg would increase operating costs for the typical 100,000 bird unit by £48,300 per year. The equivalent figure for the English broiler industry would be £41m per year.

ii) Impact based on survey responses

- *Producers currently stocking to a maximum of 38kg liveweight per square metre or less who continue, post-Directive, to maintain the same level of stocking.*

For these producers, the Directive will not impose reductions in stocking rate. There will therefore be no increase in operating costs arising from a stocking rate reduction, no loss of revenue, and no requirement to make additional capital investment to maintain the same volume of production.

- *Producers currently stocking to a maximum of 38kg liveweight per square metre who decide to maintain, post-Directive, a safety net, or margin, to ensure stocking rates do not unintentionally exceed 38kg liveweight per square metre.*

In this scenario, it is assumed that producers would under-stock slightly to allow for delays in depopulation. A one day safety net would require producers to reduce bird

numbers by 3.5 per cent. That would result in terminal stocking density falling to 36.7 kg liveweight per square metre. In such a situation, operating costs per bird would increase by 0.91 pence.

For a typical 100,000 bird unit, the increase in operating costs would be £6,375 per year. If it was assumed on the basis of the survey data that 60 per cent of producers would fall into this category, the cost to the English industry would be £3.3m per year.

- *Producers who currently stock at levels in excess of 38kg liveweight per square metre.*

Twenty per cent of producers declared that they currently stock at levels in excess of 38kg liveweight per square metre. The median value of their declared maximum stocking levels was 42kg liveweight per square metre.

For a 100,000 bird unit, the additional operating costs associated with a move from 42kg to 38kg would be £16,800 per year. For this sector of the industry as a whole, the equivalent figure is £2.9m per year.

If the same units took the approach outlined above of allowing a safety margin and working to a maximum of 36.7 kg liveweight per square metre, total additional costs to the 100,000 bird unit would be £23,170 (i.e. £6,370 more than the £16,800 above) and the cost to the sector £4.0m.

On the above assumptions, the combined additional operating cost to the industry of those producers currently stocking at or above 38kg would be £6.2m per year if those reducing to a maximum of 38kg liveweight per square metre did not allow a further safety margin, £7.3m if they did.

b) Impact on capital costs

It has been presumed that in situations where a producer is obliged to reduce stocking density, this will be achieved by rearing fewer birds to the same finishing weight as hitherto. The survey data indicates that 83 per cent of producers are likely to find themselves in this position.

The survey probed whether, in this situation, producers would rear fewer birds or build additional accommodation to make up the shortfall. Fifty-nine per cent indicated that they would rear fewer birds, the rest that they would build additional accommodation or extend their existing housing. Producers rearing fewer birds would suffer a reduction in net margin per bird and for the broiler production unit as a whole, but would incur no additional capital costs. Producers who increased their production area would maintain volume and value of output as before, but would need to invest additional capital to build the new accommodation.

New housing costs based on current industry stocking densities (i.e. 38kg) are of the order of £7.50 per bird. Where stocking densities are reduced, the cost of the great majority of the construction work is much the same per square metre, but has to be borne by fewer birds, so the per bird figure is increased. For this reason, in the following calculations capital cost has been increased on a pro-rata basis to either £9.50 per bird (reduction from 38kg to 30kg liveweight per square metre), £8.29 (reduction from 42kg to 38kg liveweight per square metre) or £7.76 (reduction from 38kg to 36.7kg liveweight per square metre). As in other calculations in this report, cycles per year have been taken as seven.

i) "Worst case" scenario

The "worst case" scenario (as already outlined in 3.i above) would be that all producers had to reduce stocking from the current average of 38kg to 30kg liveweight per square metre. If all individual producers, or the industry as a whole, then sought to maintain volume and value of output by re-investing in new or extended housing, the capital cost for a typical 100,000 bird unit would be £200k and the cost to the English industry would be £171m.

ii) Impact based on survey responses

Producer responses to the survey revealed that 41 per cent would invest capital to maintain bird numbers in the event of a mandatory reduction in stocking density. The survey also indicated that 20 per cent of producers currently work to maximum stocking densities in excess of 38kg liveweight per square metre (median value 42kg liveweight per square metre). Thirty per cent of that number said that they would build additional accommodation; six per cent of all producers.

Responses to the survey also indicated that, in order to avoid ever contravening the new regulation through eventualities such as delays in depopulation, 73 per cent of producers currently working to a maximum of 38kg liveweight per square metre will reduce bird numbers placed. Of those, 70 per cent (32 per cent of all producers) said that they would construct additional houses to compensate for the shortfall in numbers of birds produced.

Capital costs are estimated as follows:

- *Producers currently operating at 42kg liveweight per square metre*. For a typical 100,000 bird unit, the capital cost of creating extra production capacity to maintain bird numbers as before would be £79,000. Capital cost to this sector of the industry would be £4.1m. If *all* producers in this group decided to replace the productive capacity lost, or if other producers (or newcomers), replaced the lost capacity, the total cost relating to this sector of the industry would be £13.5m.

- *Producers currently operating at 38kg*. Capital cost for a typical 100,000 bird unit to replace lost bird spaces would be £26,500. Capital cost for the proportion of this sector that declared it would replace lost capacity would be £7.2m. If *all* the producers in the group (40% of all respondents), decided to build additional accommodation to make up the shortfall in bird numbers, the capital cost would be £9.1m, as it would also be if not all producers built extra accommodation to replace their own shortfall, but others made up for them by further expanding their production capacity.

c) Impact on turnover and net margin

Fifty-nine per cent of producers in the survey declared that they would need to reduce stocking density to meet the Directive level of 38kg liveweight per square metre. Further questioning revealed that when faced with a situation that required stocking density to be reduced, 33 per cent (19 per cent of all respondents) indicated that they would rear fewer birds, rather than build more rearing accommodation. That approach would result in a reduction in both turnover and broiler unit total net margin, but the need to invest new capital to create additional rearing accommodation would be avoided.

The effect on turnover and net margin will vary according to the extent to which stocking density (and therefore bird numbers) need to be reduced. For the purposes of the

calculations, revenue (turnover) per bird has been taken as 123.9 pence and net margin as 1.9 pence.

i) "Worst-case" scenario

If *all* producers had to reduce stocking density from the average of 38kg to 30kg and chose to meet this requirement by rearing fewer birds, annual turnover for the industry as a whole would fall by £157m and net margin by £2.4m. If some or all of the lost productive capacity was replaced by new construction, total annual turnover would not be reduced to that extent, and net margin might not be, but depreciation and other charges on the new buildings and equipment would in all likelihood result in a reduced industry net margin, despite the improved production efficiency of the new plant.

ii) Impact based on survey responses

- *Producers currently operating at a maximum stocking rate of 42kg liveweight per square metre*

The survey indicated that 20 per cent of producers currently operate at maximum stocking rates in excess of 38kg liveweight per square metre. Seventy-seven per cent of those (15 per cent of all respondents) said that they would simply reduce bird numbers to meet the stocking density requirement rather than build new accommodation. For a typical 100,000 bird unit, stocking with fewer birds to meet the 38kg upper limit would reduce turnover by £82.7k and net margin by £1.3k. The impact to this sector of the broiler industry as a whole (assuming this group represents 15 per cent of all birds) would be to reduce turnover by £10.6m and net margin by £163k.

- *Producers currently operating at 38kg.*

It was established by the survey that 60 per cent of producers, those currently operating at a maximum stocking density of 38kg liveweight per square metre, might take the approach of rearing fewer birds to provide a one day 'safety-net' against delays in slaughtering the birds. In that event, the typical 100,000 bird unit would see annual turnover fall by £30,000 per annum, and net revenue for the holding would be reduced by £455. For the industry as a whole, the reduction in annual turnover would be £15.4m and the reduction in net margin £234,000 per annum.

11. Effect on international competitiveness and trade

Section 5 presents a discussion of the impact of the proposed Directive on overall UK international competitiveness and trade[1]. Research undertaken by Van Horne at Wageningen LEI indicates that UK broiler production costs are slightly higher than in France, Germany and the Netherlands and significantly higher than in the United States and Brazil. It is believed that Thailand also has production costs of a similar order to those in Brazil. Implementation of the proposed Directive will increase production costs for UK broiler producers. If all EU states implement the Directive to the same extent and over the same time frame, the competitive position of UK broiler producers relative to their EU competitors may not change to any great extent. However, the competitive position of the UK (and of other EU countries) relative to the USA, Brazil and Thailand can be expected to further deteriorate.

[1] It should be noted, however, that other sections of this report relate to England only

ECONOMIC AND OPERATIONAL IMPACTS OF THE PROPOSED EU DIRECTIVE LAYING DOWN MINIMUM STANDARDS FOR THE PROTECTION OF CHICKENS KEPT FOR MEAT PRODUCTION

1 Introduction and background

The European Commission on 30th May 2005 published a draft EU Directive laying down enhanced standards for the protection of chickens kept for meat production. It is intended that the Directive will apply to all establishments with 100 birds or more. Amongst other measures, the draft proposes standards covering maximum stocking densities, minimum levels of lighting intensity and periods of darkness, maximum levels for various measures of air quality and temperature, a requirement for staff training, and specifies a comprehensive set of records relevant to livestock welfare and monitoring of compliance with the proposed standards.

Article 3 of the Directive requires that 'all single units and establishments' meet a series of minimum standards relating to levels of equipment, lighting, inspection and record keeping. These are specified in detail in Annex 1 of the Directive. Subject to these standards being met, the Directive allows a maximum stocking density of 30kg liveweight per square metre. By way of a derogation however, the Directive does allow Member States to permit a higher maximum stocking density of 38kg liveweight per square metre, subject to the owner or keeper meeting a set of more stringent requirements, entailing additional documentation, monitoring and environmental control. These are set out in Annex 2 of the Directive.

At the present time, there is no EU legislation which sets a maximum stocking density for broiler chickens. Denmark and Sweden have national legislation, whilst a number of other Member States have voluntary production schemes and welfare codes which specify maximum stocking densities.

In Denmark, maximum stocking densities are currently being reduced by one kilogram per year to a limit of 40 kg liveweight per square metre in 2006. Sweden has since the late 1980s adopted a two-level stocking density approach not dissimilar from that now proposed by the European Commission. The lower limit is set at 20 kg liveweight per square metre. A higher limit of 36 kg liveweight per square metre applies when producers participate in an Animal Welfare Programme for chickens, which sets standards for management, housing facilities, equipment and stockmanship and is taken

down to the level of individual chicken houses. It is reported that 99 per cent of Swedish producers participate in the programme.

A report from the Scientific Committee on Animal Health and Animal Welfare (SCAHAW)[2] in 2000 recorded that in most Member States production standards follow the recommendations of breeding companies, feed manufacturers or advisory services. In Germany, a voluntary industry agreement sets a maximum stocking density of 35 kg liveweight per square metre. In Spain, the Ministry of Agriculture exerts some financial leverage (eligibility for insurance against losses due to natural events, including heat stress) to impose stocking density limits that take account of season and type of house ventilation (forced / natural). Houses without forced ventilation should be stocked no higher than 28 kg liveweight per square metre in the summer; 32 kg liveweight per square metre during the rest of the year. With forced ventilation the figures can be increased to 34 kg liveweight per square metre in the summer and 38 kg liveweight per square metre for the rest of the year.

In the United Kingdom, most producers belong to the Assured Chicken Production (ACP) Scheme, which sets a maximum stocking density of 38 kg liveweight per square metre. The Farm Animal Welfare Council (FAWC) and Department for Environment, Food and Rural Affairs (Defra) in its welfare code recommend a maximum stocking density of 34 kg liveweight per square metre. The Royal Society for the Prevention of Cruelty to Animals (RSPCA) 'Freedom Food' labelling scheme specifies 30 kg liveweight per square metre. The stocking rates specified by four organisations[3] setting standards for organic production are 30 kg liveweight per square metre for mobile housing, 21 for fixed housing.

[2] The Welfare of Chickens kept for Meat Production (Broilers), Report of the Scientific Committee on Animal Health and Animal Welfare, Adopted 21st March 2000. European Commission Health and Consumer Protection Directorate-General

[3] UK Register of Organic Food Standards (UKROFS), Organic Farmers and Growers (OFG), Organic Food Federation (OFF) and the Soil Association.

Table 1 Maximum stocking densities for broiler chickens in selected EU Member States

State	Max. kg lw/sqm	status	conditions	variations
Denmark	40	legal, from 2006		
Sweden	20	legal		
Sweden	36	legal	subject to participation in Animal Welfare Programme	
Germany	35	voluntary industry agreement		
Spain	32	voluntary with government incentive	without forced ventilation	Maximum 28kg lw/sqm in summer
Spain	38	voluntary with government incentive	with forced ventilation	Maximum 34kg lw/sqm in summer
United Kingdom	38	ACP industry scheme		
United Kingdom	34	Government recommendation		
United Kingdom	30	Freedom Food		
United Kingdom	21	organic production codes	fixed units	30kg lw/sqm for mobile houses

A Defra sponsored economic study of broiler production in England conducted by the University of Exeter Centre for Rural Research in calendar year 2002 established an average output for conventional controlled environment production of 45.1 kg liveweight per square metre.[4] That figure included output from holdings that thinned crops (38% of holdings, producing 29% of birds), harvesting a part of the crop one or more times before final clearance at the end of the production cycle. The practice is adopted to maintain a lower maximum stocking density whilst increasing total output per square metre. Data collected in the course of the study indicates that it is practically possible to produce an output of up to 50 kg liveweight per square metre without at any time stocking more heavily than 38 kg liveweight per square metre. That is an increase in output, through thinning, of 31.6 per cent.

At the time of the 2002 study, many producers were relatively newly established in the Assured Chicken Production scheme, some producers included in the study joined during the year, and some remained outside. It is therefore possible that some producers stocking at beyond 38 kg liveweight per square metre in 2002, particularly in the early months of the year, ceased to do so soon afterwards.

Table 2 Proportion of holdings thinning broiler crops and membership of ACP

	2002		2005	
	% of flocks	% of birds	% of flocks	% of birds
Membership of ACP	74	84	85	92
Thinning	38	29	48	45
Kg lwt output per sq metre	45.1		44.4	

In the 2005 update survey, it was found that the liveweight output per square metre had declined to 44.4 kg, a 1.4 per cent reduction. The proportion of flocks and of birds produced to ACP standards had further increased, such that 92 per cent of birds were produced on farms subscribing to ACP. The practice of thinning had meanwhile been extended (Table 2). Coupled with the reduction in liveweight output per square metre, the number of instances where total liveweight of birds in the house at any one time exceeded 38 kg per square metre was almost certainly reduced and compliance with the industry's adopted standard (ACP) improved.

[4] The report on the study, 'The Structure and Economics of Broiler Production in England' can be downloaded from the Centre for Rural Research Website, http//www.ex.ac.uk.

2. Updating the Economic Data

Costs and margins in the English broiler industry

As a first stage in informing negotiations on the draft Directive, an update of the data collected by the 2002 Defra sponsored Special Economic Study of Broiler Chicken Production was undertaken. The 2002 study covered a representative sample of all broiler producers in England (the sample frame being based on a preliminary structure study of the industry) and was co-ordinated nationally by the University of Exeter, with on-farm visiting undertaken by six other college and university centres, each in their own region. The update was approached in a similar manner, though for practical reasons with some modification.

The update was concentrated on farms most likely to find their production practices affected by the proposed legislation; that is, holdings producing broiler chickens in conventional controlled-environment units. Of a total sample of 106 holdings in the 2002 study, the number of such holdings that were also operating the usual batch (or crop) system and subject to a payment contract whereby full information on gross values of birds produced, chicks, feed and vaccines were separately identifiable, was 89. Recognising that not all would still be in production, and that not all would necessarily agree to assist with the update, it was determined to contact, if possible, all 89. Following a preliminary letter, an initial telephone call would be made and, of those established to be still in production, 30 would be visited on-farm. The balance of all who would or were able to co-operate would be interviewed on the telephone, an appropriate time being set for a second call if necessary.

For the on-farm visit, a questionnaire was designed to collect the necessary information to update gross margins and a selection of key production parameters. The questionnaire also set out to investigate the extent to which producers would have to modify their buildings, equipment and husbandry practices to comply with the proposed new legislation, and what the necessary changes might cost.

The telephone questionnaire was a shortened version of the on-farm questionnaire. It covered most of the same ground, but collected information only on the physical and financial outputs of the most recent chicken crop, not the full gross margin, and was more limited in its investigation of the implications for producers of the draft Directive. A short series of questions found only on the telephone questionnaire catered for farms successfully contacted but no longer in broiler production. The on-farm and telephone questionnaires are reproduced as Appendices IV and V.

With some substitution of the farms that had gone out of production, the total numbers of holdings accounted for was 93, the break-down of which was:-

On farm interviews	30
Telephone interviews	52
Non-cooperators	11
Total	93

The 11 non-cooperators included those who could no longer be contacted, a number who declared themselves too busy at the present time and one who stated plainly that he "got nothing out of it last time".

All holdings on which the on-farm interview was conducted remained in conventional controlled-environment broiler production, with production practices and payment structures as specified. Fourteen producers found on initial contact to be no longer in broiler production were asked to complete the telephone questionnaire only. The relevant questions probed the date of the last broiler crop and reasons for ceasing production.

Holdings no longer in production

The 14 holdings that had gone out of production since 1st January 2003 were evenly balanced between farmer-owned and company-owned flocks at seven of each. Most farmer-owned flocks ceasing production were recorded in 2002 as having less than 40,000 birds (6 holdings); one was placed in the mid-size band of 40,000 to 100,000 birds (Table 3). By contrast, most company-owned flocks ceasing production formerly had more than 100,000 birds (5 holdings). One of those had not necessarily ceased broiler production altogether, the present survey merely established that it was no longer operated by the company. That was also the case with two smaller flocks (one of less than 40,000 birds and one of 40,000 to 100,000 birds) also recorded as no longer operated by the processor.

Half the holdings ceasing production, including five of the company-owned flocks, had done so in the first six months of 2004, two more (both farmer-owned) in the second half of 2004. Two had left the industry with the last crop of 2002, two in the first half of 2003 (one company owned) and one (the remaining company flock) in the second half of 2003. Three producers had concluded their operation was too small, three retired, one died, two units were converted to use for another type of poultry production and in two cases the operator decided to concentrate on other enterprises within the same farm business. Those were in addition to the three no longer operated by the processor who stocked and ran them in 2002, but may still in production.

Table 3 Timing of clearance of last broiler crop, 14 holdings no longer in production

	Farmer-owned			Company-owned		
Flock size band	**2K-40k**	**40k-100k**	**>100k**	**2K-40k**	**40k-100k**	**>100k**
	Ceased production					
July-Dec 2002	2	-	-	-	-	-
Jan –June 2003	1	-	-	-	1	-
July-Dec 2003	-	-	-	-	-	1
Jan –June 2004	2	-	-	1	-	4
July-Dec 2004	1	1	-	-	-	-

Even if three holdings remain in production, for 11 out of 89 to leave the industry in less than three years is a large proportion (12.4 per cent). With margins under pressure on both the production and processing operations, processors have been rationalising their activities and their suppliers. The birds on the 11 holdings removed were 9.7 per cent of the 2002 total on 89 holdings and the houses removed 13.1 per cent of the total. Those measures confirm that the holdings removed tended not only to be those with less birds than average, but with smaller than average houses too. The process continues and a further three company holdings contributing data to the present update are known not to be continuing, or at least not under the same ownership and management.

Holdings continuing in production

With the exception of one (company) where information on the latest broiler crop was unavailable, respondents willingly completed all sections of whichever questionnaire was asked of them, with several telephone interviewees volunteering data on feed quantity and cost, chick cost, vaccines and other veterinary costs that it had been intended to ask only of on-farm interviewees . Where such data was offered it was recorded and has been used in the analysis that follows.

Table 4 Farmer-owned and company-owned holdings by region (excluding non-cooperators and holdings found to be out of production)

	Farmer-owned				Company-owned				
Flock size band	**2K-40k**	**40k-100k**	**>100k**	**All**	**2K-40k**	**40k-100k**	**>100k**	**All**	**Total**
England North	6	5	7	18	-	-	2	2	20
England East	3	5	3	11	1	11	8	20	31
England West	2	3	5	10	-	2	5	7	17
All regions	**11**	**13**	**15**	**39**	**1**	**13**	**15**	**29**	**68**

Sixty-seven holdings completing the on-farm or telephone questionnaire provided information on the latest crop that had cleared the farm and for which they had at the time of the interview received written notification of the liveweight of birds taken from the farm and gross return. In most cases the chicks were placed in March or April 2005. The 67 crops accounted for 7.03 million chicks placed, 6.74 million birds harvested, an average of rather more than 100,000 per farm after 4.1 per cent mortality (For comparison, in 2002 average mortality was found to be 3.8 per cent, the average weight of birds sold 2.40kg, time in the unit 47 days and growth rate per day 51 grams. Return per liveweight kg at that time was 48.2 pence and the return per bird £1.16.)

Table 5 Details of most recent broiler crop, 67 holdings

		total	per farm	per bird
Chicks placed		7,026,729	104,877	
Birds sold		6,736,423	100,544	
Mortality	%	4.1		
Weight of birds sold	kg	16,425,484	245,156	2.44
Value of birds sold	£	8,015,200	119,630	1.19
Return per kg sold	pence	48.8		
Time in unit*	days	47		
Growth rate*	g/day	53		

*46 flocks; not all telephone survey holdings were asked for this information

Thirty producers interviewed on-farm and four interviewed by telephone provided full information on chick, feed, vaccine and veterinary costs, and a further 21 telephone interviewees provided chick costs. Table 6 summarises the resulting data. Whilst retaining the average 44 days in the unit, the 34 holdings achieved lower mortality at 3.6 per cent, a higher average weight at sale, at 2.53kg, and a growth rate of 57 grams per day. Payment per kg liveweight was somewhat lower at 49.1 pence and return per bird £1.24. Feed cost per tonne in 2002 was £145 and feed conversion ratio was 1.89 kg of feed per kg of liveweight gain.

Table 6 Details of most recent broiler crop, including chick, feed, vaccine and other veterinary costs, 34 holdings

		total	per farm	per bird
Chicks placed		3,309,979	97,352	
Birds sold		3,189,898	93,821	
Mortality	%	3.6		
Weight of birds sold	kg	8,058,426	237,013	2.53
Value of birds sold	£	3,952,983	116,264	1.24
Return per kg sold	pence	49.1		
Time in unit	days	44		
Growth rate	g/day	57		
				pence
Chick cost (55 flocks)		1,388,081	25,238	23.2
Chick cost incl. mortality (55 flocks)		1,388,081	25,238	24.3
Feed cost		2,256,258	66,361	70.7
Feed cost per tonne		152		
Feed per kg liveweight gain	kg	1.85		
Vaccines (32 flocks)		31,973	999	1.0
Other vet & med (32 flocks)		8,988	281	0.3

Costs other than those of chicks, feed, vaccines and other veterinary services and medicines were not collected by either the on-farm or telephone questionnaires. To update the other elements of the cost structure of broiler production established by the 2002 study, reference was made to statutory increases in agricultural wages over the period and to the Agricultural Price Indices of the means of agricultural production, compiled and published by Defra.

The cost of producing a broiler chicken in early summer 2005 was thereby estimated to amount to 122.0 pence. Deduction of that cost from the average return of 123.9 pence leaves an average margin of 1.9 pence. The reduction in net margin from 3.0 pence in 2002 is of considerable significance to the industry, amounting to a decline in the proportion of value of output from 3.2 to 1.9 per cent. For a typical broiler unit producing 600,000 birds a year, total net margin would be reduced from £17,800 to £11,500.

Table 7 The cost structure of broiler production, as established in 2002 and 2005 estimates

	2002 p/bird	2005/2002 % increase	2005 p/bird
Chicks (incl. mortality)	23.6		24.3
Feed	65.7		70.7
Labour	3.8	17.2	4.4
Vaccines	0.8		1.0
Other veterinary and medicines	0.6		0.3
Contractors' charges	0.6	18.9	0.7
Bedding and litter	1.4	4.3	1.5
Other variable costs	0.3	4.3	0.3
Electricity	1.3	2.8	1.3
Gas	1.8	64.4	3.0
Heating oil	0.1	64.4	0.2
Water	0.5	4.3	0.5
Small tools and miscellaneous	1.0	18.9	1.2
Contract manure removal	1.7	18.8	2.0
Other fixed costs	1.2	4.3	1.3
Specialist machinery depreciation and repairs	0.3	18.9	0.3
Broiler equipment depreciation and repairs	1.4	0.7	1.4
Building repairs and maintenance	3.1	12.8	3.5
Building depreciation/rent paid & site rent[5]	3.4	15.1	3.9
Total cost of production	112.6		122.0
Return per bird	115.6		123.9
Net margin	3.0		1.9

[5] Site rent is an accounting charge for use of the land area used by an intensive livestock enterprise and is distinct from any rent paid on buildings. In cases where a broiler unit is owner-occupied, the site rent is imputed; where the unit is rented, it forms a part of the total rent paid.

3. The likely response of broiler producers to the introduction of the proposed welfare standards

The most extensive section of both the telephone and on-farm questionnaires explored the views of broiler producers on the likely impact of the proposed new standards on their own holding, and their likely response. On the whole, producers were not too concerned by the technical requirements of the draft Directive, but few had so far gained sufficient information to take a measured view of economic aspects. Most believed that the standard to which they currently produce (85 per cent to ACP) was similar in most respects, or that their current husbandry practices, particularly with respect to litter quality, would ensure compliance with the proposed ammonia concentration and relative humidity standards. Lighting periods, and in many cases light intensity, were not currently aligned with the proposed new standards. Many producers had reservations about the merits of the light regime proposals, but few saw any significant problem with complying in terms of available equipment or the capital cost of gearing-up for compliance.

Only the proposed temperature-lift regulation caused widespread concern, and that not so great as anticipated. The proposed new standard specifies that when outside temperature is greater than 30 degrees Celsius, the temperature inside the house must not exceed outside temperature by more than 3 degrees Celsius. Many interviewees thought that they do not at present exceed that limit very often, if at all, but in conversation even those with evaporative cooling already installed conceded that it could be a problem. One grower went so far as to declare that full compliance at all times would be impossible.

The phenomenon of respondents being less concerned than those with specialist technical knowledge would expect, and of producers in many cases indicating that they thought the cost of upgrading to meet the new standards would be minimal, but apparently beginning to have second thoughts even as the interview proceeded, suggests that producers had not previously given much thought to the matter. Very few had obtained specifications or quotes for any modifications or new equipment required. Where respondents minimised the likely impact on their business of the proposed Directive, their estimates should therefore be accepted with a degree of caution.

Questions relating to the key measures proposed were standardised as far as possible. and presented in an identical manner in both the telephone and on-farm questionnaires. The on-farm questionnaire further explored how performance factors such as bird mortality, feed conversion ratio or downgrading might be affected by each proposed standard, the likely cost of it, and invited any further comments on each standard.

A preamble to the section explained:-

An EU Directive laying down minimum standards for the protection of chickens kept for meat production is soon to be discussed. Two maximum levels of stocking density are envisaged, 30kg and 38 kg liveweight per square metre. The higher weight limit may require some changes to your husbandry practices, or even new capital investment.

The following question by question summary of producer responses includes replies both from the telephone interviewees and from those interviewed on-farm. Feedback received during the series of Defra-funded consultation meetings with broiler producers arranged by ADAS in 2004[6] has been interspersed as appropriate.

Question 11 Stocking density requirement

Would a new maximum stocking density requirement of 38 kg liveweight per square metre mean that you had to reduce the maximum level at which you currently operate?

	Yes	**40**
	No	**28**
What is your current maximum?	**30 kg**	**1**
	34 to 38 kg	**10**
	38 kg	**41**
	40 kg	**5**
	More than 40 kg	**8**
	Don't know	**3**

How affected producers intend to deal with a reduction in stocking density was explored by the second part of question 11:-

If you have to reduce your stocking density will you:	
Rear fewer birds in the same house	**44**
Increase the size of the house(s) to accommodate more birds	**3**
Rear the same number of birds but build more houses to accommodate them	**27**

The current Defra Welfare Code follows the Farm Animal Welfare Council (FAWC) advice in recommending a maximum stocking density of 34 kg liveweight per square metre. The majority of English broiler producers operate to the ACP standard, which allows a maximum stocking

[6] Between late January and mid-March 2004, 17 workshops on the proposed EU Broiler Welfare Directive were held at various locations across the country. The meetings were funded by Defra and organised and run by the ADAS poultry team. The meetings were hosted by each of the major broiler producing and processing companies operating in the UK.

density of 38 kg liveweight per square metre. The large numbers subscribing to the ACP standard are reflected in the predominance of those saying that they currently work to a maximum of 38 kg liveweight per square metre.

Excluding those producers reporting that they did not know what their stocking density was, 80 per cent of respondents declared their maximum stocking density to be less than or equal to 38kg liveweight per square metre. The balance indicated that their maximum figure was greater than 40kg liveweight per square metre.

Satisfaction regarding the large proportion of producers claiming already to operate within a maximum of 38kg liveweight per square metre has to be tempered, however, by a significant proportion of producers indicating that they would nevertheless have to reduce stocking below that figure. The apparent inconsistency is explained, at least in part, by the recognition by many producers that, in order to provide a 'safety net' to allow for possible delays in removal of birds for slaughter, they would have to operate at maximum stocking rates *below* the Directive figure of 38kg liveweight per square metre. One producer suggested a figure of 200g as being a reasonable allowance – which equates to approximately 2.5 days growth at the rates achieved in the last days before slaughter. The authors conclude, however, that where a safety margin was allowed, most producers would aim to get much closer to target maximum density to minimise financial loss – probably to within 1 day's growth (approx. 85g).

With the introduction of a *statutory* upper limit of stocking density and the recognition that in future it will be an offence to exceed that limit, it is entirely realistic of producers if they are now considering a more cautious approach to stocking density than hitherto.

Some producers indicated that they would maintain total volume of output either by extending existing houses or by adding houses. However, in addition to the capital cost implications of additional housing, obtaining planning consent for new building could present major difficulties, and add substantially to the cost. In many cases, planning consent would not be granted.

The capital cost of provision of each new chick place at current levels of stocking is estimated at £7.50 (range £6 to £9). However, in a situation where stocking density is reduced, the capital cost per bird increases because the fixed costs of groundworks, house structure and most other building costs have to be spread across fewer birds. Capital cost per bird could therefore increase by as much as £2 per bird, depending on the degree of stocking density reduction.

Of those producers who recognised that their present buildings might fall short of the requirements of the Directive, the great majority were prepared to consider upgrading or replacing houses as necessary. However, at the time of the interview, few had any definite plans to upgrade, and few anticipated being obliged to make more than relatively minor adjustments to their plant and management.

The financial implications on production costs, turnover and returns and capital costs are covered in Section 4 below.

Question 12. If compliance with the requirements of the 38 kg liveweight per square metre standard involved substantial new capital investment, would you?

Upgrade houses as necessary?	**13**
Take non-compliant houses out of production (seasonally or permanently)?	**1**
Replace non-compliant houses?	**21**
Accept the lower (30kg) maximum stocking rate?	**6**
Wait for the problem to arise?	**4**
Cease production?	**6**
Other – specify?	**-**

In answering that question, what figure did you have in mind as substantial?

Up to £10,000	**11**
£15,000 to £30,000	**7**
£40,000 to £100,000	**3**
£150,000 or more	**21**

Question 12 asked producers to consider not just the stocking density limitation, but to take into account the full package of standards that must be met in order to qualify for the concessionary 38 kg maximum, rather than a new standard maximum of 30 kg liveweight per square metre. The package includes standards on temperature-lift, humidity, ammonia concentration, and more. The principal items were explored individually by subsequent questions.

Feedback from producers participating in the 2004 ADAS consultation workshops was unequivocal in that it would be uneconomic to stock at 30 kg liveweight per square metre. That is compatible with the rather low number (6) who said that they would accept the lower (30kg) maximum stocking rate. More surprising is that only two of those who took that view were drawn from those who said they already work to a maximum of less than 38kg liveweight per square metre.

On the basis of the number of drop-outs from the industry between the 2002 survey and the 2005 update, those who said that they would cease production might be regarded as no more than would have done so anyway over the next two to three years.

As a supplementary question, respondents were asked what figure they had in mind as "substantial" when answering the main question. The response was bi-polar, with approximately one quarter specifying a sum of no more than £10,000, half more than £150,000, and the balance between £15,000 and £130,000. Expressed in terms of expenditure per square metre of production area, the figures ranged from less than £1 to a little over £150, with a mean of £28.72.

Question 12 went on to enquire whether implementation of the Directive from 31st December 2007 would result in the upgrade of houses ahead of present intentions and when producers planned to upgrade houses in any case.

If the Directive took effect from 31st December 2007, would that result in you upgrading ahead of present intentions?

	Yes	**9**
	No	**43**
When did you plan to upgrade houses in any case?	**2005**	**4**
	2006	**4**
	2007	**2**
	2008	**2**
	Rolling programme	**1**
	No plans	**20**
	Never	**4**

Only nine of 52 producers answering this question thought the Directive would result in earlier upgrading than planned, but the majority had no definite plans as to when they would next upgrade. Just four noted in answer to the first part of Question 12 that they would wait for the problem of compliance with the new standards to arise before undertaking substantial new investment, and only ten (27 per cent of those answering the question) had existing plans to upgrade before the end of 2007. Taken together, those items of information confirm that at the time of the interview time few producers anticipated being obliged by the prospective legislation to make more than relatively minor and low-cost adjustments to their plant and management.

Question 13 The draft Directive proposes that all production units should provide a minimum of 20 lux during the lighting period and a total of 8 hours in 24 of darkness, of which at least 4 hours must be continuous.

Current practice on light intensity?	**Less than 10 lux**	**5**
	10 lux	**21**
	12 to 16 lux	**16**
	20 lux	**17**
	More than 20 lux	**4**
Current practice on hours of darkness?	**Less than 4 hours**	**10**
	4 hours	**37**
	5 to 7 hours	**8**
	8 hours	**6**

The proposed lighting requirement, which would be applied to all holdings, whether stocked to a maximum 30 kg or 38 kg liveweight per square metre, differs substantially from the current ACP standard, which specifies a minimum of 10 lux and an uninterrupted dark period of at least four hours. In addition, the ACP standard allows producers to reduce the dark period during the first seven days and for the last ten days prior to slaughter. This dispensation is intended during the first week to encourage rapid development of feeding and drinking behaviour in the chicks, whilst the later allowance is designed to reduce the 'flightiness' of birds during the catching process. Annex 1 of the draft Directive says, "Within three days from the time when the chickens are placed in the building and until three days before the foreseen time of slaughter, the light must follow a 24 hour rhythm and include periods of darkness lasting at least eight hours in total, with at least one uninterrupted period of darkness of at least four hours."

Whilst not all producers were able to specify the actual light intensity currently provided in their houses, 29 stated that their current practice is in accord with the proposed standard and 39 that it is not. However, the current light intensity specified by those providing a figure was in 42 cases below the proposed standard. The discrepancy suggests that producers are not familiar with the measurement of light intensity in terms of lux, and may indicate a need for the wider use of light meters in the future. A third of respondents indicated that they were already providing 20 lux or more of light. Given that 20 lux is well above the current ACP standard, this is surprising and the answers should perhaps be interpreted bearing in mind that many producers do not measure light intensity, but rely on judgement alone. The survey finding is also in apparent conflict with the view widely held among producers that high light levels would present management difficulties and could detract from bird welfare. The challenges to both management and welfare would be

through birds scrambling for the feeders and drinkers when the lights came back on, and being "flighty" when caught at the end of the growing period. At the consultation workshops, all groups considered 20 lux too high.

On hours of darkness, ten stated that their current practice was in accord with the proposed standard, 58 that it was not. In contrast to the replies on the light intensity question, this outcome was as expected. It is also readily reconciled with the feedback from the earlier ADAS workshops, where none of the groups agreed with the proposed eight hours minimum period of darkness in the draft Directive, favouring instead a minimum dark period of four hours, given as one uninterrupted period of four hours of darkness, i.e. as per the ACP recommendation. The derogation to allow shorter periods of darkness during the first and last few days of rearing was also a major concern to the majority of producers at the workshops, with many wanting those periods to be increased to cover the first seven and last ten days.

Although, clearly, the majority of producers are currently using much shorter dark periods than those specified by the draft Directive, there has nevertheless been a move in recent times towards more extended dark periods. This management practice has been introduced to reduce early growth rate and improve leg health. If this trend continues, the proportion of producers meeting the Directive requirement will increase.

Thirty-seven of those interviewed for the present survey said that they could meet the proposed standard with their existing equipment, 31 that they could not. Of those who could not meet the standard, two thought they could upgrade as necessary for less than £1,000, 26 for between £1,000 and £10,000, and one thought it would cost more than £10,000. One was unable to estimate the cost and one said that he would not upgrade. For those providing a figure, the estimate ranged from 21 pence to £5.66 per square metre.

On-farm interviewees were further asked if they thought changing from their existing programme to that of the proposed lighting requirement would have a cost to them in terms of performance factors such as mortality, feed conversion ratio or downgrading. Nineteen thought that it would, ten that it would not, one did not know. Thirteen of those who thought that there would be a cost between them mentioned all three of the suggested performance costs. The extent and possible costs of downgrading and mortality were for the most part regarded as an unknown, but several producers were firm in specifying poorer growth rates, with attendant cost in terms of feed conversion ratio, weight at sale or days taken to achieve target weights. Slower feeding and consequential slower growth, especially in the early weeks of the crop cycle, are in fact the objective of the extended dark periods, so as to slow bone growth and avoid subsequent leg and

other problems. Because of welfare concerns, there has already been some movement within the industry over recent years towards longer dark periods. One grower thought half a day extra to achieve the same sale weight, another thought an extra two days. Those estimates translate to between 1.2 to 4.7 per cent additional time to reach crop maturity.

Question 14. Annex 2 of the proposed Directive, relating to holdings stocked up to 38 kg liveweight per square metre, requires that ammonia concentrations in the air inside the house should never exceed 20ppm.

Is this requirement in accordance with your current practice?

Yes	**55**
No	**10**

With your existing facilities, would you be able to meet this requirement at all times, including cold, damp, winter days?

Yes	**52**
No	**14**

Whilst the ACP standards include a section on 'temperature, ventilation and air quality', the main focus is on temperature control and avoidance of heat and cold stress. There is no standard for ammonia control. In practice, well maintained houses, well insulated and with effective ventilation would normally be expected to be capable of meeting this requirement. It should be recognised, however, that even in circumstances that are generally very good, there may be occasions when ammonia levels do exceed the level specified by the draft Directive for short periods.

The greatest challenge to producers will be during cold, damp weather. In such conditions, there is an increased risk that shortcomings in insulation, ventilation and heating systems may lead to reduced air quality (increased humidity, ammonia and dust) and wet litter. In many cases, the long term solution to this problem would be to upgrade insulation, and improve ventilation and heating system controls. In most cases however, it is likely that producers will continue to attempt to meet this particular problem by increasing ventilation rate and using more heat to maintain house temperature. That has an impact on operating costs during the colder months of the year, and meeting the requirements of the Directive might increase future heating costs by up to one penny per bird per crop. Based on two crops per year being affected in that way, the additional annual costs for a 20,000 bird unit would be of the order of £400 per year.

Of interviewees who thought that their existing facilities would need an upgrade to meet this requirement, seven were unable to estimate how much it might cost them to bring their unit up to

the new standard, the balance of seven offered estimates ranging from £1,200 to £20,000 (34 pence to £5.66 per square metre, with a mean of £1.94 per square metre). Pressed further in the context of the on-farm interview, six producers mentioned that they anticipated higher heating costs as a result of this measure. However, most respondents were not very concerned by this proposed measure, saying they already used additional heat in winter with a view to maintaining litter quality.

In cases where upgrading of older houses was not considered feasible, and additional heat input and ventilation were used to minimise ammonia levels, heating and electricity costs might (for example) rise by 10 per cent. In that event, the ADAS estimate for the additional running costs would be £3,150 a year for an average site rearing 100,000 birds per crop.

At the 2004 Directive workshops, half of the groups considered that the proposed requirement for a maximum ammonia emission level of 20ppm was achievable given adherence by the producer to strict minimum ventilation rates. A further one third of those responding at the workshops considered that 20ppm would be generally difficult to achieve in the absence of any 'averaging' – i.e. they felt that an average of 20ppm was achievable, but that short-term levels might exceed that.

Question 15 Another Annex 2 requirement is that when outside temperature *(in the shade)* is 30C, or above, the temperature inside your houses should never be more than 3 degrees higher.
Is this requirement in accordance with your current practice?

Yes	**47**
No	**21**

With your existing facilities, would you be able to meet this requirement?

Yes	**46**
No	**22**

Current ACP standards specify neither recommended operating temperatures nor a maximum temperature lift, preferring to leave those matters to the discretion and experience of the stock keeper. However, the code does state that temperature should be carefully monitored and controlled and that the ambient house temperature should be suited to the birds' physiological needs.

This requirement of the draft Directive, often referred to as the temperature-lift requirement, has been foreseen as a significant technical challenge to many producers, and one that may be

impossible to achieve in even the most modern broiler house. In the case of older housing stock, considerable capital investment may be required even to get close to the requirement.

The owners or managers of rather more than two-thirds of the production units in the survey considered they were already achieving this standard and that they could meet it with their existing facilities. Nevertheless, many producers were keen to discuss the problem and the one-third who were aware that they are not at present meeting the proposed standard constitute a substantial minority. In conversation, several producers explained how they currently achieve a cooling effect on hot days, with measures ranging from evaporative cooling through removal of sections of the sides of the house, to use of a slurry tanker to spray river water on the chicken house.

The cost of upgrading older houses to meet current specifications on ventilation and air throughput has been estimated by ADAS to be of the order of £30 to £50 per square metre. For a typical 20,000 bird unit, that would become £32,000 to £53,000. At 25 to 40 per cent of the cost of a new house, that represents a substantial outlay, reflecting the complexity of the work involved, the degree of associated difficulty, and the fact that there are few contractors prepared to take on that type of work.

Where evaporative cooling is deemed necessary (i.e. in higher risk locations), the typical cost per house is £4,000 to £6,000. Whilst that is a very much cheaper proposition than re-insulating an entire roof, the full benefit of installing evaporative cooling would only be a achieved where the insulation standards are already adequate (i.e. U value of 0.4).

When questioned as to capital cost implications, 17 producers offered an estimate of the cost of upgrading facilities to meet this requirement. Their figures averaged £4.34 per square metre, with a range from 35 pence to £14.82 per square metre. One suggested the cost to him would be "millions" and added the view that the proposal is not practical.

Although concerned about the difficulty of at all times complying with the letter of such an exacting standard, several expressed support for the principle. However, it would appear that most respondents were less than fully aware of the potential impact of the requirement, as drafted, on their own operation and that, in light of the ADAS estimates for re-insulation given above, they seriously underestimated the likely capital cost.

On the issue of running costs, only seven of the 30 on-farm interviewees foresaw increased operating costs as a result of the temperature lift requirement. The typical response was that

whilst electricity and water costs would be increased, it was impossible to say by how much. In view of the relatively infrequent, but highly variable incidence from year to year of shaded temperatures in the UK exceeding 30 degrees Celsius, and that, on the all-in, all-out production cycles operated by virtually all broiler producers, a house might well happen to be empty or only newly re-stocked on the few days in a particular year when temperatures approached such a level, that response was reasonable.

At the consultation workshops there was considerable discussion of the proposed three degree maximum temperature differential. Most of the groups taking part in the exercise pointed out that whilst three degrees might be achievable in the most modern buildings, older buildings with less sophisticated ventilation and insulation would only be able to meet a maximum five degree temperature lift.

Appendix A1 presents a review of some other aspects of the temperature-lift requirement.

Question 16. Further Annex 2 requirements are that Relative Humidity should not exceed 70% when outdoor temperatures are below 10C and that temperature and humidity should be recorded on a continuous basis and water consumption on a daily basis.
Is this requirement in accordance with your current practice?

Yes	**26**
No	**41**

With your existing facilities, would you be able to meet this requirement?

Yes	**27**
No	**40**

The ability to meet this requirement necessitates similar standards of insulation, ventilation, heating and management skills to those required to meet the draft Directive's 20ppm ammonia target. The current ACP standard does not specify a standard or target for humidity.

This requirement was of less concern than temperature lift, many producers saying that, as with the ammonia concentration requirement, they believed they already met the standard through their care to keep the litter always in good condition. Some said that in winter they customarily burnt additional gas with a view to keeping the litter dry and friable and that they believed the standards on both ammonia and relative humidity were therefore comfortably met. However, at the 2002 ADAS workshops, the majority of producer groups commented that, in the interests of chick health and welfare, it is standard industry practice to maintain humidity levels in excess of

70 per cent for the first few days of chick rearing. The proposed Directive requirement would, in theory, rule out this practice at times when outdoor temperatures are below 10°C.

The large numbers answering this question to the effect that they thought they do not at present meet the requirement, and that they could not do so with their existing equipment, largely relates to the recording of temperature, humidity and water consumption. Estimates offered for cost of upgrading facilities as necessary ranged from £100 to £20,000, seven pence to £16.99 per square metre, with a mean of 99 pence per square metre. Twelve of the on-farm interviewees thought that additional running costs would be involved, mentioning capital costs, electricity, repairs and labour for monitoring, but apart from a suggestion that the extra labour for monitoring a 60,000 bird unit would be £750 a year, none were able to quantify the costs.

In practice, if steps were already being taken in older houses to minimise ammonia emissions (by additional heat and ventilation), these measures would also go a long way towards meeting the relative humidity target set in the Directive.

Question 17. Annex 2 also requires that the following documentation should be kept up to date and should always be available for inspection. Please note which items you already keep.

	Answering question	keeping record	
	Number	Number	%
Technical details of the establishment and its equipment			
- dimensions	30	28	93
- ventilation, cooling and heating system, including a ventilation plan, detailing target air quality parameters, such as airflow, air speed and temperature	30	24	80
- feeding and watering systems	30	29	97
- alarm systems & backup systems in case of electric failure	30	29	97
- floor and litter type	30	24	80
Production targets	29	24	83
Management			
- number of personnel	30	25	83
- qualifications of keeper & other persons attending chickens	30	23	77
- suppliers of chicks and feed	30	29	97
- veterinarian attending the establishment	29	28	97
- inspection plan & procedures concerning daily management, including culling procedures	29	23	79
- inspection and maintenance plan for technical equipment	30	23	77
- depopulation procedures, including catching	29	25	86
- cleaning and disinfection procedures	30	25	83
- emergency plan for use in the case of electric failure	29	27	93
Technical inspections of the ventilation & alarm system	29	27	93

This question was asked of on-farm interviewees only. It would appear that the great majority of producers already kept most of the records specified under this section of the proposed Directive and would have few problems with compliance. In answering the question, many remarked that the records had been established for the purposes of the ACP scheme or with a view to production for a particular retailer, in the past if not currently.

Three producers allowed themselves a minor grumble; “The processing company agreed to provide NVQ training/certification as part of ACP certification, but that has not happened to date”, “Documents don't make you a better poultry keeper”, and “Production of relevant documentation seems to have taken a higher priority than the production of the poultry itself”, but the requirement for well-kept documentation seems already to have been generally accepted.

Those with some shortfall on documentation estimated the cost of full compliance at £100 to £3,000, two pence to 57 pence per square metre of growing area, with a mean of 17 pence.

4. The impact of changes in stocking density on cost of production

For the purpose of considering economic impacts of the Directive, the status quo in terms of stocking density was taken as 38kg liveweight per square metre, which is the current ACP standard, and the level declared by the majority of producers. The range of densities considered in the report however is 25kg to 42kg liveweight per square metre. Although both thinned and non-thinned methods of rearing were considered, the majority of English broiler producers thin crops as they approach maturity, and the main focus of this report is on thinned flocks.

Four key aspects of the impact of the Directive on the economics of production were examined. These were production (operating) costs, capital costs, turnover and net margin. In assessing the potential change under each of those heads, two alternative scenarios were considered:- i) a "worst-case" scenario whereby all broiler growers would be forced to operate at lower levels of stocking and ii) an assessment of what the impact on costs might be in practice, based on information on current production practices gleaned from producers by way of the survey.

a) Impact on production costs

The following calculations seek to determine the impact on operating costs *per se* arising from a forced reduction in stocking density. It must be remembered, however, that the increased operating costs will **always** be associated with *either* a fall in net revenue (reflecting the reduced number of birds reared in the house), or with a requirement to invest capital to replace lost bird spaces. This must be taken into account when seeking to calculate the overall financial impact of the Directive's stocking density requirements.

i) "Worst-case" scenario

The "worst case" scenario is that all broiler producers would have to reduce stocking density to 30kg liveweight per square metre. When, in the course of the present survey, producers were asked their present maximum stocking density, 98 per cent indicated that they stocked at levels above 30kg liveweight per square metre, with a majority (63%) indicating that they currently stock to a maximum of 38kg liveweight per square metre.

If it were assumed that the *average* stocking density is 38kg, then a forced reduction to 30kg would increase operating costs for the typical 100,000 bird unit by £48,300 per year. The equivalent figure for the English broiler industry would be £41m per year.

ii) Impact based on survey responses

- *Producers currently stocking to a maximum of 38kg liveweight per square metre or less who continue, post-Directive, to maintain the same level of stocking.*

For these producers, the Directive will not impose reductions in stocking rate. There will therefore be no increase in operating costs arising from a stocking rate reduction, no loss of revenue, and no requirement to make additional capital investment to maintain the same volume of production.

- *Producers currently stocking to a maximum of 38kg liveweight per square metre who decide to maintain, post-Directive, a safety net, or margin, to ensure stocking rates do not unintentionally exceed 38kg liveweight per square metre.*

In this scenario, it is assumed that producers would under-stock slightly to allow for delays in depopulation. A one day safety net would require producers to reduce bird numbers by 3.5 per cent. That would result in terminal stocking density falling to 36.7 kg liveweight per square metre. In such a situation, operating costs per bird would increase by 0.91 pence.

For a typical 100,000 bird unit, the increase in operating costs would be £6,375 per year. If it was assumed on the basis of the survey date that 60 per cent of producers would fall into this category, the cost to the English industry would be £3.3m per year.

- *Producers who currently stock at levels in excess of 38kg liveweight per square metre.*

Twenty per cent of producers declared that they currently stock at levels in excess of 38kg liveweight per square metre. The median value of their declared maximum stocking levels was 42kg liveweight per square metre.

For a 100,000 bird unit, the additional operating costs associated with a move from 42kg to 38kg would be £16,800 per year. For this sector of the industry as a whole, the equivalent figure is £2.9m per year.

The combined additional cost to the industry of those producers in the latter two categories (*b)* and *c)* above) would be £6.2m per year.

b) Impact on capital costs

It has been presumed that in situations where a producer is obliged to reduce stocking density, this will be achieved by rearing fewer birds to the same finishing weight as hitherto. The survey data indicates that 83 per cent of producers are likely to find themselves in this position.

The survey probed whether, in this situation, producers would rear fewer birds or build additional accommodation to make up the shortfall. Fifty-nine per cent indicated that they would rear fewer birds, the rest that they would build additional accommodation or extend their existing housing. Producers rearing fewer birds would suffer a reduction in net margin per bird and for the broiler production unit as a whole, but would incur no additional capital costs. Producers who increased their production area would maintain volume and value of output as before, but would need to invest additional capital to build the new accommodation.

New housing costs based on current industry stocking densities (i.e. 38kg) are of the order of £7.50 per bird. Where stocking densities are reduced, the cost of the great majority of the construction work is much the same per square metre, but has to be borne by fewer birds, so the per bird figure is increased. For this reason, in the following calculations capital cost has been increased on a pro-rata basis to either £9.50 per bird (reduction from 38kg to 30kg liveweight per square metre), £8.29 (reduction from 42kg to 38kg liveweight per square metre) or £7.76 (reduction from 38kg to 36.7kg liveweight per square metre). As in other calculations in this report, cycles per year have been taken as seven.

i) "Worst case" scenario

The "worst case" scenario (as already outlined in 3.i above) would be that all producers had to reduce stocking from the current average of 38kg to 30kg liveweight per square metre. If all individual producers, or the industry as a whole, then sought to maintain volume and value of output by re-investing in new or extended housing, the capital cost for a typical 100,000 bird unit would be £200k and the cost to the English industry would be £171m.

ii) Impact based on survey responses

Producer responses to the survey revealed that 41 per cent would invest capital to maintain bird numbers in the event of a mandatory reduction in stocking density. The survey also indicated that 20 per cent of producers currently work to maximum stocking densities in excess of 38kg liveweight per square metre (median value 42kg liveweight per square metre). Thirty per cent of this number said that they would build additional accommodation; six per cent of all producers.

Responses to the survey also indicated that, in order to avoid ever contravening the new regulation through eventualities such as delays in depopulation, 73 per cent of producers currently working to a maximum of 38kg liveweight per square metre will reduce bird numbers placed. Of those, 70 per cent (32 per cent of all producers) said that they would construct additional houses to compensate for the shortfall in numbers of birds produced.

Capital costs are estimated as follows:

- *Producers currently operating at 42kg liveweight per square metre*. For a typical 100,000 bird unit, the capital cost of creating extra production capacity to maintain bird numbers as before would be £79k. Capital cost to this sector of the industry would be £4.1m. If *all* producers in this group decided to replace the productive capacity lost, or if other producers (or newcomers), replaced the lost capacity, the total cost relating to this sector of the industry would be £13.5m.

- *Producers currently operating at 38kg.* Capital cost for a typical 100,000 bird unit to replace lost bird spaces would be £26.5k. Capital cost for the proportion of this sector that declared it would replace lost capacity would be £7.2m. If *all* the producers in the group (40% of all respondents), decided to build additional accommodation to make up the shortfall in bird numbers, the capital cost would be £9.1m, as it would also be if not all producers built extra accommodation to replace their own shortfall, but others made up for them by further expanding their production capacity.

c) Impact on turnover and net margin

Fifty-nine per cent of producers in the survey declared that they would need to reduce stocking density to meet the Directive level of 38kg liveweight per square metre. Further questioning revealed that when faced with a situation that required stocking density to be reduced, 33 per cent (19 per cent of all respondents) indicated that they would respond by rearing fewer birds, rather than building more rearing accommodation. That approach would result in a reduction in both turnover and broiler unit total net margin, but the need to invest new capital to create additional rearing accommodation would be avoided.

The effect on turnover and net margin will vary according to the extent to which stocking density (and therefore bird numbers) need to be reduced. For the purposes of the calculations, revenue (turnover) per bird has been taken as 123.9 pence and net margin as 1.9 pence.

i) "Worst-case" scenario

If *all* producers had to reduce stocking density from the average of 38kg to 30kg and chose to meet this requirement by rearing fewer birds, annual turnover for the industry as a whole would fall by £157m and net margin by £2.4m. If some or all of the lost productive capacity was replaced by new construction, total annual turnover would not be reduced to that extent, and net margin might not be, but depreciation and other charges on the new buildings and equipment

would in all likelihood result in a reduced industry net margin, despite the improved production efficiency of the new plant.

ii) Impact based on survey responses

- *Producers currently operating at a maximum stocking rate of 42kg liveweight per square metre*

The survey indicated that 20 per cent of producers currently operate at maximum stocking rates in excess of 38kg liveweight per square metre. Seventy-seven per cent of those (15 per cent of all respondents) said that they would simply reduce bird numbers to meet the stocking density requirement rather than build new accommodation. For a typical 100,000 bird unit, stocking with fewer birds to meet the 38kg upper limit would reduce turnover by £82.7k and net margin by £1.3k. The impact to this sector of the broiler industry as a whole (assuming this group represents 15 per cent of all birds) would be to reduce turnover by £10.6m and net margin by £163k.

- *Producers currently operating at 38kg.*

It was established by the survey that 60 per cent of producers, those currently operating at a maximum stocking density of 38kg liveweight per square metre, might take the approach of rearing fewer birds to provide a one day 'safety-net' against delays in slaughtering the birds. In that event, the typical 100,000 bird unit would see annual turnover fall by £30,000 per annum, and net revenue for the holding would be reduced by £455. For the industry as a whole, the reduction in annual turnover would be £15.4m and the reduction in net margin £234,000 per annum.

5 The impact of the proposed Directive on overall UK international competitiveness and trade[7]

The costs of broiler production in the UK are currently slightly higher than those of other EU member states, and are significantly higher than those of the USA, Brazil & Thailand.
The UK broiler industry already operates in a highly competitive market with increasing incursions on its home market from other EU countries and (in particular) from non-EU countries such as Thailand and Brazil. Any additional cost burden imposed on the industry as a result of meeting the Directive requirements will increase the price competition of imports from these and other countries and, with the progressive reduction of tariff barriers, will add significantly to competitive pressures.

Research by Van Horne at LEI Wageningen ("Cost Price Development in Broiler Meat" – LEI, Wageningen, The Netherlands, 2002) set out to calculate the costs of broiler meat production (primary cost plus processing cost) in four European countries and to compare them with the corresponding costs in Brazil and the USA (Table 8). Van Horne did not include figures on Thailand in his report, but it is generally accepted that the cost of broiler production in Thailand is well below that of the EU.

Table 8 Comparative costs of broiler production, the UK, France, Germany, the Netherlands, USA and Brazil

	UK	France	Germany	Netherlands	USA	Brazil
	Eurocents per kg ready-to-cook weight*					
Cost of production	140	137	136	134	105	87

*Ready to cook weight (RTC) is about 70 per cent of liveweight.

Table 8 clearly shows the UK's small cost disadvantage compared to other EU countries (3 per cent compared to the average of France, Germany and the Netherlands) and its considerable disadvantage compared to the USA (33 per cent) and Brazil (61 per cent).

Further analysis, shown in Table 9, indicates the primary production cost advantages enjoyed by the UK's major competitors (note that this table excludes processing costs).

[7] The authors gratefully acknowledge the notes and data for this section contributed by John Newton, a member of the ADAS Poultry Team.

Table 9 Primary costs of broiler production, the UK, France, Germany, the Netherlands, USA and Brazil

	UK	France	Germany	Netherlands	USA	Brazil
	Eurocents per kg ready-to-cook weight					
Chick	15.8	11.8	14.3	12.0	9.1	7.5
Feed	44.6	40.0	36.3	37.1	32.7	32.0
Other	6.7	7.6	6.8	7.0	4.2	4.2
Labour	3.6	6.4	6.1	5.8	2.6	1.6
Housing	5.8	4.1	4.7	5.0	2.8	3.3
General	1.0	1.3	1.1	1.1	0.8	0.8
Manure disposal	-0.2	0.0	0.2	1.3	-	-0.6
Total (excl. labour)	73.7	64.8	63.3	63.5	52.2	47.2
Total (incl. labour)	**77.3**	**71.2**	**69.4**	**69.3**	**49.6**	**48.8**

The 'base position' is that in the UK total costs of production (including labour) are 77.3 Eurocents per kg. This compares with an average of 70.0 Eurocents per kg in France, Germany and the Netherlands, 52.2 Eurocents in the USA and 48.8 Eurocents in Brazil. On primary production costs, the UK therefore has a cost disadvantage relative to the average of France, Germany and the Netherlands of ten per cent, and 56 and 58 per cent respectively relative to Brazil and the USA.

Implementation of the proposed Broiler Welfare Directive will inevitably increase production costs for UK broiler producers, both through increased production costs and the need to service new and additional capital investment. If all EU member states implement the Directive to the same extent and over the same time frame, the competitive position of UK broiler producers relative to their EU competitors may not change to any great extent. However, the competitive position of the UK (and indeed of other EU countries) relative to the USA, Brazil and Thailand can be expected to further deteriorate.

APPENDICES

I UK temperature data relevant to the proposed temperature-lift regulation

UK Regional Maximum and Minimum Temperature Averages, 1971–2000

Highest maximum temperatures – 10th August 2003

Contour temperature map on the day of the highest ever recorded temperature in the UK

II The Impact of the Draft Directive on Physical and Financial Performance

III Tables for Calculating the Cost of Reducing Stocking Densities

IV Questionnaire used for telephone interviews

V Questionnaire used for on-farm interviews

Appendix I Considerations and Data Relevant to the Proposed Temperature-Lift Regulation

The Directive requirement to limit house temperature lift to three degrees Celsius when outside shade temperature is 30^0C or above raises a number of issues to do with interpretation of the requirement and is likely to present serious technical challenges to the broiler industry. For this reason, a more detailed analysis of the issue is presented below.

a) The UK has a temperate climate, with average summer temperatures over the past 30 years not exceeding 22°C. (See Appendix Table A1 for Met. Office records of average shade temperatures.) However, the UK is subject to short episodes of extremes of temperature (Appendix Table 2 and Chart 1). In August 2003, a new UK record temperature of 38.5°C was recorded, and there have been periods of one to two weeks when temperatures exceeded 30°C, most notably in 1976. In most recent years there has been a short episode of daytime temperatures exceeding 30°C. Thus, it would be wrong to conclude with reference to average temperatures that shade temperatures in excess of 30°C and the proposed Directive requirements with respect to temperature-lift have little relevance to the UK.

b) Broiler houses are typically not in the shade and can have large areas of (hot) concrete near the houses over which incoming air has to travel to reach the ventilation inlets. *The temperature of ventilating air entering the house is therefore likely to be significantly higher than the shade temperature.* Recent tests by ADAS indicate that the average temperature difference between shade temperature and the temperature of incoming air entering the house in hot weather is of the order of two degrees Celsius. In the context of attempting to limit temperature-lift to three degrees Celsius, this represents a major problem. It could mean that, even if the house had a theoretical air change ability to maintain a three degrees Celsius temperature lift, the in-house temperature might be more than three degrees above outside shade temperature, and apparently non-compliant. A more reliable representation of the ability of the house to keep the temperature gradient within acceptable limits would be obtained by measuring the air temperature as it passes through the inlet.

c) Achieving a temperature-lift of no more than three degrees Celsius over *true shade temperature* is likely to be achievable for well insulated houses with appropriate levels of

air throughput. To meet the criteria requires an insulation U value of 0.4 or better, and the ventilation air change rate in a broiler house stocked at 38 kg liveweight per square metre with two kilogram birds should be in the region of 9.5 to 10 cubic metres per bird per hour. Both of these standards are generally met in modern houses. Many older houses do not meet these standards – either because of deterioration of insulation over time and/or because the specifications for insulation and fans of (say) 20 years ago were much lower than today.

d) Notwithstanding the above comments, it should be noted that many modern UK broiler houses (especially those with ventilation equipment designed by companies from mainland Europe), are specifically designed to provide for a temperature-lift of nor more than five degrees Celsius, and allow for air speed (wind-chill) to provide heat stress relief to the birds. In terms of the Directive requirements, air change requirement might be theoretically inadequate, even if the farm has never in practice experienced a bird welfare problem due to heat stress.

UK Regional Maximum and Minimum Temperature Averages, 1971–2000

	N W & N Wales		N & N E		Midlands		E Anglia		S W & S Wales		S E & Central S	
°C	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
May	14.5	5.9	14.3	5.5	15.5	6.1	16.1	6.7	15.1	6.6	16.3	6.9
Jun	16.7	8.6	17.1	8.4	18.2	9.0	19.0	9.6	17.5	9.2	19.1	9.7
Jul	18.9	10.9	19.7	10.6	20.9	11.2	21.8	11.8	19.9	11.5	21.7	11.9
Aug	18.6	10.7	19.5	10.5	20.5	11.0	21.9	11.8	19.7	11.4	21.6	11.8
Sep	15.9	8.8	16.6	8.6	17.4	9.0	18.6	9.9	17.1	9.5	18.5	9.8

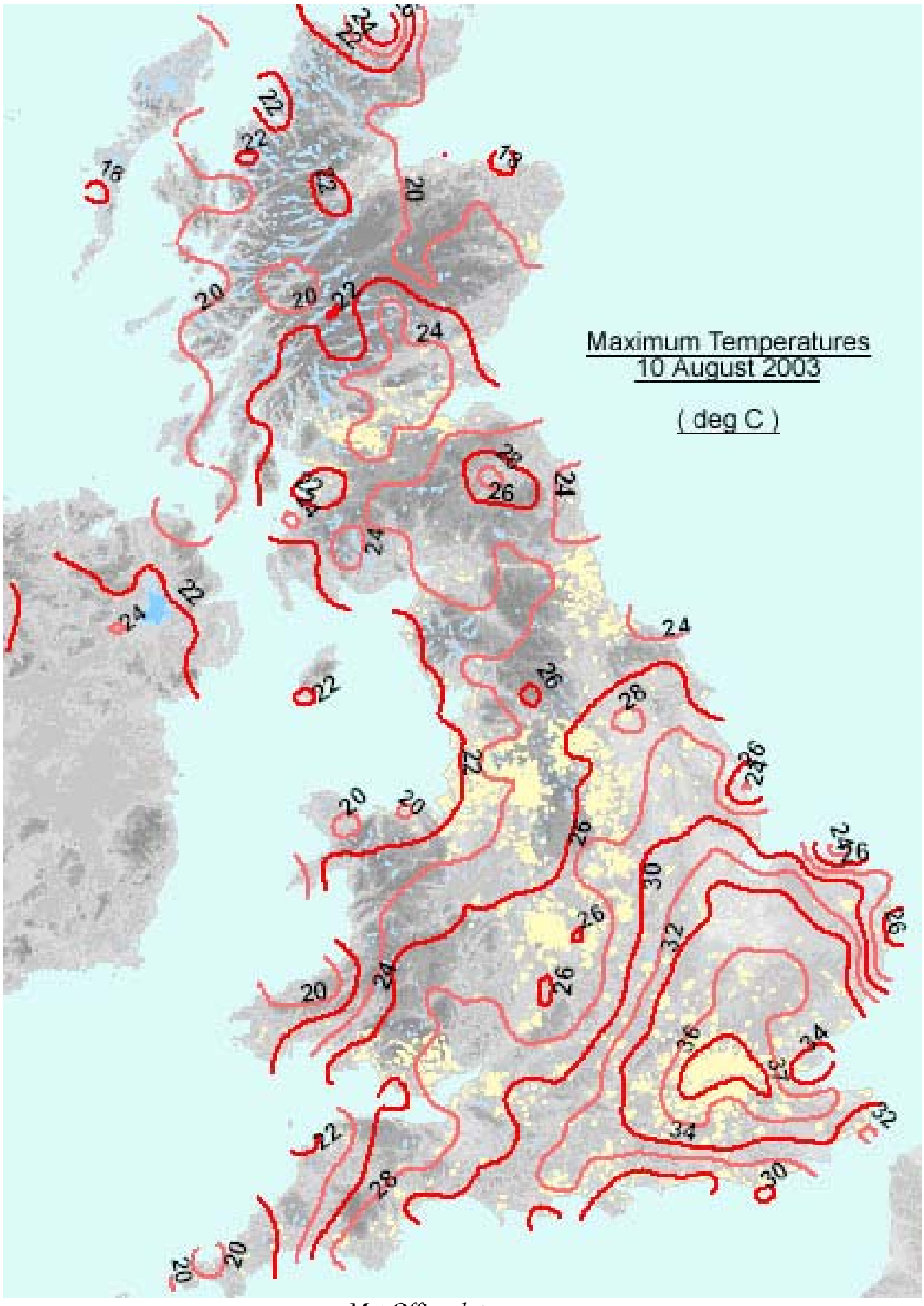
(Met Office Data.)

Highest maximum temperatures – 10th August 2003

Station name	Maximum temperature (°C)	Extra information
Brogdale near Faversham (Kent)	**38.5**	**New UK maximum temperature record.**
Kew Royal Botanic Gardens (London)	38.1	New station record beating the previous high of 36.2 °C on 3/8/1990, digital data records back to 1981.
Gravesend-Broadness (Kent)	38.1	New station record, but data records only back to 1995.
Heathrow (London)	37.9	New station record beating the previous high of 36.5 °C on 3/8/1990, digital data records back to 1949.
Wisley (Surrey)	37.8	New station record beating the previous high of 35.4 °C on 3/8/1990, digital data records back to 1959.
Enfield (London)	37.8	New station record beating the previous high of 35.7 °C on 3/8/1990, digital data records back to 1960's (data records only patchy).
Northolt (London)	37.7	New station record beating the previous high of 36.3 °C on 3/8/1990, digital data records back to 1984.
Met Office London	37.6	New station record beating the previous high of 35.0 on 3/8/1990, digital data records back to 1974.
St.James Park (London)	37.6	New station record beating the previous high of 35.3 on 3/8/1990, digital data records back to 1959 °C.
Cambridge Guildhall (Cambridgeshire)	37.5	New station record, but data records only back to 1997.
Greenwich, Observatory (London)	37.5	New station record beating the previous high of 34.7 °C on 3/8/1990, digital data records back to 1959.
East Malling (Kent)	37.4	New station record beating the previous high of 34.6 °C on 3/8/1990, digital data records back to 1959.
Cavendish	37.3	New station record beating the previous high of 35.2 °C on 3/8/1990, digital data records back to 1977.
Northwood (London)	37.0	New station record beating the previous high of 34.6 °C on 3/8/1990, digital data records back to 1959.

(Met Office Data)

Contour temperature map on the day of the highest ever recorded temperature in the UK



Met Office data

Appendix II The impact of the draft directive on physical and financial performance

Stocking density

Prior to the initial drafting of the Directive, the Commission had been guided as to the potential effect of stocking density of a range of physical parameters (and subsequent financial effects) by the March 2000 SCAHAW report (see Footnote 2, page 20) ('The Welfare of Chickens Kept for Meat Production (Broilers)). This report used a series of assumptions on the effect of stocking densities on growth rate, food conversion ratio and mortality to model the subsequent effects on production costs. The report however recognised that 'these evaluations are necessarily incomplete' and 'even though one can envisage these direct effects, the absence of commercial scale trials means that it is impossible to accurately estimate their financial implications'

Since the SCAHAW report was published, a major Defra-funded study on stocking density and welfare has been completed by Professor Marion Dawkins et al in 2003 (Defra project AW0219 – 'Effect of stocking density and welfare on broilers'). Given the accepted limitations of the SCAHAW report and in the light of the more recent, science-based work by Dawkins, the findings of the latter paper have been used to produce an up-to-date model on the financial impact of changes to stocking density.

Impact on physical performance

The Dawkins paper concluded that as stocking density increased from 30 kg to 46 kg liveweight per square metre, there was a significant depression in growth rate of 2.46 grams per bird per day to 35 days. For densities between 30 kg and 38 kg liveweight per square metre the equivalent figure was 0.56 grams per bird per day, although this difference was not statistically significant. Because of the very small and non-significant differences on growth rate between 30 kg and 38 kg liveweight per square metre, this effect has been ignored in the stocking density model set out below.

No association was seen between mortality and stocking density (in contrast to the previous assumption used in the SCAHAW model) and so, similarly, this has not been included in the current financial model.

Although the Dawkins paper reports that at densities greater than 42 kg liveweight per square metre, there was a significant deterioration in gait score, there is no evidence to suggest that this would influence production costs or returns.

The trial work made no attempt to monitor the effect of food consumption and therefore no information is available on the effect of stocking density on subsequent food conversion ratio (FCR).

Impact on operating costs

Any reduction in maximum permissible stocking rates resulting from the proposed Welfare Directive will have ramifications for the total output that can be produced from a given production area. That, in turn, will impact on production costs, a concern for producers, given that margins are already slender and their past experience has been that cost increases tend not to be fully compensated by the market[8].

In the circumstance that the output per unit of production area is reduced, some costs will continue much the same as for the former, higher level of production, others will be reduced roughly in proportion to the reduction in output. In practice, straight-line relationships will not pertain between value of output and variable cost items such as incoming chicks at all levels of output – a marked reduction in number of chicks delivered would likely result in a higher unit cost per chick – neither will fixed cost items such as contract manure removal or building repairs and maintenance remain exactly the same regardless of throughput of birds. Nevertheless, over the output ranges with which serious negotiations over the draft Directive are likely to be concerned, it is for the most part safe to make such assumptions.

A calculator has been developed whereby any proposal regarding maximum stocking densities can be costed in terms of reduction in average output from the current situation (44.4 kg liveweight per square metre) and its impact on costs and margins.

[8] The reasons why cost increases frequently have to be absorbed is that chicken producers are "price takers", not "price setters", the production and consumption of chicken meat being widespread not only in the European Union but throughout much of the world, the product of one region or country being essentially similar to that of another, and the commodity increasingly being traded relatively freely. Thus, the producers in any one region do not have the power to respond to increased costs pertaining only to themselves by raising prices; their customers are free to purchase cheaper chicken elsewhere. Increased world prices for feed inputs such as grain and soya bean or for energy might result in increased prices for chicken meat, perhaps after a time-lag, but increase in the local cost of inputs such as labour does not. Increased production costs imposed by means of legislation are unlikely to be compensated by the market, unless the legislation is widely reflected in other major production areas. Producers affected by the cost increase are therefore likely to demand protection of home or other markets from suppliers not subject to the same legislation, or that the export product at least should be subject to the same standards as their own production. In the case of legislation designed to enhance the welfare of livestock, or of production personnel, or to constrain practices or emissions harmful to the environment, a proportion of consumers could be expected to support the latter demand.

For the purposes of illustration, a number of fixed points have been identified. For a situation in which crop thinning continues to be permitted, the points and the presumed consequent liveweight output per square metre are detailed in Table 8.

Table A1 Output per square metre at various maximum stocking rates – management system with crop thinning

Max. kg lw/sqm	Output per square metre	% of status quo
42	49.1	111
38	44.4	100
30	35.1	79
25	29.2	66

Based on the findings of the 2002 and 2005 Exeter studies, the underlying assumptions of Table A1 are that:-

i) Thinning crops as they mature will still be permitted and most producers operating conventional systems will adopt the practice if maximum stocking densities of 42 kg liveweight per square metre or less are legally enforced.

ii) The ratio of liveweight output to maximum stocking density will at all levels be 1.17:1 (i.e. 44.4/38), the figure discovered by the 2005 Exeter update study in a situation where the specified maximum stocking rate of the ACP scheme adhered to by the majority of producers was 38kg liveweight per square metre.

iii) Whilst the 38 kg liveweight per square metre figure specified by the UK Assured Chicken Production scheme is not legally enforceable and producers can with impunity exceed the limit, it is presumed that the extent to which the 1.17:1 ratio is supported by some producers currently taking stocking densities beyond 38kg liveweight per square metre will be balanced out under a regime with greater potential penalties by greater numbers of producers exercising the thinning option.

iv) It is noted from the Exeter studies that it is practically possible to produce an output of up to 50 kg liveweight per square metre without at any time stocking more heavily than 38 kg liveweight per square metre. The ratio of output to stocking density in that circumstance is 1.32:1. A ratio of 1.17:1 therefore neither pushes all systems to the limit nor presumes that all producers who do not already do so will adopt thinning practices.

Cost assumptions of the model

The various elements of the cost of producing a chicken can be grouped as in Table A2 (e.g. vaccines with other veterinary and medicine costs) and categorised as either subject to increase or decrease proportional to the kilograms of liveweight output per square metre, or not subject to such increase or decrease. It should be noted that whilst variable costs tend to vary in proportion to numbers of birds produced and fixed costs to remain the same, the distinction does not hinge on definition of a cost as fixed or variable.

Chicks (including allowance for mortality). Chick cost clearly increases or decreases according to number of chicks placed. A reduction in numbers delivered might result in a marginal increase in unit cost (delivery charges being spread over a smaller number) but, over the range of potential reductions considered here, it is thought that decreased mortality resulting from lower stocking rates will compensate for any increase in chick cost and the cost of chicks, inclusive of the mortality charge, is taken to increase or decrease in direct proportion to the number of chicks.

Feed. Consumption of feed, and thus its cost is also taken to vary in direct proportion to volume of output.

Labour. Tipping-out chicks and harvesting will take less time with reduced numbers of birds, but those jobs are usually undertaken by teams employed by the processor, not the farmer. Preparation of the house, daily inspections of the birds, feed and water supplies, etc. and cleaning of the house at the end of each crop cycle will take much the same time, regardless of any change of stocking density within the ranges being discussed. The labour cost in the calculator is therefore not varied according to stocking density.

Vaccines, other veterinary and medicines. These are taken as varying in direct proportion to the number of birds.

Contractors' charges, litter and other variable costs. Contractors' charges are most usually for fumigating houses before each crop and for pressure washing at the end of each cycle. They will not vary with stocking density. Neither is it anticipated that litter or other variable costs will be significantly different with a change in stocking density within the range being discussed.

Table A2 Impact on production costs of variation in stocking density around the current 38 kg liveweight per square metre industry standard

	38kg lw/sqm (current standard)		Change in total cost resulting from change in number of birds per sq metre	new cost pence per bird sold at maximum stocking density of 42kg lw/sqm (+11%)		30kg lw/sqm (-21%)		25kg lw/sqm (-34%)	
Cost item	**% of total costs**	**Pence per bird sold**		**% of total costs**	**Pence per bird sold**	**% of total costs**	**Pence per bird sold**	**% of total costs**	**Pence per bird sold**
Chicks (incl. mortality)	19.9	24.3	proportional	20.3	24.3	18.8	24.3	17.9	24.3
Feed	58.0	70.7	proportional	59.2	70.7	54.9	70.7	52.2	70.7
Labour	3.6	4.4	no change	3.3	4.0	4.3	5.6	5.0	6.7
Vaccines, other veterinary & medicines	1.1	1.3	proportional	1.1	1.3	1.0	1.3	1.0	1.3
Contractors' charges, litter & other variable costs	2.0	2.5	no change	1.9	2.3	2.5	3.2	2.8	3.8
Electricity, gas & heating oil	3.7	4.5	no change	3.4	4.1	4.5	5.8	5.1	6.9
Water	0.4	0.5	no change	0.4	0.5	0.5	0.7	0.6	0.8
Small tools & misc., contract manure removal & o. fixed costs	3.7	4.5	no change	3.4	4.1	4.4	5.7	5.1	6.9
Machinery & equipment depreciation & repairs	1.4	1.8	no change	1.3	1.6	1.7	2.2	2.0	2.7
Building repairs and maintenance	2.9	3.5	no change	2.7	3.2	3.5	4.5	4.0	5.4
Building depreciation/rent paid & site rent	3.2	3.9	no change	2.9	3.5	3.8	4.9	4.4	5.9
Total	**100.0**	**122.0**	-	**100.0**	**119.6**	**100.0**	**128.9**	**100.0**	**135.4**

Electricity, gas and heating oil. For the purposes of the calculator, these three items are classified as not subject to change with varying stocking densities. It is possible that, with fewer birds in a house, more heat will sometimes be required in the early stages, but that is likely to be compensated by a lower requirement for energy to run fans in the later stages. If, as has been suggested, some producers will place the same number of chicks, but finish them at lighter weights, additional heat would not be required and the requirement for electricity for ventilation could be reduced.

Water. If it is paid for by volume, the extent to which less water is drunk by fewer chickens (or by the same number of chickens finishing at a lighter weight) would be a cost saving, though the quantities used to wash-out a house would not much vary. However, many farmers do not pay for water by volume but have capital costs for pumping equipment and/or storage facilities, and possibly also pay for an abstraction licence, a fixed cost. The cost of water in the calculator therefore does not vary with number of birds.

Small tools and miscellaneous costs, contract manure removal and other fixed costs. These costs are not expected to vary with stocking density. Contract manure removal would involve reduced quantities with lower stocking rates, but the house size and volume of bedding placed in the house before stocking would be the same and it is not expected that contractors would reduce charges.

Machinery and equipment depreciation and repairs. Significant changes to machinery and equipment depreciation and repairs with change in stocking density are not anticipated.

Building repairs and maintenance. Similarly with building repairs and maintenance.

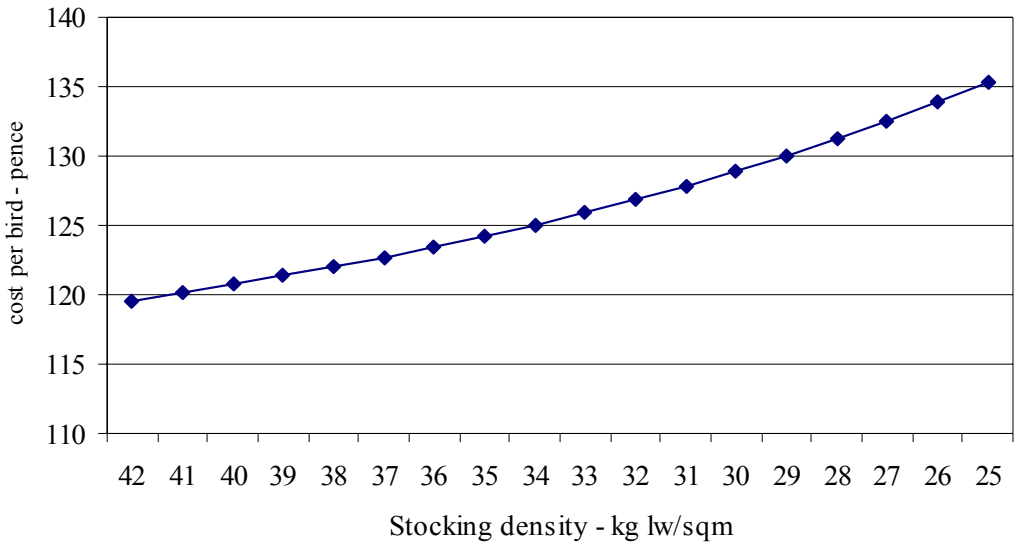
Building depreciation, rent paid and site rent. These costs too are expected to be much the same regardless of variation in stocking rates.

Table A3 summarises the change in production cost per bird at the selected stocking density levels and Figure A1 illustrates the trend across all stocking densities examined. Figure A1 describes an upward sloping curve as the burden of costs that remain the same as stocking rate and output decline is carried by a smaller number of birds. As Table A3 makes clear, however, the increase in cost per bird is very much less than the decline in volume of output. That is because chick, feed, vaccine, veterinary and medicine costs are not incurred for the birds not produced and they constitute 80.5 per cent of total costs

Table A3 Change in production cost per bird at various stocking density levels – management system with crop thinning

Stocking density kg lw/sqm	% change in output from status quo	Production Cost per bird pence	change in cost %	Annual cost to English industry £m	Increased capacity required %
42	+11	119.6	-2.0	-14.7	-10
38	no change	122.0	-	0	0
30	-21	128.9	+5.6	41.1	27
25	-34	135.4	+11.0	80.2	52

Figure A1 Change in production cost per bird at various stocking density levels – management system with crop thinning



A maximum stocking rate of 25 kg liveweight per square metre represents a 34 per cent reduction on the status quo of 38 kg liveweight per square metre, but only produces an 11 per cent increase in cost of production. An addition of 13.4 pence to the cost of producing a chicken might seem modest for the welfare gain accrued, but it should be borne in mind that the producer margin on the chicken in the 2005 Exeter survey was 1.9 pence. A substantial increase in returns to producers would therefore be required.

For the English broiler production industry as a whole, producing 600 million birds a year, the cost of a reduction in maximum stocking rate from 38kg to 30kg liveweight per square metre would be £41.1m annually. If total output was to be maintained, it would be necessary to invest in 27 per cent more production capacity to make up for what would otherwise be a 21 per cent shortfall of output. The calculator also provides for the situation in which thinning is not permitted and output per square metre cannot exceed maximum stocking density. For the purposes of the calculation, it is presumed that producers would allow a 3.5 per cent margin (85

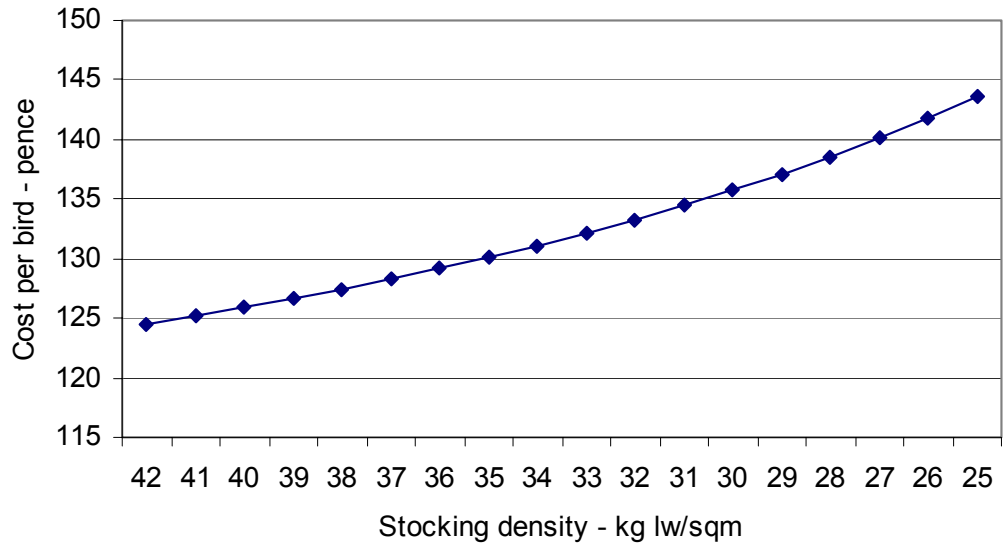
grams per bird) as an insurance against delay in removal of the birds, allowing for a further one days' growth before stocking density exceeded the specified limit. Table A4 summarises the result in a manner corresponding to Table A3.

As in Table A3, it is seen that increases in per bird production costs are proportionally smaller than the reduction in volume and value of output. Nevertheless, even at a maximum stocking rate of 42 kg liveweight per square metre, without thinning, output is nine per cent below the current status quo and the cost of production increased by 10.4 per cent. At 30 kg liveweight per square metre, output is reduced by 35 per cent and cost increased by 20.4 per cent. The increase in cost to the English broiler production industry of retaining the current upper stocking limit of 38 kg liveweight per square metre but not thinning would be £32.5 per annum, and of reducing maximum stocking density to 30 kg liveweight per square metre without thinning £82.3m per annum. If 30 kg liveweight per square metre without thinning was the maximum permitted, reinstatement of the total capacity of the industry would involve construction of an additional 53 per cent of capacity. Figure A2 corresponds to Figure A1 in illustrating the rise of production costs over the full range of stocking densities covered by the calculator.

Table A4 Change in production cost per bird at various stocking density levels – *without* crop thinning

Stocking density kg lw/sqm	% change in output from status quo	Production Cost per bird pence	change in cost %	Annual cost to English industry £m	Increased capacity required %
42	-9	124.5	+10.4	14.7	10
38	-17	127.4	+13.1	32.5	21
30	-35	135.7	+20.4	82.3	53
25	-54	143.6	+27.4	129.6	84

Figure A2 Change in production cost per bird at various stocking density levels – management system *without* crop thinning



Variation of cost structure between EU Member States and change in input costs

As is seen in Section 5, impact of the proposed Directive on overall UK international competitiveness and trade cost structures of broiler production vary between EU Member States. Table A5 illustrates delivered prices for feed wheat in October 2004 and February 2005 in France, Germany and the UK, with the Black Sea export price for the same months added for reference.

Table A5 Feed wheat, delivered price France, Germany and UK and Black Sea export price, October 2004 and February 2005

	October 2004		February 2005	
	delivered price €/tonne	% of UK price	delivered price €/tonne	% of UK price
France (delivered)	106.38	116	103.18	104
Germany (delivered)	105.00	114	103.00	104
UK (delivered)	91.73	100	99.32	100
Black Sea (export)	86.21	94	88.30	89

In as much as wheat is an important part of the diet of broiler chickens, and feed around 60 per cent of total cost of production, the higher delivered prices for feed wheat in France and Germany than in the UK in the two months examined are likely to have impacted on broiler production costs. The marked increase in UK price between October 2004 and February 2005, contrasted with the decline over the same period in France and Germany, is likely also to have had an effect on relative profitability of the national broiler production industries.

Absolute and relative profitability depend, however, on product price as well as input costs[9]. Table 13 provides data on poultrymeat prices in fifteen EU Member States in the same months, October 2004 and February 2005.

It is instructive to test the effect of varying the values used for feed cost by the highest and lowest values seen in Table A5, i.e. plus 16 per cent and minus 11 per cent.

[9] Production, or Technical, Efficiency is also likely to vary between countries, in part because of different approaches to management and housing, also because of different diets (some with a high proportion of maize) and product markets.

Table A6 Poultrymeat prices, 15 EU Member States, October 2004 and February 2005

	October 2004		February 2005	
	€/kg dwt	% of UK price	€/kg dwt	% of UK price
France	195.0	140	164.7	121
Germany	158.0	113	157.2	115
UK	139.4	100	136.2	100
Belgium	148.0	106	140.7	103
Denmark	155.4	111	173.1	127
Greece	168.0	121	169.6	125
Spain	150.9	108	150.0	110
Finland	197.7	142	197.8	145
Irish Republic	183.5	132	182.6	134
Italy	140.0	100	139.7	103
Netherlands	145.0	104	142.7	105
Austria	181.8	130	180.1	132
Poland	106.9	77	111.8	82
Portugal	185.0	133	141.7	104
Sweden	183.6	132	199.4	146

Table A7, which can be compared with Table A3, demonstrates that whilst increase and decrease of feed cost has significant effect on cost of production of a chicken, the cost to the industry of variation in maximum stocking density is not affected. That is, the cost to the industry of moving from one maximum stocking density to another is the same regardless of feed cost; feed cost does not affect the cost of reducing stocking density. Neither does it affect the amount by which industry capacity (i.e. production area) must be increased if the same output of chickens is to be maintained.

The same is true of other costs that change in direct proportion to the number of chickens produced, i.e. chicks, vaccines and other veterinary costs. The industry cost of a change in maximum stocking density is not affected by variation in the cost of any of these items.

Changes to costs that do not vary in proportion to number of birds produced do, however, affect the cost of decreasing stocking densities. As an illustration, the cost of labour is varied in Table 14 by plus and minus 50 per cent. The cost to the English industry of decreasing maximum stocking density to 25 kg liveweight per square metre in a situation in which labour cost was half as much again as in the standard figures would be £87.1m; where labour cost was only half the standard, £73.3m. The industry cost of making that stocking density change at the standard labour cost was £80.2m. It will be noted, therefore, that the influence exerted by even quite extreme variation in labour cost is not great.

That observation can be extended to other costs that do not vary in proportion to number of chickens produced. In all, the figures indicate that the variation in production costs between different EU Member States[10], should not be regarded as the most important issue in the forthcoming negotiations.

Table A7 Change in production cost per bird at various stocking density levels and with feed and labour costs increased/decreased – management system with crop thinning

Stocking density kg lw/sqm	% change in output from status quo	Production Cost per bird pence	change in cost %	Annual cost to UK industry £m	Increased capacity required %
		Feed cost increased by 16%			
42	+11	130.9	-1.8	-14.7	-10
38	no change	133.3	-	0	0
30	-21	140.2	+5.1	41.1	27
25	-34	146.7	+10.0	80.2	52
		Feed cost decreased by 11%			
42	+11	111.8	-2.1	-14.7	-10
38	no change	114.2	-	0	0
30	-21	121.1	6.0	41.1	27
25	-34	127.6	11.7	80.2	52
		Labour cost increased by 50%			
42	+11	121.6	-2.1	-16.0	-10
38	no change	124.2	-	0	0
30	-21	131.7	6.0	44.7	27
25	-34	138.7	11.7	87.1	52
		Labour cost decreased by 50%			
42	+11	117.6	-1.9	-13.4	-10
38	no change	119.8	-	0	0
30	-21	126.1	5.2	37.6	27
25	-34	132.0	10.2	73.3	52

[10] For the most part, variation between Member States will be very much less than the figures tested here.

Appendix III Tables for Calculating the Cost of Reduced Stocking Densities

Calculator for a range of maximum stocking densities, crop thinning permitted

Stocking Density	Output	% of status quo	cost per bird	%change	Industry cost England £m	% increased capacity required
42	49	111	119.6	-2.0	-14.7	-10
41	48	108	120.1	-1.5	-11.3	-7
40	47	105	120.7	-1.1	-7.7	-5
39	46	103	121.4	-0.5	-4.0	-3
38	44	100	122.0	0.0	0.0	0
37	43	97	122.7	0.6	4.2	3
36	42	95	123.4	1.2	8.6	6
35	41	92	124.2	1.8	13.2	9
34	40	89	125.0	2.5	18.1	12
33	39	87	125.9	3.2	23.4	15
32	37	84	126.8	4.0	28.9	19
31	36	82	127.8	4.8	34.8	23
30	35	79	128.9	5.6	41.1	27
29	34	76	130.0	6.5	47.9	31
28	33	74	131.2	7.5	55.1	36
27	32	71	132.5	8.6	62.8	41
26	30	68	133.9	9.7	71.2	46
25	29	66	135.4	11.0	80.2	52

Stocking Density Expressed in kg liveweight per square metre.

Output Expressed in liveweight kg per square metre.
Ratio of output to maximum stocking density presumed to remain constant with that established for the staus quo level. Value can be varied.

% of status quo Current UK standard predominantly 38kg liveweight per square metre
Outputs and costs per bird established for that level by 2002 Univeristy of Exeter Survey, updated by partial re-survey and application of indices, July 2005.

Cost per bird Estimated production cost per bird at the stocking density shown.

% change Variation from the cost per bird at the status quo level.

Industry cost Annual figure based on output of 600 million birds

Calculator for a range of maximum stocking densities, without crop thinning

Stocking Density	Output	% of status quo	cost per bird	%change	Industry cost England £m	% increased capacity required
42	40.5	91	124.5	10.4	14.7	10
41	39.6	89	125.2	11.0	18.9	12
40	38.6	87	125.9	11.7	23.2	15
39	37.6	85	126.6	12.4	27.7	18
38	36.7	83	127.4	13.1	32.5	21
37	35.7	80	128.3	13.8	37.6	24
36	34.7	78	129.2	14.6	42.9	28
35	33.8	76	130.1	15.4	48.5	31
34	32.8	74	131.1	16.3	54.5	35
33	31.8	72	132.1	17.3	60.8	39
32	30.9	70	133.3	18.2	67.5	44
31	29.9	67	134.5	19.3	74.7	48
30	29.0	65	135.7	20.4	82.3	53
29	28.0	63	137.1	21.6	90.5	59
28	27.0	61	138.5	22.9	99.2	64
27	26.1	59	140.1	24.3	108.6	70
26	25.1	57	141.8	25.8	118.7	77
25	24.1	54	143.6	27.4	129.6	84

Stocking Density Expressed in kg liveweight per square metre.

Output Expressed in liveweight kg per square metre. Estimated at 3.5 per cent less than the permitted maximum, equivalent to one days' growth at 85 grams per day (growth rate in final days).

% of status quo Current UK standard predominantly 38kg liveweight per square metre with thinning permitted; liveweight output 44.4 kg liveweight per square metre. Outputs and costs per bird established for that level by 2002 University of Exeter Survey, updated by partial re-survey and application of indices, July 2005.

Cost per bird Estimated production cost per bird at the stocking density shown.

% change Variation from the cost per bird at the status quo level.

Industry cost Annual figure based on output of 600 million birds

Appendix IV Questionnaire Used for Telephone Interviews

BROILER UPDATE 2005
TELEPHONE QUESTIONNAIRE

Code No:

PART 1 Checking and Updating 2002 data

	2002 data inserted by Exeter	Changed or new answer
0. EU region (North 41, West 43, East 44)		

1. Is the farm still producing broiler chickens? (Code: Yes 1, No 2)

If yes, go to section A

If no:-

Date of completion of last crop

Brief reasons for going out of production

End of interview for those no longer in production. Thank the respondent and close the interview.

A Ownership and contractual arrangements

2. Who operates the holding? (Tick with a 1)

Individual farmer or farming company		
Chicken processing company		

3. Please tick as many of the following boxes as best describe your production

Conventional		
Free-range		
Organic		
Grading-up to Organic		
None of the above		

4. How do you pay for:- (tick with a 1)

	CHICKS	FEED	VACCINES & MEDICATION	CHICKS	FEED	VACCINES & MEDICATION
Cost deducted from payment for broilers						
Supplied "free" by contractor						
Purchased directly and paid for by yourself						

B Housing, management and marketing

5. Have you attained, or are you grading-up towards, an Assurance Scheme such as Assured Chicken Production (ACP)?

Already attained (state which schemes)	scheme 1		
	scheme 2		
	scheme 3		
Grading-up towards (state which schemes)	scheme 1		
	scheme 2		
	scheme 3		

6. What is the total floor area of the broiler houses? sq. metres — **Vital! Be very sure to check this**

7. In how many separate houses?

8. How many chicks do you normally take in at the beginning of each crop cycle?

PART 2 Bringing us up to date

9. Since January 2003, have you:- (Tick with a 1)

	NUMBER	FLOOR AREA
Added any new houses		
Undertaken a major renovation or re-fit of houses		
Taken any houses permanently out of production		

10 If you have added new houses or undertaken a major renovation or re-fit, please provide a brief description of the work, including:-

Description and cost of building work

Description and cost of equipment

PART 3 Looking to the future

An EU Directive laying down minimum standards for the protection of chickens kept for meat production is soon to be discussed. Two maximum levels of stocking density are envisaged, 30kg and 38kg liveweight per square metre. The higher weight limit may require some changes to your husbandry practices, or even new capital investment.

11 Stocking density requirement

Would a new maximum stocking density of 38kg liveweight per square metre mean that you had to reduce the maximum level at which you currently operate? (Code: Yes=1, No=2)

What is your current maximum? kg lwt per sqm

If you have to reduce your stocking density, will you:- (tick with a 1)

Rear fewer birds in the same house(s)	
Increase the size of the house(s) to accommodate the same number of birds	
Rear the same number of birds but build more houses to accommodate them	

12 If compliance with the requirements of the 38kg liveweight per square metre standard involved substantial new capital investment, would you:-

Upgrade houses as necessary
Take non-compliant houses out of production (either seasonally or permanently)
Replace non-compliant houses
Accept the lower (30kg) maximum stocking rate
Wait for the problem to arise
Cease production
Other - specify

In answering that question, what figure did you have in mind as "substantial"? £

If the directive took effect from 31st December 2007, would that result in you upgrading ahead of present intentions? (Code: Yes=1, No=2)

When did you plan to upgrade houses in any case? (enter as, e.g. 03/2006)

13 The draft Directive proposes that all production units* should provide a minimum of 20 lux during the lighting period and a total of 8 hours in 24 of darkness, of which at least 4 hours must be continuous.

Are these requirements in accordance with your current practice?

20 lux (Code: Yes=1, No=2) Current practice - lux
8 hrs darkness (Code: Yes=1, No=2) Current practice - total hrs

With your existing facilities, would you be able to meet these requirements? (Code: Yes=1, No=2)

If no, what would you have to do and how much might it cost?

Action: Cost £

14 Annex 2 of the proposed Directive, relating to holdings stocked up to 38kg liveweight per square metre, requires that ammonia concentrations in the air inside the house should never exceed 20ppm

Is this requirement in accordance with your current practice? (Code: Yes=1, No=2)

With your existing facilities, would you be able to meet this requirement? (at all times, including cold, damp winter days) (Code: Yes=1, No=2)

If no, what would you have to do and how much might it cost?

Action: (better insulation, improved fan controls, equipment to measure ammonia) Cost £

15 Another Annex 2 requirement is that when outside temperature is 30C, or above, the temperature inside your houses should never be more than 3 degrees higher.

Is this requirement in accordance with your current practice? (Code: Yes=1, No=2)

With your existing facilities, would you be able to meet this requirement? (Code: Yes=1, No=2)

If no, what would you have to do and how much might it cost?

Action: (better insulation, extra fans, evaporative cooling) Cost £

16 Further Annex 2 requirements are that Relative Humidity should not exceed 70% when outdoor temperatures are below 10C *and that temperature and humidity should be recorded on a continuous basis and water consumption on a daily basis.*

Are these requirements in accordance with your current practice? (Code: Yes=1, No=2)

With your existing facilities, would you be able to meet these requirements? (Code: Yes=1, No=2)

If no, what would you have to do and how much might it cost?

Action: (better insulation, improved fan and heater controls, monitoring equipment) Cost £

* The Directive proposes standards for the protection of chickens kept for meat production, but does not apply to establishments with less than 200 chickens or to breeding stocks and hatcheries.

PART 4 Details of most recent crop

Finally, can I please ask for some details of your most recent chicken crop

	THINNING 1	THINNING 2	THINNING 3	FINAL
Date in				
Number of chicks placed				
Date out				
Number				
Liveweight kg				
Gross return				

THANK YOU VERY MUCH INDEED

Appendix V Questionnaire Used for On-Farm Interviews

Survey on the impact of the proposed new broiler standards

Code No:

Sheet 1: Basic data about the holding

Save this file under its own unique name as soon as you begin to insert data. See notes below on naming files and code numbers. Having named it, you can use Autosave (via Tools menu and "Add-ins") to ensure that you never lose more than a few minutes' un-saved work.

PART 1 Checking and Updating 2002 data

	2002 data inserted by Exeter	Changed or new answer
1. **EU region** (North 41, West 43, East 44)		

A Ownership and contractual arrangements

2. **Who owns the broiler chickens on the holding?**		Tick with a 1
Yourself (or the business that you represent)		
The business that will process the chickens		
Other (specify)		

3. **Please tick as many of the following boxes as best describe your production**		
Conventional		
Free-range		
Organic		
Grading-up to Organic		
None of the above (brief description)		

4. **How do you pay for:-**	CHICKS	FEED	VACCINES & MEDICATION	CHICKS	FEED	VACCINES & MEDICATION
Cost deducted from payment for broilers						
Supplied "free" by contractor						
Purchased directly and paid for by yourself						

B Housing, management and marketing

5. **Have you attained, or are you grading-up towards, an Assurance Scheme such as Assured Chicken Production (ACP)?**			
Already attained (state which schemes)	scheme 1		
	scheme 2		
	scheme 3		
Grading-up towards (state which schemes)	scheme 1		
	scheme 2		
	scheme 3		

6. **What is the total floor area of the broiler houses?**	sq. metres		
7. **In how many separate houses?**			
8. **How many chicks do you normally take in at the beginning of each crop cycle?**			

PART 2 Bringing us up to date

9. **Since January 2003, have you:-** (Tick with a 1)	NUMBER	FLOOR AREA
Added any new houses		
Undertaken a major renovation or re-fit of houses		
Taken any houses permanently out of production		

10 If you have added new houses or undertaken a major renovation or re-fit, please provide a brief description of the work, including:-

Description and cost of building work

Description and cost of equipment

Code No: 0

Sheet 2: Draft Welfare Directive (questions sequential with sheet 1, Basic Data)

An EU Directive laying down minimum standards for the protection of chickens kept for meat production is soon to be discussed. Two maximum levels of stocking density are envisaged, 30kg and 38kg liveweight per square metre. The higher weight limit may require some changes to your husbandry practices, or even new capital investment.

11. Stocking density requirement

Would a new maximum stocking density of 38kg liveweight per square metre mean that you had to reduce the maximum level at which you currently operate? (Code: Yes=1, No=2)

What is your current maximum? kg lwt per sqm

If you have to reduce your stocking density, will you:- (tick with a 1)
Rear fewer birds in the same house(s)
Increase the size of the house(s) to accommodate the same number of birds
Rear the same number of birds but build more houses to accommodate them

12. If compliance with requirements of the 38kg liveweight per square metre standard involved substantial new capital investment, would you:-

Upgrade houses as necessary
Take non-compliant houses out of production (either seasonally or permanently)
Replace non-compliant houses
Accept the lower (30kg) maximum stocking rate
Wait for the problem to arise
Cease production
Other - specify

In answering that question, what figure did you have in mind as "substantial"?

If the directive took effect from 31st December 2007, would that result in you upgrading ahead of present intentions? (Code: Yes=1, No=2)

When did you plan to upgrade houses in any case? (enter as, e.g. 03/2006)

13. The draft Directive proposes that all production units* should provide a minimum of 20 lux during the lighting period and a total of 8 hours in 24 of darkness, of which at least 4 hours must be continuous.

Are these requirements in accordance with your current practice?

20 lux (Code: Yes=1, No=2) Current practice - lux
8 hrs darkness (Code: Yes=1, No=2) Current practice - total hrs

With your existing facilities, would you be able to meet these requirements? (Code: Yes=1, No=2)

If no, what would you have to do and how much might it cost?
Action: Cost £

Do you think that this requirement will have a cost to you in terms of eg. mortality, FCR, downgrading, etc.? (Code: Yes=1, No=2)
If yes, please specify what the cost will be and, if possible, the amount by which a particular performance factor might be affected

Other comments on the lighting requirements:

14. Annex 2 of the proposed Directive, relating to holdings stocked up to 38kg liveweight per square metre, requires that ammonia concentrations in the air inside the house should never exceed 20ppm

Is this requirement in accordance with your current practice? (Code: Yes=1, No=2)

With your existing facilities, would you be able to meet this requirement?
(at all times, including cold, damp winter days) (Code: Yes=1, No=2)
If no, what would you have to do and how much might it cost?
Action: (better insulation, improved fan controls, equipment to measure ammonia) Cost £

Do you think that this requirement will increase your operating costs? (Code: Yes=1, No=2)
If yes, please specify in what way and, if possible, how much

Other comments on the ammonia concentration requirement:

15. Another Annex 2 requirement is that when outside temperature is 30C, or above, the temperature inside your houses should never be more than 3 degrees higher.

Is this requirement in accordance with your current practice? (Code: Yes=1, No=2) ☐

With your existing facilities, would you be able to meet this requirement? (Code: Yes=1, No=2) ☐

If no, what would you have to do and how much might it cost?

Action: (better insulation, extra fans, evaporative cooling) Cost £ ☐

Do you think that this requirement will increase your operating costs? (Code: Yes=1, No=2) ☐

If yes, please specify in what way and, if possible, how much

Other comments on the temperature lift requirement:

16. Further Annex 2 requirements are that Relative Humidity should not exceed 70% when outdoor temperatures are below 10C *and that temperature and humidity should be recorded on a continuous basis and water consumption on a daily basis.*

Are these requirements in accordance with your current practice? (Code: Yes=1, No=2) ☐

With your existing facilities, would you be able to meet these requirements? (Code: Yes=1, No=2) ☐

If no, what would you have to do and how much might it cost?

Action: (better insulation, improved fan and heater controls, monitoring equipment) Cost £ ☐

Do you think that these requirements will increase your operating costs? (Code: Yes=1, No=2) ☐

If yes, please specify in what way and, if possible, how much

Other comments on these requirements:

17. Annex 2 also requires that the following documentation should be kept up to date and be always be available for inspection. Please note which items you already keep.

	Already kept (Code: Yes=1, No=
Technical details of the establishment and its equipment	
- dimensions	☐
- ventilation, cooling and heating system, including a ventilation plan, detailing target air quality parameters, such as airflow, air speed and temperature	☐
- feeding and watering systems	☐
- alarm systems and backup systems in the case of electric failure	☐
- floor and litter type	☐
Production targets	☐
Management	
- number of personnel	☐
- qualifications of the keeper and other persons attending the chickens	☐
- suppliers of chicks and feed	☐
- veterinarian attending the establishment	☐
- inspection plan and procedures concerning the daily farm management, including culling proceedures	☐
- inspection and maintenance plan for technical equipment	☐
- depopulation procedures, including catching	☐
- cleaning and disinfection procedures	☐
- emergency plan for use in the case of electric failure	☐
Technical inspections of the ventilation and alarm system	☐
Estimated cost of filling the gaps in the above sections	£ ☐

Any comments on the practicalities of providing the above:-

* The Directive proposes standards for the protection of chickens kept for meat production, but does not apply to establishments with less than 200 chickens or to breeding stocks and hatcheries.

Sheet 3: Data on most recent crop

Code No:	0

Crop	Date	Number	Age in days	Lwt kg	Outgoing birds Date	Number	Lwt kg	Gross return £	Days in unit	Av. lwt kg	Growth rate g per day	Gross return** p per kg
Most recent crop									0			
									0			
									0			
									0			
									0			
									0			
									0			
									0			
									0			
TOTAL	Mortality	0				0	0	0	0			

Miscellaneous income (usually none, may be manure*)

*Frequently, there will not be any Miscellaneous income. The most likely source is sale of manure. If manure is exchanged for straw (or some other input), calculate the value of the exchange and enter the revenue value here.

Feedingstuffs	tonnes	£	£ per tonne
Compounds			
Wheat:- purchased			
home-grown			
Barley:- purchased			
home-grown			
Other energy			
Soya bean meal			
Other protein (incl. protein concs. & milk powder)			
Mins, vits. & additives			
TOTAL	0.000	0	

Most usually compound feed only, with the addition in some cases of home-grown or purchased wheat.

Chick purchases Number	£
pence per chick	
per bird sold	

Vaccines
#DIV/0!

Other Vet & Med	Total vaccines Vet & Med
	0.0
#DIV/0!	#DIV/0!

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