

Regulatory Impact Assessment

Title of Proposal

1. This Regulatory Impact Assessment considers the impact of a proposal to publish the document 'Managing Farm Manures for Food Safety - guidelines for growers to reduce the risks of microbiological contamination of ready-to-eat crops', a good practice guide prepared by the Food Standards Agency (FSA).

For list of abbreviations see page 18.

Purpose and Intended Effect of the Measure

(i) Objective

2. The purpose of publishing the document is to reduce the numbers of consumers who acquire foodborne illness from ready-to-eat crops and to provide growers with practical advice on how to reduce the risk of microbiological contamination when using farm manures to improve soil fertility.

(ii) Background

Manures and Food Safety Risks from Ready-to-eat Crops

3. Farm manures (both solid manures and slurries) are applied to agricultural land to meet crop nutrient requirements and to improve soil fertility. Around 96 million tonnes of farm manures are applied to approximately 4.3 million hectares of agricultural land each year in the UK. These manures can contain pathogenic microorganisms (for example *E. coli* O157, *Salmonella*, *Listeria*, *Campylobacter*, *Cryptosporidium* and *Giardia*) which may cause foodborne illness. Factors such as the age, diet and management of animals, as well as regional and seasonal influences affect the number of microorganisms in manures. These pathogens may also be present in dirty water, yard run-off and water draining from stored manures.
4. A considerable proportion of the area used to grow ready-to-eat crops may receive farm manures prior to planting. The management and handling of farm

manures, particularly the length of time they are stored, are important factors in the survival of microorganisms. The method and timing of manure applications to land can affect the length of time that pathogens survive in the soil, and the likelihood of their getting onto food crops. Additionally, dung deposited by grazing livestock is also a potential source of pathogenic microorganisms. In order to reduce any risks of foodborne illness resulting from the use of farm manures and following dung deposition by grazing livestock, there is a need for good practice in the growing, harvesting and packing of ready-to-eat crops to avoid contamination.

5. For the purposes of this guidance, ready-to-eat crops are those that are always or sometimes eaten raw such as lettuce or carrots. This means that the destruction of pathogens by cooking does not take place and the risks are higher than for other crops.
6. The guidance contains a list of 30 ready-to-eat crops including salads, fruit, and some vegetables which are less likely to be cooked.
7. The guidance provides growers in the UK with advice to develop safety plans that will reduce the risks of microbiological contamination of ready-to-eat crops. Many of the recommendations are common sense and are already in place on farms. Others may take good management practices a step further. The guidance does not prescribe specific mandatory requirements and following its advice will be on a voluntary basis.
8. The main aspects of the guidance are:
 - The selection of land on which ready-to-eat crops are grown.
 - Management of manures and slurries before application to land.
 - Timing of applications of manure (including fresh manure from grazing animals) and slurry in relation to production of ready-to-eat crops.
 - Prevention of contamination of growing crops and reduction of risks during and after harvest.
9. Ready-to-eat crops are not generally considered to be a major cause of foodborne infectious intestinal disease (IID). For the UK in 2005, the estimated total number of cases of IID is 863,000 (FSA, 2006) of which salads, vegetables

and fruit are estimated to account for about 2.5% (based on Adak et al, 2005 – see Annex 2).

10. The producers of most ready-to-eat crops in the UK are thought to follow the advice in the guidance because they supply major retailers and are members of produce assurance schemes, principally the Assured Produce scheme. Those who currently may not follow the advice in the guidelines are more common among organic producers and small conventional producers selling mainly to wholesale markets, or direct to small greengrocers, farm shops, farmers' markets or through box schemes. The growing influence of major retailers and produce assurance schemes means that the proportion of ready-to-eat crops that are grown in ways that accord with the advice in the guidance is gradually increasing.
11. Other developments in relation to reducing risks from ready-to-eat crops include the Food Hygiene Regulation 852/2004 which came into force on 1 January 2006. Enforcement by officers approved by the local food authority began in 2006 and they are planning to visit primary producers (including growers) once every 4 to 50 years. The regulation does not make specific requirements for the management of manures for food safety in relation to ready-to-eat crops but the proposed FSA guidance does make voluntary recommendations on this subject. Another relevant piece of legislation is EU Regulation 834/2007 'on organic production and labelling of organic products' which will be implemented on 1 January 2009.

Consultation

(i) Within Government

12. Development and drafting of The 'Managing Farm Manures for Food Safety' guidance document was overseen by a steering group chaired by the Food Standards Agency and involving representatives from the Department for Environment, Food and Rural Affairs (DEFRA), the Environment Agency (EA) and the Scottish Executive Environment and Rural Affairs Department (SEERAD). Industry interests were also represented on the steering group by the National Farmers Union (NFU), the Soil Association (SA), the British Retail Consortium (BRC), the Chilled Food Association (CFA) and the Food and Drink

Federation (FDF). This guidance was written by ADAS UK Ltd. and Direct Laboratory Services Ltd (formerly ADAS Laboratories) who had carried out the underpinning research funded by the FSA.

(ii) Public Consultations

13. The guidance document was issued for public consultation in June 2002. A total of 16 organisations responded to the consultation and a summary of these comments along with the FSA's responses was published on the Agency's web site. The guidance was subsequently revised to take into account the comments received and the results of additional research on livestock grazing, carried out to address specific issues identified by consultees.
14. The partial RIA was issued for public consultation by the FSA in England, Wales, Scotland and Northern Ireland in autumn 2007. Responses were received from the following organisations:

Organisations Responding to the Consultation on the Partial RIA

Organisation	Abbreviation
National Farmers Union	NFU
National Farmers Union Scotland	NFUS
British Retail Consortium	BRC
Chilled Food Association	CFA
Institute of Food Research	IFR
Environment Agency	EA
Water UK	WUK
Dr. Keith Jones, Lancaster University	KJ
Chris Rowlands, consultant	CR
Soil Association	SA
Organic Growers' Alliance	OGA
Welsh Agrifood Partnership Organic Horticulture Sub-Group	WAP
Northern Ireland Food Advisory Committee	NIFAC
Scottish Environment Protection Agency	SEPA

15. The FSA gratefully acknowledges the input of these organisations and individuals.

The nature of the important points they made and the response of the FSA to them is now summarised. For brevity, the points raised are dealt with one by one with the abbreviations used to denote the respondents from whom they came. Overall there were 14 responses but only 1 (NFU) opposed publication of the guidance.

16. The NFU and NIFAC suggested that the CBA should take account of the contribution to human illness of imported produce. This is accepted and has now been incorporated into the CBA – reducing the benefits.

17. Several organisations raised the question of whether small producers would follow the advice in the guidance and questioned whether the guidance should be voluntary (BRC, CFA, IFR & KJ). Some of these expressed concern that the partial RIA 'condones' failure to follow the guidance.

18. In carrying out Impact Assessment in cases of compulsory regulation the FSA is required by the Department for Business, Enterprise & Regulatory Reform (BERR) instructions to assess what proportion of affected businesses etc. will change practice. In the case of voluntary advice this is yet more necessary. The FSA wants all food producers to follow its advice in the guidance on the safe use of farm manures. However, in assessing the impact of publishing the guidance, the FSA is required to make realistic assessments of the proportion of businesses which will, and will not, follow the advice in the guidance. Although some comments were received about the assumptions put forward in the CBA for the proportion of growers adopting the advice, none of the respondents suggested alternative assumptions. This aspect of the CBA has not been changed.
19. In contrast to the concern reported above, about the guidance being voluntary, three organisations expressed concern if the guidance were to be made compulsory (SA, OGA and NIFAC). These concerns related to difficulty and cost for some producers, especially small and organic ones, in making changes to follow the advice in the guidance. The FSA has no plans to make the guidance compulsory.
20. Two respondents (NFU and NIFAC) noted that the calculation of benefits in the CBA rests on two assumptions by an expert on the reductions in cases of foodborne disease caused by ready-to-eat crops (10% for salads and 1% for fruit) which following the guidance would cause. One respondent (NFU) suggested use of sensitivity analysis. The RIA does include sensitivity analysis and break-even analysis in Table 20 in Annex 2.
21. One respondent (NFU) questioned the inclusion of the value of reductions in pain and suffering. Additional explanation and justification of the inclusion of pain and suffering as a monetised benefit has been added to Annex 2.
22. One respondent (EA) suggested the sustainability assessment should examine the climate change impacts of more fertiliser use. In the opinion of the FSA this misinterprets the impact of the recommendations, in certain specific situations, to use more fertiliser on ready-to-eat crops. The total supply of manure is determined by livestock populations and husbandry systems. The main effect of

any recommendations in this guidance will be to slightly change the distribution of manure and fertiliser among ready-to-eat and all other crops, rather than to change the total quantities of either used in the UK. Changes in the crops to which manure is applied and in the timing could have very small positive or negative effects on the efficiency with which it is used by crops but any impact on overall fertiliser use would be extremely small.

23. The BRC suggested that the assumed life of the guidance document of ten years is too long. The FSA accepts that the guidance will need to be refreshed to make sure it is up to date in terms of references to other documents and developments, and that is likely to be within 10 years. However, new scientific knowledge in this area takes time to generate. The FSA intends to consider future research needs but if a decision were taken to commission more research it would take at least six or seven years to be ready for inclusion in any new edition of the guidance. There is an argument that 10 years is too short a time to value the benefits. Regulation and advice in the food safety subject area (as in other areas that relate to risks to the public) very rarely gets weakened or removed (the so called 'ratchet effect'). The new advice to reduce risks in the guidance can be expected to last almost indefinitely. On balance, the FSA believes that the assumption of a 10 year life for the guidance in order to value its benefits is appropriate.

24. There was concern that the analysis should reflect regional differences (NIFAC). The statistics for the areas of crops and the number of horticultural businesses are now for the UK. The analysis, in taking account of the specific situation of different types of crops grown and the greater proportional cost burden on small businesses and organic businesses, does take account of the way production conditions vary around the UK. No additional methods of calculating the burdens were suggested by any respondents but the RIA has been changed so that whereas the CBA in the partial RIA was for GB, the CBA in the final RIA is for the UK.

25. The Institute for Food Research questioned the assumption that all protected production of ready-to-eat crops takes place in soil-less systems. Small areas of soil-based protected cropping have now been included in the CBA.

26. Some comments from respondents related not to the content of the RIA but to the drafting of the guidance. In general, the FSA does not intend to reopen discussion on the text of the guidance which was the subject of an earlier consultation. However it will make limited changes to the references listed to make sure they are up to date and inclusive for the UK.

Options

27. There are 2 options considered as follows:

- Option 1: Do nothing.
- Option 2: Publish the guidance.

Option 1

28. This option would maintain the current policy with no specific Government advice published on management of manures for food safety.

29. There would be a small saving in the cost of publication to Government which will be trivial. The cost of preparing the guidance has been spent including the cost to stakeholders engaged in consultations. In addition the cost of the underpinning research was £1.408 million. These are sunk costs which do not need to be taken into account in the assessment of impact.

30. There may be small continued improvements in the safety of ready-to-eat crops as market requirements for food safety develop, through retailer requirements and produce assurance schemes. However this may be balanced by the trend towards more organic food which is more often marketed direct to consumers without participation in farm assurance schemes. Otherwise, current levels of foodborne disease from ready-to-eat crops can be expected to continue.

Option 2

31. This option is to publish the guidance. In practical terms this would mean copies of the guidance being available for free downloading from the FSA website. It may also involve production of additional promotional materials such as a poster or leaflet.

32. It is assumed that produce assurance schemes and major retailers would quickly adopt the guidelines in their production protocols. It is likely that producers who supply the major retailers or belong to assurance schemes would have to obtain the guidance and keep records to demonstrate they follow it. Most of these producers would need to make no change to their methods of production since the existing requirements of the major retailers and some produce assurance schemes already meet or exceed the Agency's guidance.
33. For some smaller conventional producers and organic producers, the guidance may require changes to their methods of production and may result in some additional costs. As adoption of the guidance will be voluntary, it is anticipated that a proportion of these producers may not make changes to follow the advice in the guidance.
34. The number of cases of foodborne infectious intestinal disease would be expected to fall compared to Option 1. The beneficiaries will be:
- The public
 - Producers
 - Retailers
 - Government
35. The public benefit from a small reduction in food risks. Producers benefit from the provision of simple guidance from a trusted source increasing awareness of the need to follow good practice to avoid contamination of ready-to-eat crops. In the case studies carried out to support the CBA in this RIA there were some examples of growers becoming aware of risks they could easily eliminate at zero cost but of which they had not been aware before receiving the guidance (see pages 46 and 61 for examples relating to control of farm dogs). There could be some benefit to producers if publication of the guidance dissuades some purchasers from developing even more stringent protocols of their own. Producers would also benefit from the maintenance and improvement of consumer confidence which could otherwise be lost as a result of cases of foodborne illness caused by ready-to-eat crops. Retailers benefit from the provision of advice which they can adopt and place as a requirement on their suppliers. They avoid the cost of developing their own protocols. In addition the

Government will benefit from slightly lower NHS costs. There is also some benefit to the FSA since it will help the Agency achieve its targets if IID cases are reduced.

Costs and Benefits

(i) Business Sectors Affected

36. The businesses affected will be those producing ready-to-eat crops. There are approximately 11,200 businesses classified as horticultural in the UK (Defra, 2006) but not all produce fresh food produce crops. However a considerable number of businesses not classified as horticultural also grow ready-to-eat crops so the estimated figure of 11,200 is considered reasonably valid. The area of ready-to-eat crops grown in the UK is approximately 121,000 ha.

Option1:

37. As this option would maintain the status quo, there would be no additional cost/benefit implications.

Option 2:

Initial Public Sector Cost Calculation

38. The impact on the public sector is the cost of publishing the document. The cost of providing a downloadable version on the FSA web site will be trivial. There may be additional costs if the FSA decides to develop other supporting materials, for example a leaflet.

(ii) Costs

39. Four case studies were carried out where businesses were visited and the actual costs of adjusting the production system to meet the recommendations in the guidance were calculated and agreed with the proprietors. One of these businesses was a large conventional root crop producer where no changes will be required. One was a large conventional grower of brassica crops where some changes will be required because of grazing carried out before crops are planted.

The remaining two businesses were a small mixed organic farm which produces vegetables and a small organic unit which runs poultry in an orchard.

Case Study	Assessed Cost £/year
No. 1, Large conventional root producer	7
No 2, Small organic vegetable producer on mixed farm	982
No. 3, Conventional leafy crop producer grazing sheep	6,271
No. 4, Small mixed organic farm with poultry and top fruit	301

40. The information from these case studies was used to prepare the costing methodology used in the CBA. The case studies where the guidance will cause additional costs were hard to find because most producers of ready-to-eat crops will have to make no changes and hence will have no cost increases.

41. The basic logic of the CBA calculation is that there are three groups of producers:

- Those that currently meet the recommendations in the guidance.
- Those that currently do not meet the recommendations in the guidance, but would change practice if it was published.
- Those that currently do not meet the recommendations in the guidance and would not change practice if it was published.

Estimates for the area of crops for each group of producers, separately for conventional and organic producers, are given in Annex 2 on pages 33, 34 and 65 onwards. The crops are classified in a manner that facilitates the calculation of costs of changing practice to follow the recommendations in the guidance. Least cost changes are then applied to estimate the total cost of changing practice. Annex 2 is transparent since all the steps in calculating costs from the evidence base and the assumptions are presented.

42. The costs to producers will be about £0.3 million per year in recurrent costs. Uptake will be gradual but it is estimated that about 12,000 ha of crop may not be grown in ways that follow the advice in the guidance. Over the medium term (say 5 years) about 6,700 ha might change to meet the guidance as a result of the voluntary adoption by growers. The costs of adoption include about £0.56 million for one-off administrative costs to obtain the guidance, read it and adapt recording systems and about £16,000 per year to keep additional records. The bulk of the recurrent costs of about £0.3 million per year are actual changes to farming systems to meet the advice in the guidance. These are costs such as storing manure for longer, losing income from grazing, additional fertiliser costs and so on. The estimate of the cost of the guidance to the sector has a wide margin of error attached to it and might be high or low by a margin of 30% or 40%. However the estimate of costs is thought to be more reliable than the estimate of benefits.

43. The estimated additional administrative costs of £16,000 per year in recurrent costs and £0.56 million of one-off costs should not be confused with the administrative burdens of regulation. Adopting the guidance will result in some additional administrative costs but these are business as usual costs, not burdens caused by regulation. Since adoption of the guidance would be a commercial decision it may be reasonably assumed that businesses which do so perceive there to be overall benefits from its adoption.

(iii) Benefits

44. The benefits are estimated to be about £1.15 million per year from a reduction in the number of cases of foodborne infectious intestinal disease. This estimate of the benefits is made up of £21,000 per year for reduced NHS costs, £89,000 per year for reductions in lost earnings and other expenses and £1.043 million per year for reduced pain and suffering.

45. The estimates of the benefits are very approximate and depend on expert judgement to estimate the impact of the changes the guidance will bring about on the number of cases of infectious intestinal disease. The actual impact could vary widely from the central assumption. If the impact on disease was 50% lower than

estimated the value of the benefits would fall to £0.57 million per year and if the impact was 50% higher than estimated the benefits would increase to £1.73 million per year. For the benefits to equal costs the impact on foodborne disease would have to be about one quarter of the most likely estimate. The chance of this occurring is low. There are also some non-costed benefits such as advice available in a single place, in a simple to follow guide, and from a trusted and commercially neutral source.

46. Assuming a ten year life for the guidance and discounting the net benefits at the Treasury test discount rate of 3.5% gives a Net Present Value of £6.5 million.

Sustainable Development

47. A sustainability assessment has been completed and is attached as Annex I.

48. In terms of government receipts or savings, there will be a small but uncertain benefit in lower National Health Service Costs (about £21,000 per year). There will also be modest costs of publication. The guidance is voluntary so there will be no additional public service costs associated with enforcement. The implications for organisational impacts including trust and reputation are unclear. Failure to publish could be criticised as failing to protect the public but publication could also be criticised as part of an overly safety-conscious culture likely to harm traditional food production processes and particularly small producers. It is estimated that 67% of the cost will fall on conventional producers and 33% on organic producers.

49. The overall cost of publication and adopting the guidance to food production businesses will be small but it will fall mainly on the smallest businesses.

50. The publication is unlikely to affect consumer behaviour. Costs will fall predominantly on small rural businesses whereas benefits will primarily accrue to urban consumers. There is some variation between English Regions and Scotland, Wales and Northern Ireland in the adoption of organic farming. The highest participation in organic farming is in the South West of England.

51. The environmental consequences are modest. The need to use stored manure might lead to a very small increase in heaps of farm yard manure (FYM) stored

outside but the quantity would be virtually insignificant compared to current practice. Care in sitting these heaps is important in avoiding water pollution but requirements on growers already exist under Nitrate Vulnerable Zone (NVZ) rules and Cross Compliance for the Single Payment.

52. The impact on traditional orchard management of grazing (mainly by sheep) has previously caused some concern with stakeholders. This practice is rarely carried out where dessert apples are produced. Provided apples are picked from the trees, grazing would not be prevented by following the guidance. The clarification that the guidance does not have implications for cider production practices may alleviate concerns since picking apples from the ground is more prevalent in cider production than the production of dessert apples. See Annex 2 pages 33 and 34 for an explanation of why cider orchards have been excluded from the impact assessment. Selling windfall dessert apples already contravenes the EU Horticultural Marketing Standards which require fruit not to be bruised.

53. The implications for sustainable development including rural development are minimal.

Small Firms Impact Test

54. Businesses having fewer than 250 full time equivalent (FTE) employees are regarded as small businesses for the purposes of the Small Firms Impact Test. (Note this is different to the use of the term 'small business' elsewhere in this RIA where it is used to refer to crop production business which are small in relation to crop production holdings in general, say less than two FTE employees. Nearly all UK producers of ready-to-eat crops employ less than 250 FTEs. The standard government definitions are: Large > 250 FTE, Medium 50 – 249 FTE, Small 0 – 49 FTE which includes micro 0 - < 9 FTE. Four micro businesses (using the standard government terminology) which produce ready-to-eat crops were consulted face to face and the information collected is reported in Annex 2. Two of these were in the West, one in the North West and one in the East of the UK.

55. The fact that the guidance is voluntary means that the smaller businesses, which would have greatest difficulty and cost in following the recommendations, can choose not to do so. A small business exemption is not appropriate since almost

all ready-to-eat produce is grown by businesses of less than 250 employees. The smallest businesses are an important target audience where current practice is most likely to need improvement.

Administrative Burdens

56. Additional administrative costs are estimated to be £565,639 in one-off costs and £16,254 per year in additional recurrent costs to producers of ready-to-eat crops (see pages 69-71 for details). The one-off costs are due to the need to obtain, read, digest the guidance and then make changes to record keeping systems. In calculating these one-off costs it is assumed that the time taken to obtain, read and digest the 10-page guidance is 3 hours per business with a further 2 hours per business assumed for those needing to adapt their record keeping systems. The recurrent costs are due to increased record keeping recommendations in the guidance.

57. These are costs borne voluntarily by firms adopting good practice without specific requirements in regulations. They are thus business as usual costs. Administrative burdens are administrative costs less business as usual costs.

58. The Agency considers that there will be no additional administrative burdens to industry as a result of this guidance, as following the guidance will be voluntary.

Competition Assessment

59. The competition filter was applied and yielded only one positive answer to the ten questions. The relevant market is the market for ready-to-eat crops where many producers face many buyers but the major retailers are important purchasers. Option 1 would have no effect on existing competition because it is the status quo. Option 2 will lead to a small cost increase for some producers but it will not significantly affect costs of entry into production of ready-to-eat crops or change competition.

Option 1

60. As this option would maintain the status quo, there would be no implications for competition.

Option 2

61. As noted above, publication of the guidance will add about £0.3 million per year to the costs of the sector that grows ready-to-eat crops. These costs will fall primarily on smaller conventional growers and on the organic producers of ready-to-eat crops (which also tend to be small businesses). Not all producers will follow the advice in this voluntary guidance and it may give continuing financial advantages to those who chose to ignore it. However, safety of food is a matter of great concern to consumers and this gives opportunities for those who follow the advice in the guidance to use this fact when promoting their produce. Since direct retailing to the public is more common for organic production than conventional production this may be an opportunity that the organic sector can make use of.
62. Large conventional producers are generally producing ready-to-eat crops in ways that meet the advice in the guidance so it has few implications for them.

Enforcement, Sanctions and Monitoring

63. Following the advice in the guidance will be voluntary so no issues of enforcement or sanctions are relevant.
64. It would be appropriate to monitor the influence of the guidance to check that continuing publication is worthwhile. Apart from obvious checks such as the number of website downloads and the number of hard copies distributed, it would be worth occasional assessments of the impact of the guidance. Periodic (say five yearly) examination of farm assurance and major retailer protocols for ready-to-eat crops for reference to the guidance would be highly relevant. In addition, periodic examination of the extent to which producers follow the advice, for example from farm practices survey information, would test the value of the guidance and the necessity to continue publication in the longer term. Where crop assurance scheme audits check that growers follow the recommendations in the guidance this would indicate continuing value in publication.

Implementation and Delivery Plan

65. If option 2 is adopted and publication is to proceed it will require only a small group to decide on formatting and production of a web version and provision of hard copies. Full consultation on the content of the guidance has already taken place.

Post Implementation Review

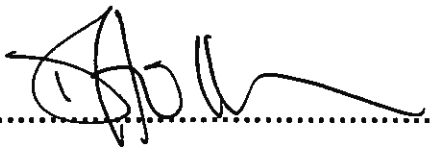
66. The effectiveness of the policy should be examined along the lines described above in five years time.

Recommendation

67. On the basis of this RIA the Agency intends to publish the guidance document, as the benefits to public health appear to outweigh significantly the associated costs of following the advice in the guidance.

Declaration

I have read the regulatory impact assessment and am satisfied that the benefits justify the costs.

Signed.....

Date..... 9.12.08

Dame Deirdre Hutton, Chair, Food Standards Agency

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List of Abbreviations

Abbreviation	Meaning
APS	Assured Produce Scheme
BASIS	A professional register for pesticide advisers
BERR	Department for Enterprise & Regulatory Reform
CBA	Cost benefit analysis
FACTS	Fertiliser Advisers Certification & Training Scheme
FTE	Full Time Equivalent
FYM	Farm yard manure
GAP	Good Agricultural Practice
HACCP	Hazard Analysis and Critical Control Point
LERAPs	Local Environmental Risk Assessment for Pesticides
LFA	Less Favoured Area
NPV	Net Present Value
NVZ	Nitrate Vulnerable Zone
RB209	Fertiliser recommendations published by Defra
SDA	Severely Disadvantaged Area of the Less Favoured Area
SSSI	Site of Special Scientific Interest

Annex 1

Sustainability Assessment Table

Summary of issue: Provide a brief outline of the issue to be assessed and why along with any relevant background information.

Base case or do nothing option: Describe the “base case” or “do nothing option” which should be the current policy situation (i.e. no change in policy), and must be compared to any proposed new policy options for change. You could also mention here why a change is being considered. Comparing the options against the “do nothing” or “base case” option provides justification for the eventual chosen route as it facilitates identification of the implications of not acting

The do nothing option is for the FSA to choose not to publish or otherwise promote the draft guidance on Managing Manures for Food Safety. Preparation for publishing the guidance has been taken forward in line with the objectives of the FSA to reduce foodborne Infectious Intestinal Disease. The Guidance has been prepared and agreed with stakeholders.

Options 1, 2, 3...etc: Provide a short paragraph summarising each of the policy options you propose to carry out a sustainability assessment on. In line with current RIA practices a non-regulatory option (if relevant) should also be considered where possible alongside any regulatory options. As many options as are desired can be considered together, just add in extra columns to the table below.

Option 1 is to publish the Guidance in a freely available form such as a pdf document on the Agency’s web site and a printed version.

- **Now assess the options by answering the questions in the table below** (Insert N/A if the question is not applicable to the policy option being considered).

Note: Paragraph numbers in the Table below refer to the FSA document “Sustainable Development and Sustainability Assessment and How it Links to the Regulatory Impact Assessment” (FSA, 2006) - not to this RIA.

	Questions for consideration	<u>Do nothing or Base Case assessment</u>	<u>Option 1 assessment</u>	<u>Option 2 assessment</u>
SECTION A: ECONOMIC IMPACTS				
A1: Public accounts and public service (Paras 36 - 38)	<ul style="list-style-type: none"> • Will the proposal result in receipts or savings to the Government? • Will it involve costs to the Government? • Will it impact on the public sector including the resources of front line delivery staff or impose administrative or other burdens on public service providers, e.g. frontline staff in health, education, local government or criminal justice? • Will it have any organisational impacts including trust and reputation? 	<p>No change</p> <p>No change</p> <p>No change</p> <p>Not publishing will have a negative impact, as all the development work has been carried out and stakeholders are aware of the draft guidance. It might also be regarded as a failure to act to protect public health.</p>	<p>Small reductions in NHS costs</p> <p>Modest costs of publication and promotion. The cost of preparing the guidance has been spent.</p> <p>No. The guidance is voluntary so front line inspectors will not check on whether growers follow the advice.</p> <p>Publishing will add to the Agency's reputation as a source of advice. However the Guidance might be seen as part of a culture of government that places too much emphasis on safety.</p>	
A2: Business (Paras 39 - 41)	<ul style="list-style-type: none"> • Will it result in new technologies or a new process that will make existing goods redundant over time? • Will it result in a change in the investment behaviour in people, equipment, infrastructure, or other asset both into the UK and UK firm overseas and into particular industries? • Will the proposal impact on the levels of competition within the affected sector? 	<p>N/A</p> <p>N/A</p> <p>N/A</p>	<p>N/A</p> <p>Some capital investments will be required by some producers to follow the guidance.</p> <p>The guidance will place more significant costs on small producers than large producers, many of whom already produce crops in ways which are consistent with the advice in the guidance.</p>	

	Questions for consideration	<u>Do nothing or Base Case assessment</u>	<u>Option 1 assessment</u>	<u>Option 2 assessment</u>
	<ul style="list-style-type: none"> Will it impact on business, charities or the voluntary sector? 	N/A	Additional costs will mainly affect growers' businesses but also a few charities and voluntary sector organisations. Growers with small businesses and organic growers will be affected more than growers with large conventional businesses. A small number of charities running growing businesses for educational reasons or to provide employment for those with learning or physical disabilities will be marginally affected.	
A3: Consumers (Paras 42 - 43)	<ul style="list-style-type: none"> Will the proposal impact on consumers? Will the policy or project affect the cost, quality or availability of commercially available or publicly provided goods or services? Will it result in a change in the choice available to consumers, or the availability of information to enable them to exercise choice? 	N/A N/A N/A	<p>Yes – there will be a reduction in the low risks from acquiring foodborne disease associated with eating fresh produce.</p> <p>No. Horticultural Marketing legislation already makes sale of food items such as windfall apples illegal. There will be a very small effect on prices of some fresh produce crops due to increased costs. Those making juice or selling fruit to makers of un-pasteurised juice from windfall fruit in grazed orchards would be affected. Few desert apple producers graze orchards.</p> <p>Through publishing good practice guidelines the guidance will assist consumer choice since in the event that this is a subject that concerns them they could ask if produce was produced in accordance with the guidelines.</p>	
SECTION B: SOCIAL IMPACTS				
B1: Public health and safety (Paras 44 - 46)	<ul style="list-style-type: none"> Will the proposal influence health-related behaviour or affect demand for health services? For example its affects on diet, physical activity, alcohol, tobacco and drug consumption? Will it affect access to health services? 	N/A N/A	<p>Unlikely to affect consumer behaviour. To the extent that it reduces the already low risks of eating fresh produce, it might have very small effect to increase consumption.</p> <p>N/A</p>	

	Questions for consideration	<u>Do nothing or Base Case assessment</u>	<u>Option 1 assessment</u>	<u>Option 2 assessment</u>
	<ul style="list-style-type: none"> • Will it influence safety at work or affect the likelihood of accidents in the community? • Will it affect the use of the work environment to maintain or improve health, or the ability of people to return to work from illness (whether the illness is work related or not)? 	N/A N/A	N/A N/A	
B2: Crime (Para 47)	<ul style="list-style-type: none"> • Will the proposal affect the rate of crime or crime prevention or create a new offence/opportunity for crime? e.g. through fraud • Will it divert people away from or prevent crime? • Will it affect people's fears about being victim of crime? • Does the policy create new investigative powers that could increase the risk of violence against public sector workers? 	N/A N/A N/A N/A	N/A N/A N/A N/A	
B3: Capital, community and education (Paras 48 - 49)	<ul style="list-style-type: none"> • Will the proposal affect the levels of skills and education? • Will it affect the provision of facilities or services that support community cohesion or in other ways that affect the quality of life in the local community? E.g. will it affect the number of people involved in voluntary and community activities? • Will it affect people's access to information or social networks? 	N/A N/A N/A	N/A N/A N/A	

	Questions for consideration	<u>Do nothing or Base Case assessment</u>	<u>Option 1 assessment</u>	<u>Option 2 assessment</u>
	<ul style="list-style-type: none"> • Will it affect the availability of affordable homes of suitable quality? • Will it affect the capacity for parents / guardians to provide a stable environment for their children? • Will it affect access to, and the range of, facilities for the arts, culture, sports and leisure pursuits? 	N/A	N/A	

Subject area of Impact	Framework questions for consideration	<u>Do nothing or Base Case assessment</u>	<u>Option 1 assessment</u>	<u>Option 2 assessment</u>
B4.1: Differential effects on different sectors of society (Paras 53 - 60)	<ul style="list-style-type: none"> • Will the proposal result in any changes or differential impact on any of the following groups or issues? <ul style="list-style-type: none"> - Race equality and faith including different ethnic groups <p>If impacts are likely in this area, can changes be made to ensure that the policy reflects the requirements of the Race Relations (Amendment) Act 2000, i.e. to promote racial equality?</p> <ul style="list-style-type: none"> - Human rights, - Particular genders or age groups, - People with disabilities - are you ready to provide consultation material in alternative formats (e.g. Braille) on 	N/A	N/A	

Subject area of Impact	Framework questions for consideration	<u>Do nothing or Base Case assessment</u>	<u>Option 1 assessment</u>	<u>Option 2 assessment</u>
	demand? - Deprived or particular income groups <ul style="list-style-type: none"> • How will any differential impacts identified in the above be addressed (can the impact be justified in policy terms or in terms of the law?) • Will the interests of these groups be taken into account during the consultation phase? 	N/A N/A	N/A N/A	
B4.2: Rural communities (Paras 61 - 62)	<ul style="list-style-type: none"> • Will the proposal have a different impact in rural communities from that elsewhere because of the particular characteristics of those areas? 	N/A	Costs will mainly fall on rural businesses producing fresh produce crops. Benefits will mainly be experienced by urban consumers because the urban population exceeds the rural population.	
B4.3 Devolved Countries & particular regions of the UK (Paras 63 - 64)	<ul style="list-style-type: none"> • Will the proposal have a different impact in devolved countries and/or different regions and localities in the UK because of the particular characteristics of those areas? 	N/A	The costs will particularly fall on small and organic producers and some English regions such as the South West have a higher than average proportion of these.	
SECTION C: ENVIRONMENTAL IMPACTS				
C1: Climate change (Paras 65 - 68)	<ul style="list-style-type: none"> • Will the policy option lead to a change in the emission of greenhouse gases, for instance by consumption of fossil fuels? • Will it be vulnerable to the predicted effects of climate change e.g. flooding? 	N/A N/A	N/A N/A	

Subject area of Impact	Framework questions for consideration	<u>Do nothing or Base Case assessment</u>	<u>Option 1 assessment</u>	<u>Option 2 assessment</u>
C2: Air quality (Paras 69 - 70)	<ul style="list-style-type: none"> • Will the policy option impact significantly on air quality, for example, would it lead to a change in the emissions of air pollutants? • Will it result in greater or fewer numbers of people being affected by existing levels of air pollution? • Will it have a bearing on areas of existing poor air quality? 	N/A N/A N/A	There could be a very slight and insignificant increase in ammonia emissions due to longer storage of manure. N/A N/A	
C3: Landscape (Paras 71 - 72)	<ul style="list-style-type: none"> • Will the policy option involve any material change to the appearance of the landscape or townscape? • Will it involve visually intrusive construction works? • Will it involve demolition or modification of historic buildings? • Will it impact on a location in such a way as to change its sense of place or identity in any other way? 	N/A N/A N/A N/A	Small increase in heaps of farm yard manure in fields. Unlikely to affect the appearance of orchards. N/A N/A N/A	
C4: Land use, waste and water (Paras 73 - 76)	<ul style="list-style-type: none"> • Will the policy option lead to a change in the financial costs or the environmental and health impacts of waste management? • Will it change: the degree of water pollution; levels of water abstraction or otherwise affect the low, run-off or recharge of water in particular; the exposure to flood risk? • Will it consume a substantial volume of natural, non-renewable resources, 	N/A N/A N/A	Small increase in animal waste management costs. Storage of farm yard manure in fields can increase water pollution if not properly sited. Other initiatives such as NVZ regulations, cross compliance and catchment sensitive farming initiatives make this less likely. Land take for farm yard manure heaps not substantial. Precautions about siting crops	

Subject area of Impact	Framework questions for consideration	<u>Do nothing or Base Case assessment</u>	<u>Option 1 assessment</u>	<u>Option 2 assessment</u>
	<p>including land?</p> <ul style="list-style-type: none"> Will it lead to a change in the volume of waste produced or to the way it is processed? Will it affect the efficient use of energy or water? 	<p>N/A</p> <p>N/A</p>	<p>sometimes will affect which land is used but not its quantity.</p> <p>N/A</p> <p>N/A</p>	
<p>C5: Biodiversity (Paras 77 - 78)</p>	<ul style="list-style-type: none"> Will the policy option disturb or enhance habitat or wildlife for example give relief of disturbance to habitats or species by change of land use, light or noise? Will it lead to severance, fragmentation, isolation or change in size of habitats? 	<p>N/A</p> <p>N/A</p>	<p>N/A</p> <p>N/A</p>	
<p>C6: Noise (Para 79)</p>	<ul style="list-style-type: none"> Will the policy option affect the number of people exposed to noise or the levels to which they're exposed? For example in sensitive buildings such as schools and hospitals? Will it lead to a change in standards or use that would increase or decrease the noise generated by products? 	<p>N/A</p> <p>N/A</p>	<p>N/A</p> <p>N/A</p>	
SECTION D: LEGAL IMPACTS				
<p>D: Legal (Para 80)</p>	<ul style="list-style-type: none"> Will the policy option require any legislative changes? Will any existing legislation impose constraints on the policy? 	<p>N/A</p> <p>N/A</p>	<p>N/A</p> <p>N/A</p>	
SECTION E: OTHER				

Subject area of Impact	Framework questions for consideration	<u>Do nothing or Base Case assessment</u>	<u>Option 1 assessment</u>	<u>Option 2 assessment</u>
E1: Animal Welfare (Para 81)	<ul style="list-style-type: none"> • Will the policy option have any effect on animal welfare? 	N/A	N/A	
E2 Additional impacts not covered in any of the above	<ul style="list-style-type: none"> • Will the policy option have an impact that does not appear to be reflected in any of the categories above? 	N/A	N/A	

Having identified the impacts now go to section 3 of the guidance to assess how sustainable the different options are. If no option is particularly sustainable consider how you can modify the options to increase sustainability and adjust the assessment accordingly.

Annex 2: FSA RIA Managing Manures for Food Safety CBA

Main Section Headings

- The grouping of ready-to-eat crops for the Cost Benefit Analysis
- Areas of ready-to-eat crops in UK
- The impact of Food Hygiene Regulation 852/2004
- The four producer case studies
- Calculation of the cost of the impact on current practice
- Assessment of impact on public health
- Value of impact on public health

The grouping of ready-to-eat crops for the Cost Benefit Analysis

For the purpose of carrying out the Cost Benefit Analysis (CBA) the ready-to-eat crops listed in Appendix 1 of the guidance have been grouped into eight groups, but two of them have only a very small area as follows.

Table 1: Grouping of Crops for Calculation of Additional Costs

Crop Group	Conventional	Organic
1. Crops near the ground - roots, leafy crops and strawberries.	X	X
2. Remote from the ground - Top fruit, cane fruit and bush fruit.	X	X
3. Protected crops remote from the ground grown in soil - e.g. tomato/cucumber crops	X (But small area)	X (But small area)
4. Protected crops close to the ground grown in soil – salads, herbs etc.	X (But small area)	X (But small area)

Careful thought was given to the grouping to produce categories of crops where the same change of practice (and hence cost) can be used to address the fact that production does not currently follow the advice in the guidance.

Firstly it was necessary to separate conventionally produced crops and organically grown crops. The latter have to observe a host of rules and a system of production which may constrain the changes in practice they can make to follow the advice in the guidance. For example, they cannot replace manure with fertiliser as is often possible for conventional producers.

Secondly the physical structure of the crop and the natural consequences for microbiological contamination by soil and manure were considered. Crops such as apples or raspberries only normally come into contact with the ground and manure if they are not picked from the tree or cane. Hence the separation of the crops into those remote from the ground and those close to the ground proves more useful for this CBA than many other common categorisation approaches (for example root crops, leafy crops, salad crops etc – in this analysis they all form one group).

Growing of crops in protected structures (tunnels and glasshouses) raises different issues from growing outside. For conventional production, soil-less systems (such as

Rockwool) are common and have been excluded from the areas reported here. For organic protected crop production, soil is the common growing medium and FYM the main source of plant nutrients. These crops must therefore be included in the analysis. Separating crop production in protected structures from other crops as a separate group is necessary because in structures cropping every year is economically essential and techniques for maintaining fertility such as multi-year rotations are not feasible. This makes the supply of plant food to the soil in the protected structures as manure essential in organic systems.

Areas of Ready-to-eat Crops as Listed in FSA Guidance in the UK (ha)

Table 2: UK area of crops grown close to the ground (ha)

Ready-to-eat (RTE) crops	Conventional area	Organic area
Lettuce	5,593	190
Radish, mangetout, courgettes, squash, herbs, garlic, shallots, spinach, chicory, celeriac, baby leaf, fennel	6,592	571
Onions "	9,963	300
Beans	3,913	
Vining peas	31,025	All legumes 398
Fresh peas	907	
Cabbage	8,767	
Cauliflower	9,925	All brassicas 1266
Calabrese/Kale	8,721	
Celery	831	50
Red beet	1,641	
Carrots	9,512	All roots 1625
Asparagus	788	
Strawberries	3,782	40
Total	101,960	4,440
" includes salad onions		
(Baby leaf, not included in original list of crops in Guidance.)		

Table 3: UK area of crops remote from the ground (ha)

Ready-to-eat (RTE) crops	Conventional area	Organic area
Apples	7,130	167
Pears	1,699	N/S
Plums	1,046	N/S
Raspberries and currant	4,395	20
Total area	14,270	187

Cider apples and pears for perry have been excluded from the top fruit area because the guidance is not expected to impact upon cider production practices, as most cider

is pasteurised or sterilised by other processes (National Association of Cider Manufacturers, 2007) and also, the products of the fermentation are likely to kill pathogens.

Table 4: UK area of protected crops remote from the ground in soil based systems (ha)

Ready-to-eat (RTE) crops	Conventional area	Organic area
Cucumbers	30	50
Tomatoes	50	40
Peppers	10	30
Fruit	30	nil
Total area	120	120

Table 5: UK protected crops close to the ground in soil based systems (ha)

Ready-to-eat (RTE) crops	Conventional area	Organic area
Salads and herbs	150	58

Sources:

Basic Horticultural Statistics in the UK, Defra 2006.

Survey of Vegetables and Flowers, England.2006, Defra

January Survey 2006 England and Wales, Defra

June 2006 Survey of Vegetable Crops, DARDNI, Northern Ireland.

Defra Organic Statistics January 2006, Organic and In conversion Land use in England.

Soil Association, The UK Organic Vegetable Market 2006.

The Impact of Food Hygiene Regulation 852/2004.

REGULATION (EC) No 852/2004 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 29 April 2004 on the hygiene of foodstuffs states:

“10. Food hazards present at the level of primary production should be identified and adequately controlled to ensure the achievement of the objectives of this Regulation.”

By:

“11. The application of hazard analysis and critical control point (HACCP) principles to primary production is not yet generally feasible. However, guides to good practice should encourage the use of appropriate hygiene practices at farm level. Where necessary, specific hygiene rules for primary production should supplement these guides. It is appropriate for the hygiene requirements applicable to primary production and associated operations to differ from those for other operations.”

Annex 1 of the above Regulation clarified primary producers’ requirements;

“5. Food business operators producing or harvesting plant products are to take adequate measures, as appropriate:

e) as far as possible to prevent animals and pests from causing contamination;

There is a requirement in the Regulation for the recording of;

(b) any occurrence of pests or diseases that may affect the safety of products of plant origin;

and

(c) the results of any relevant analyses carried out on samples taken from plants or other samples that have importance to human health.

EU Regulation 852/2004 came into force on 1st January 2006 and enforcement by officers approved by the local food authority began in 2006.¹

They are only planning to visit once every 4 to 50 years so very few growers will have experienced a visit. Initial visits are expected to be mainly advisory in the early stages. Impact on changing practice of the sector must be very small so far.

The Regulation requires food safety hazards to be identified at primary production and adequate measures taken to protect the public.

Growers who are members of the Assured Produce Scheme (APS) are advised to undertake a HACCP based food safety approach in the form of a Hygiene Risk Assessment across the whole business in which all food safety hazards must be considered including field, transport and pack-house. As such, Regulation 852/2004 is already being accommodated by growers in the Scheme and places no additional burden upon them. Indeed, growers who follow the guidance of the APS, are recording and keeping records to verify the composting processes as recommended in the APS, the retailer schemes and the Chilled Food Association guidance.

Growers who are not members APS may not be aware of Regulation 852/2004 and the additional requirements it has over and above the General Food Law that producers must ensure food is 'safe and fit for human consumption'. Some growers when retailing produce may not be aware that the consumer will eat the produce raw without cooking. A case can be made that growers should be more aware of the potential for some of the produce they sell to be consumed raw. The FSA guidance will increase this awareness.

Key conclusion:

The Guidance recommends minimum time periods between the application of fresh and composted manure and the grazing of livestock before RTE crops should be planted or harvested to ensure that the resulting produce is safe to the consumer. In doing so it is providing good practice information on the safe use of manure which

¹ In Northern Ireland the Enforcement Authority is the Department of Agriculture and Rural Development (DARD) Quality Assurance Branch.

will assist compliance with Regulation 852/2004 specifically 'as far as possible to prevent animals and pests from causing contamination' to produce.

The Four Producer Case Studies

Note about costing of the case studies.

The case studies have been costed assuming a 7% interest rate which is a typical cost of borrowed capital for farm businesses. One-off costs have been amortised over their life. This is typical of financial accounting in small businesses and was adopted as easier for the consultees to relate to than the standard Treasury approach used in the CBA.

Case Study 1 – A conventional Grower of Root Crops for large Retailers.

Location

A leading conventional company growing and packing root crops as well as other vegetable and salad crops for large retailers. For root crops, production is on short term rented land for which an annual rent is paid. Root crops are grown by the company themselves and also by contract growers for the company. Root crops are grown across the UK from Scotland and Northumberland to East Anglia and the North West in order to provide continuity of supply for large retailer customers.

Total Area Cropped

Around 1,400 ha of vegetable and salad crops are grown with over 1,100 ha down to carrots and parsnips. There are also around 115 ha of grass.

Labour Force

Full time company farm staff are involved in all root crop growing and harvesting operations and there is also a large packhouse operation. Approximately 67,000 tonnes of carrots and 20,000 tonnes of parsnips are processed every year.

Rotation and Soils

Farm managers seek suitable clean land for carrot and parsnip crops that may often have been in cereal cropping prior to root cropping. Because of the risk of wireworm damage root crops do not follow grass. Soil pH varies according to soil type. The aim is to grow the root crops on land with a soil pH of around 6.5.

How Sold

A wide variety of packs are supplied to the large retailer customers. After harvesting roots are washed prior to packing. The washing systems clean the product of soil residues and remove a thin layer of top skin.

For carrots which are all sold fresh, packs include large trays of loose product typically of 15 kg weight in multiples trays with a plastic liner, a range of prepacks sold by weight in plastic bags tied or in form filled square packs of first and second class product ranging from 500 gram to 2 kg in weight, and also punnets of carrots.

For parsnips the range includes large trays, prepacks and mini parsnips in trays.

Assurance Schemes

When supplying the large retailer customers, following the protocols of their assurance schemes is paramount and assurance schemes drive production practice. Assurance Scheme protocols complied with by the company include the Assured Produce Scheme, and the schemes of two major retailers.

Livestock

The company currently has 32ha of long term rented ground down to grass grazed by sheep owned by a local livestock dealer. Root crops are not grown on land following grass.

On the short term rented root crop land no livestock grazing or spreading of animal manures prior to and during root cropping is permitted as specified in the various retailer protocols.

Prior to renting any land 'land assessment forms' are completed by the company farm managers and as part of their assessment they will identify fields where animal manures have been spread or animals grazed. The time scales identified for microbial safety pre cropping by the various assurance schemes are followed and these are printed on the land assessment forms to ensure that only suitable land is rented.

The company adheres to the guidance provided by the various customer retailer protocols including the Assured Produce protocol.

Risk analysis through HACCP is carried out by the company for all crops including the root crops.

The Assured Produce Generic Protocol Guidance Notes 2007 Section 14 is devoted to 'Microbial Food Safety' which provides guidelines for the company and all assured growers on risk management and Good Agricultural Practice in relation to the microbial safety of food.

Carrots are listed as a Category 1 High Risk crop that can be eaten raw, and parsnips a Category 3 Low Risk crop that the customer always cooks.

A five year history of the use of the field to be rented is obtained with an evaluation of potential microbial hazards from agricultural inputs.

Clause 14.6 'Microbial – Routes of contamination – Animal Manures and Sewage Sludge' states that:

- Raw FYM cannot be used on a crop rotation a minimum of 12 months before drilling/planting a high or medium risk crop,
- No untreated manure must be used on high risk crops for a minimum of 18 months before drilling or planting,
- Where possible, domestic animals and wildlife should be excluded from cropping area.

Any Changes in Practice to Conform to the Draft Guidelines

Introduction – Ready-to-eat Crops

After harvesting the roots are driven in trailers to the packhouse. At the packhouse the roots are flushed out of the dedicated steel sided and floored trailers by a flume wash into a holding tank, then through various cleaners and washers onto the packing lines. Operations pre packing include stone separation, brush washing, Wyma washing and hydrocooling. Trailers hold up to 26 tonnes of crop. Recycled water is used for the flume wash and clean mains water is used for all subsequent washing operations.

This washing process thoroughly cleans the roots and removes a thin layer of top skin prior to hydrocooling and packing.

Stage 1 – Reducing Risks before Crop Establishment

Site Selection

- Company policy is to avoid fields that may have received manure or that have been used for livestock grazing as directed by retailer protocols
- As part of the crop HACCP completed by farm managers the risk of airborne contamination from neighbouring ground is assessed.

The use of stored and treated manure or fresh manure is not seen to be an issue for the company as Assured Produce and other retailer protocols are followed.

Land Application and Soil Incorporation

Following the relevant Codes of Good Agricultural Practice (**GAP**) is a requirement of the retailer protocols. Nutrient management plans are also required by the retailer assurance protocols.

Stage 2 – Reducing Risks After Crop Establishment And During The Growing Season

Manure Applications

No manure applications are made to any root crops during the growing season.

Field Operations

On rented ground there can be no control of manure spreading by other farmers on neighbouring fields. However according to company farm managers manure spreading in neighbouring fields has never resulted in drift onto the root crops grown. Cross compliance buffer strips may be in place, and Local Environmental Risk Assessment for Pesticides (**LERAPs**) buffer strips and 6 metre headlands may also be in place.

Irrigation and Water Use

Irrigation water quality is driven by retailer protocols. Monthly analysis of water for microbiological contaminants including *E. coli* and coliforms is made as demanded by retailer protocols.

On rented ground irrigation water may be from boreholes, rivers, ponds, reservoirs or from the mains.

A risk assessment is carried out of all irrigation water sources.

Water is applied to root crops by rainguns or booms.

Keep livestock and pets out of growing crops

The access of livestock and pets on rented ground is assessed by farm managers but has not been an issue for the company. However they are aware of the hazard.

STAGE 3 – REDUCING RISKS DURING AND AFTER HARVEST

Hygiene checks are made on all harvesting equipment pre harvest start up. Daily harvest check sheets are completed with machinery and equipment checked at the start of each day. Harvesters and trailers are cleaned down when moving between fields. Trailers are flushed out with water each time they are emptied by the flume wash at the packhouse.

Trailers are covered with a sheet to protect crops from airborne contaminants before leaving the fields.

There is a maximum period of 24 hours between harvesting and the washing process.

Stage 4 – General Management

Root crops are only grown on short term rented ground.

Soil Protection Reviews and erosion risk assessments are carried out for all land farmed by the company.

BASIS and FACTS qualified consultants are used.

An annual soil analysis is carried out on all rented fields.

On short term rented root crop land liquid based fertilisers are applied pre drilling by contractor and crops are top dressed with granular fertiliser applied by company staff.

Summary of Case Study 1

This large conventional vegetable grower and packer company faces increasing pressure in accessing suitable short term rented land for cropping across the UK. Suitable land becomes even scarcer when land grazed by livestock or where animal manures have been used has to be turned down because of the demands of retailer assurance protocols and the risk of microbiological contamination. Areas where livestock production predominates may effectively be barred from vegetable and salad crop production, despite the benefits that animal manures in the rotation bring in maintaining or enhancing soil organic matter and stabilising soils helping to prevent soil erosion.

As this producer is a member of the Assured Produce Scheme and complies with retailer protocols publication of the proposed FSA guidance will not require any changes to current practice and will not involve additional burdens or costs – other than perhaps obtaining and reading the guidance.

Case Study 2: Mixed organic farm with vegetables

1. Background Information

Location:

In a mountainous area in the West of GB.

Labour Force:

2 full time persons and many seasonal workers during harvest.

Size of Farm:

202 ha; of which 12.1 ha of lowland (with vegetables in rotation with short term grass; every year 3.2 – 3.6 ha are used for vegetable production.)

The remainder is permanent pasture of which the majority is hill land (SDA).

Vegetable production:

(0.3 ha potatoes, 0.3 ha carrots, 0.8 ha brassicas (cabbage, cauliflower, kale), 0.7 ha swedes, leeks, parsnips, a few herbs, beetroots, mouly (a sort of radish) and 1.4 ha brussel sprouts.

The 12.1 ha of potential vegetable growing land is divided into 9 fields. Every year on average 2-3 fields are used for vegetable production. The rotation is as follows: 1 year vegetable production followed by 3 years of short term grass. The short term grass is grazed by sheep.

In addition there is one polytunnel in which salads and Chinese leaves are produced.

The livestock are 15 suckler cows and progeny and 200 breeding ewes.

Cattle are housed during the winter from mid November to end of May. The slurry is stored in a tank and spread on the permanent grassland. The manure is stored in a heap/ clamp with cover on top. In total 6 heaps are made in an area of 15x 15 m. The heaps are turned twice. The FYM is essential for the vegetable production.

Marketing

Beef and lamb are sold via organic livestock markets in two local towns (under 100 miles away). Lambs are finished in December.

Vegetables are mainly sold (80%) via wholesalers (including one who sells to a multiple retailer). The remainder is sold via a farm shop, 2 local shops and a few box schemes

Quality Scheme

The farm belongs to the national quality food certification scheme which certifies organic produce.

2. List of all the changes in Practice to Follow the Codes' advice, including costs attributed to changes

The FSA guidance needs to be read.

Extra costs: 2 hours @ £8.5 = £17

Stage 1

Site selection

Excluding the field, next to livestock building, from vegetable production reduces the potential vegetable land by 1.2 ha (from 12.1 to 10.9 ha). It will influence the rotation. Rather than narrowing down the rotation the farmer would buy extra land.

Extra costs: 1.2 ha @ £10,000-£12,000 per ha = £12,000-14,000.

Use of stored and treated manure

Generally, all manure that is collected between November and May is stored and applied on the vegetable fields the next March. However, not all manure applied to the vegetables has been stored for over 6 months.

The farmer agreed that there was need for differentiation between the old and fresher manures. Manure stored less than 6 months, will not be applied to the ready-to-eat crops but on other crops like potatoes. Only FYM stored between 10 and 12 months will be used on the ready-to-eat crops.

This requires a slight change of management. It requires more administration and a slight increase in fuel costs as the machines would have to make more trips to the fields.

Initial administration costs: 1 day @£60

Extra administration costs: 1 day @£60 /year

Use of Fresh Manure

Ideally, there should be a gap of 12 months between livestock last grazing the field and harvesting of a ready-to-eat crop. This would impact the system as follows: Animals cannot graze the short term grass after October of the preceding year (as the crops are harvested in October). Extra feed would have to be bought-in or the short term grass would need to be cut.

However, as the producer is certified as organic, the livestock grazing is considered as an essential part of the farming system, the minimum gap is reduced from 12 to 6 months. In this case the producer currently meets the guidance.

Land Application and Soil Incorporation

The FYM is applied at the end of March and is incorporated as soon as possible. There is no risk of run-off and contamination.

Stage 2

Manure Application

No manure is applied after planting

Field Operations

Manure is only spread before establishing the crop and will form no risk to neighbouring crops. There is a slight risk of a neighbouring farmer spreading muck after crop establishment. However, if this neighbouring farmer abides by the cross compliance rules this should not happen.

Irrigation and Water Use

Water used on the farm comes from a well on the top of the hill. An area of 10 acres around the well are fenced off.

Keep Livestock and Pets out of Growing Crop

The sheep dog does join the farmer on a number of occasions in the area used for vegetable production. The farmer has become aware of the risks and will keep the sheepdog out of the fields.

There are no costs involved with this change of management.

Stage 3

Harvesting

A manure spreader and rotavator are used on both vegetable production and short term grass area. The machines are cleaned well and there is little risk of contamination.

Crates used for harvesting and storage are re-used but are cleaned with water (“power washed”) between every harvest. The risks of contamination are small.

Vegetables supplied to the wholesalers, are packed in new crates supplied by the wholesalers.

Stage 4

Farmer has attended a Farm Safety day in 2007. However, no analysis of food safety hazards has been drawn up for the farm. There are no other permanent staff on farm besides himself and his partner. An analysis of food safety hazards will need to be drawn up to ensure compliance with requirements under 852/2004.

Extra costs: 1 day's work at £60

Records are maintained for application of manures and livestock grazing on the 12.1 ha used for a rotation of vegetables and short term grass.

The farm has a farm waste management plan and animal health plan. This is part of the organic certification. The farmer commented: “there are no guidelines (yet) for mixed farming systems”.

With the expansion of the vegetable production this year, some time and money has to be invested in raising awareness about safety aspects amongst seasonal workers.

3. Extra costs:

Capital Costs

Extra costs: 1.2 ha @ £10,000-£12,000 per ha = £12,000-14,000.

Extra administration costs: 1 day @ £60 £60

Extra labour costs (set up HACCP) 1 day's work at £60 £60

Extra costs (read guidance): 2 hours @ £8.5 = £17

Total £12,137-£14,137

Charge just the interest on the new land at 7% (not a depreciating asset) = £910 per year.

One off admin costs of £87 with a life (period before they need repeating) of say 10 years. Annuity factor at 7% over 10 years is £142/£1,000 = £12.

Recurrent costs:

Extra administration costs: 1 day @ £60 £60

Total Annual Equivalent Cost increase of £982 per year.

The gross margin of the farm without the Organic Farming Scheme payment was £26,616 in 2005/06

4. Summary for Case 2.

The extra capital costs the farmer would incur to follow the advice in the guidance are considerable when compared with the gross margin. In this case these costs are

largely due to the cost of purchasing extra land to replace the land adjacent to farm buildings taken out of cropping.

Case Study 3: A conventional grower of “leafy crops” where grazing of vegetable waste takes place before planting and within 12 months of harvest of fresh produce.

Location

A substantial and leading agribusiness incorporating growing, packing, procurement and marketing operations with a budgeted turnover of £110 million this year. Customers include the large multiple retailers, ready meal suppliers and prepared vegetable suppliers. The customer mix demands that the business is responsible for supply and procurement all the year round for the full range of vegetable products. A wide range of crops are grown by the business including brassicas, potatoes, vining peas, sugar beet and combinable crops. The land farmed is in East Anglia and includes owned, tenanted and contract farmed land. The business has partnership arrangements with many other growing businesses from Scotland to Cornwall in the UK as well as in Europe.

Total Area Cropped

In total around 4,650 ha of land are cropped and of this 2,500 ha is down to a wide range of brassicas including cauliflower, broccoli, calabrese, brussel sprouts, purple sprouting broccoli and cabbage types such as Savoy, January king, prim, red and white cabbage, spring greens and tenderheart. There is a small block of 20 ha of grass established after vining peas. Set aside land is cropped with industrial combinable crops or left as over-wintered stubble. There is a separate sheep enterprise that grazes some of the brassica aftermaths, the grass block and also neighbouring farmers land.

Labour Force

There is a large full time labour force under the direction of a team of farm managers who grow and harvest the crops and a dedicated packhouse team. Approximately 15.7 million heads of cauliflower will be harvested this year, with 6477 tonnes of

calabrese and broccoli and 2994 tonnes of brussel sprouts. 364 ha of cauliflower and 162 ha of broccoli are grown for florets and freezing.

Rotations and soils

Farm managers in any year will seek the best land available for the cauliflower and broccoli crops, and will then allocate land for the cabbage and brussel sprout crops. Over-wintered cauliflower crops may follow the vining pea crop. Land previously cropped with oilseed rape is not cropped with brassicas. Wheat grown for seed is grown after vegetable crops. First and possibly second wheats if profitable are grown on the heavier land. Brassicas may follow potatoes, cereals and vining peas or another brassica crop.

Soil is predominantly Class 1 silt or heavier silty clays with pHs typically from 7.5 to 8.0. Sheep will graze the silt soils but not the heavier silty clays. A small part of the heavier silty clay land farmed is in an NVZ but the rest of the land farmed is not. Leaching is not seen as being a problem. There are dikes on many of the farms and the EA carry out regular water sampling.

How sold

The purpose built packhouse features a number of pack lines handling the wide range of brassicas which incorporate a range of specialised equipment. This allows the business to giro pack brussel sprouts, over wrap and heat shrink cabbage and broccoli, over-wrap punneted product, and market product presented loose in trays or as bagged product. There is also a specialist line for size graded cauliflower and broccoli florets produced for the ready meal trade. Florets may be blanched and frozen or cut up dry and packed into floret-packs.

Assurance Schemes

When supplying the large retailer customers' following the protocols of their assurance schemes is paramount, and assurance schemes drive production practice. Assurance scheme protocols followed by the business include the Assured Produce Scheme, the Assured Combinable Crops Scheme and the schemes of two major retailers. The business is a Linking Environment and Farming (**LEAF**) corporate member and the sheep are CMi assured.

Livestock

The sheep that graze the aftermaths are run as a distinct and separate business enterprise out with the main business farming operations by the managing director of the business as a hobby. No rent is paid for the grazing and the farm managers dictate where the sheep are to graze.

The sheep are bought from local markets and graze the brassica aftermaths over the winter from September to March. Over the last year 243 ha of broccoli, cauliflower, cabbage and brussel sprouts aftermaths were grazed by 1493 fattening lambs sold to a local butcher, 78 cull ewes sold through a local livestock market and 1036 breeding ewe lambs over wintered and now on grass destined to be sold through various sheep breeding sales in August to September this year – a total of 2,607 sheep. It normally takes around 12 to 14 weeks of grazing before the lambs are fat enough to be marketed.

The stocking rate per ha varies depending upon on the type of brassica aftermath grazed, the time of year and whether it is a wet or dry winter. The aftermath does not have to be grazed right down to the ground. During wet periods to avoid damaging soil structure the sheep are moved onto fresh ground on a regular basis. This can happen because there is plenty of ground available and the enterprise owner does not pay any rent.

The sheep are normally grazed in 6 ha blocks with grazing controlled by an electric fence. A vet inspects all sheep to ensure they are healthy when they arrive on the land farmed and a report is produced. The sheep are initially held on grass where they are showered for lice control, feet are trimmed, and they are dosed with Heptavac P. They are kept for 1 week before they are turned out on to the brassica aftermaths. The sheep are supplied with mineral licks and water. There is no supplementary feeding. No straw bedding is supplied. A movement record is kept of where the stock are grazing.

Once aftermath grazing is finished the land is inspected by the farm managers and then the land is ploughed down. Normally no discing or rotavation is required after the sheep grazing thus saving in labour, machinery and fuel which is good for the environment.

The 20 ha of grass established after vining peas will be ploughed in the autumn and drilled with winter wheat after which brassicas will be established in the rotation.

The business adheres to the guidance provided by the various customer retailer protocols including the Assured Produce protocol.

Risk analysis through HACCP is carried out by the company for all crops including the brassica crops.

The Assured Produce Generic Protocol Guidance note 2007 Section 14 is devoted to 'Microbial Food Safety' and provides guidelines for the farm managers on risk management and GAP in the area of microbial food safety.

Broccoli, Cabbage and Cauliflower are listed as Category 1 High Risk crops that can be eaten raw. Brussels sprouts are listed as Category 3 Low Risk crop that the customer always cooks.

The farm managers hold detailed specific and adjoining field histories for the land farmed going back 5 or more years to enable them to evaluate any potential microbial hazards from agricultural inputs. The field records are held on the Farmade system.

Clause 14.6 'Microbial – Routes of contamination – Animal Manures and Sewage Sludge' states that:

- Raw FYM cannot be used on a crop rotation a minimum of 12 months before drilling/planting a high or medium risk crop,
- No untreated manure must be used on high risk crops for a minimum of 18 months before drilling or planting,
- Where possible, domestic animals and wildlife should be excluded from cropping areas.

Changes in practice to conform to the draft guidance.

Introduction

Brussels sprouts are harvested using mechanical harvesters into 1 tonne plastic bins and taken by trailer to the packhouse for packing. Some sprouts are still harvested by hand.

The other brassica crops are harvested and packed in the field on specialist field harvesting rigs into bags or the multiples own trays. The multiples trays are supplied clean before use or washed at the packhouse pre use. Cauliflower and calabrese for fliriting are harvested into 1 tonne plastic bins which hold around 200 kg in weight. These bins do not touch the ground in the field.

Bins are power washed with water to clean them prior to use. No disinfectants are used.

All field packing trays and bins are transported on trailers and never touch the ground throughout the harvesting process.

Stage 1 – Reducing Risks Before Crop Establishment

Site Selection

Brassicas will follow other crops such as the combinable crops, vining peas, potatoes, sugar beet or over-wintered stables, and some brassicas may follow brassicas where sheep have grazed the aftermaths. The farm managers comment that this will vary from year to year but may be around 25% of the area grazed which on present figures is 60.75 ha.

HACCPS are carried out for all the vegetable and potato crops. Fields farmed are not adjacent to livestock buildings so there is no risk of airborne contamination, and there is no risk of surface run off from yards or manure storage areas.

Use of Stored and Treated Manure

The use of stored and treated manure is not an issue because it is not used on this farm.

Use of Fresh Manure

Under the proposed guidelines the 12 month gap between livestock grazing in the field and harvesting of a ready-to-eat crop and the minimum period of 6 months between the last grazing and drilling/planting of the crop could be an issue for the business. A period of 3 months would not present a problem. The sheep fattening grazing period is currently September to March. After the aftermath has been ploughed down some new brassica crops may currently be established within the 6 month period and harvested within 12 months. The farm manager consulted estimated that around 25% - 60.75 ha - of grazed brassica aftermath may be followed with another brassica crop and thus fall within this proposed minimum period.

Livestock grazing is not an essential part of the conventional farming system as it is a hobby enterprise.

Land Application and Soil Incorporation

Following the relevant Codes of GAP is a requirement of the retailer protocols. A nutrient management plan is in place for all land farmed.

Stage 2 – Reducing Risks After Crop Establishment And During The Growing Season

Manure Applications

No manure applications are made during the growing season.

Field Operations

No issues for this business. Cross compliance buffer strips are in place and LERAPs undertaken. All land farmed is in the Entry Level Stewardship Scheme.

Irrigation and Water Use

Irrigation water quality is driven by retailer protocols. If required boom irrigation is used but the farm management policy is not to irrigate brassica crops. Water may be extracted from rivers for irrigation and will then undergo analysis for microbiological contaminants.

Keep livestock and pets out of growing crops

There are some footpaths across the land farmed. There is no sheep dog used on the sheep enterprise. Farm managers are aware of the hazard posed by pets to growing crops.

Stage 3 – Reducing Risks During And After Harvest

Harvesting machinery is regularly cleaned.

Some product is harvested into multiple customers trays. These are supplied clean before use or washed at the packhouse pre use.

Brassicas may be harvested into 1 tonne plastic bins which are power washed to clean them prior to use with no disinfectants used.

Trays and bins are transported on trailers and never touch the ground throughout the harvesting process.

Stage 4 – General Management

A soil analysis of every vegetable cropping field is undertaken every year with fertilisers applied according to specific recommendations for that crop. The current issue of 'Fertiliser Recommendations' RB209 is consulted. Well N is also used for the brassica crops. Leaf N testing is carried out.

Liquid fertilisers are applied by contractor. Any non-liquid fertilisers required are applied by farm staff.

A Soil Protection Review and Soil Management Plan have been completed for the land farmed under Cross Compliance and Entry Level Scheme.

Crops are walked regularly and crops analysed for residues on a monthly basis. All field activities are recorded using Farmade which provides record keeping for external checks and management information for the farm management team.

Within the farm management team BASIS and FACTS qualifications are held.

Possible Cost Implications of Following the Proposed Guidance

Sheep grazing is a separate enterprise from the main business and run as a hobby by the managing director. The main cost implications considered are for the farm business.

Loss of Fertility Cost

The farm managers do not currently budget for the nutrients supplied to the following crops by the grazing sheep. They state that the sheep neither add nor take away any nutrient, but that they simply recycle the vegetable aftermath which is then ploughed in.

The farm manager consulted estimated that around 25% of the brassica area grazed by sheep – 60.75 ha - may be followed with another brassica in an average year and might not meet the proposed guidelines.

Calculating the stocking rate of 2607 sheep in total being predominantly ewe lambs on the total brassica area of 242 ha gives an average stocking rate of 10.77 lambs per ha.

From RB209 pp 34 1 lamb housed for 1 month produces 0.2 kg N, 0.05 kg P and 0.1 kg K.

Lambs are grazed for 12 to 14 weeks or say 3.5 months so over the grazing period each lamb may produce 0.7 kg N, 0.175 kg P and 0.35 kg K.

10.77 lambs will therefore produce 7.54 kg N, 1.88 kg P and 1.1 kg K which are negligible amounts.

John Nix 'Farm Management Pocketbook 2007' pp gives the average price of N as 45 p per kg, P 31 p per kg and K 24 p per kg.

So the cost implication in terms of lost fertility if the sheep are withdrawn from 25% of the brassica area grazed is per ha:

£3.39 for N

£0.58 for P

£0.26 for K

Total £4.23 per ha on 60.75 ha - £257 total cost

Extra cultivation cost

If sheep are withdrawn from the brassica aftermaths then extra cultivation may result as identified by the farm manager consulted. These would be a pass with discs and a rotavator before ploughing. As well as the machinery cost there is the extra cost of labour.

From Nix pp 157 the average contractors (include labour) cost of heavy disc cultivating is £33.00 per ha and for rotavating up to £65.00 per ha.

Over 60.75 ha this gives an increase in cultivation costs of £2,005 for discing and £3,949 for rotavating – total cost £5,954.

Other costs – Record Keeping

Farmade is used for all farm records. The farm manager consulted thought that the business could tie in the grazing programme to the Farmade farm recording system, programming in the planting intervals that result from the proposed guidelines after the grazing of brassica aftermaths to identify in the farm records which fields would be suitable for the planting of following brassica crops. This is a small record keeping adjustment, not a solution to the lack of land to graze the sheep.

From Nix pp 130 extra labour cost might be for one 'farm manager' per day – 7.8 hours at £7.75 per hour - total extra cost minimum £60.45 per day to programme in.

Total estimated cost to farming business

Loss of fertility - £257

Extra cultivations - £5,954

Other costs - £60

Total - £6,271

Cost implications for the sheep farmer

The sheep farmer who runs his own separate business aims to make a net profit of £5 per lamb after all expenses but this is very dependent on the sheep trade which has been very poor of late.

No rent is being paid for the land grazed.

If the area he can graze is reduced by 25% then this means that he will have 654 lambs less to sell (10.77 lambs per ha by 60.75 ha) at £5 net profit per head which means an estimated overall loss of £3270.

Note that his equipment such as fencing and handling systems would also be utilised less.

Total Estimated Cost to Sheep Farmer

£3,270 (25% of expected total income)

Note: Second round effects on businesses not directly affected by new developments are not usually costed in the CBA in RIAs. Costs to businesses directly affected often represent benefits to other businesses. In this case the sheep grazing is not a completely “arms length” arrangement since the farm manager runs this business. Often, independent graziers would pay for the grazing provided by one farm, and if it was not available could look for another farm rather than reducing sheep numbers.

Case study No 4: Small mixed organic farm with fruit

1. Background information

Location:

In a mountainous area in the West of GB.

Labour force:

3 full time persons and 2 part time staff for sorting eggs.

Size of farm:

5.97 ha; of which less than one hectare is fruit trees and soft fruits. The remainder is pasture and woodland. The land is all in the LFA.

Fruit production:

In total approximately 40-50 trees (apple, plum, damsons and pears). The poultry (chickens and turkeys) are used for maintaining the grass under the trees. The chickens' excreta provide nutrients to the trees and the trees provide shade to the chickens. Both enterprises are very much interlinked. The fruit trees are fertilised exclusively with chicken manure in the spring (end February).

The soft fruit production consists of raspberries, black currant, red currant and goose berries. The bushes are fertilised solely with chicken manure.

Animal husbandry

Poultry: 1,100 laying hens, 250 table birds, 50 turkeys and other poultry.

Flock: 8 breeding ewes (mainly kept for the wool).

There are three chicken houses which stand in a top fruit orchard. One of these houses is cleaned every three weeks and the manure is stored in small heaps outside each shed. The shortest distance from a manure heap to a fruit tree is about 5 metres. Three times per year these heaps are put on a large manure heap in another field. This heap is covered and is turned once per year. Part of this FYM is applied to the fruit trees and fruit shrubs. The FYM is essential for the fruit production. However, the remainder of FYM is applied to the permanent grasslands and some of it has until recently been sold to a neighbouring producer.

The sheep are in part kept to eat down the pasture.

Marketing

Currently, only soft fruit, eggs and poultry are sold. This year also top fruit will be sold. All this produce is sold via a number of local shops, a box scheme and the farm shop.

Quality scheme

The farm belongs to a quality food certification scheme which certifies organic produce.

2. List of all the changes in Practice to Follow the Codes' advice, including costs attributed to changes

STAGE 1

Site selection

Excluding the fields, next to poultry building of fruit production reduces the current fruit production to less than half. The poultry buildings are situated within the orchard.

The poultry buildings would have to be moved to another field. The poultry buildings are wooden structures which are no longer moveable. The current price for houses of this type is £8,000 so three would cost £24,000. This would involve be a financially disproportion expenditure for a small poultry unit. The recommendation in the FSA guidance only applies "where possible".

The manure from the sheds is initially stored in the field (with the sheds and fruit trees) and then moved to a big field heap in another field where it is covered with plastic. At present there are no machines available on farm to directly move the manure from the sheds to the big field heap.

In identifying a solution, which is not very expensive, it has been assumed that it would be satisfactory to leave the chicken houses in their current location and move the manure directly to the big field heap so that there is no accumulation near the orchard.

Furthermore, cleaning the sheds all at once, once per month would reduce the additional costs of transporting the manure from the sheds to the big field heap.

Extra costs:

Hire of equipment/ tractor to move the manure directly to the big field heap (and away from the fruit trees):

£17 per hour for a tractor and driver (Organic management handbook, 2007); 1 hour per month = 9 x £17= £153 per year. (The heaps are currently moved three times per year).

Use of stored and treated manure

Manure is produced the whole year. It is a mixture of straw and excreta from the chickens. The manure is batch stored for 6 to 12 months before application to the fruit trees and soft fruit bushes.

Fresh manure/ use of the orchard as a chicken run

The guidance allows for full-time grazing in orchards subject to restrictions on the use of fruit which comes into contact with the ground.

Land Application and Soil Incorporation

The FYM is applied at the end of February and is not incorporated. The orchard cannot be ploughed, as ploughing would damage the roots and low branches of the trees.

The field is level and there is little risk of run-off and contamination.

STAGE 2

Manure application

Every year, manure is applied at least 5 months before harvesting the fruits of both trees and bushes while they are dormant. (The manure is applied at the end February; harvest of ready-to-eat fruit takes place from the end of July to the end of October). The manure does not come into contact with the ready-to-eat crops that are sold.

Field operations

Manure is spread end February/ beginning of March. There is no risk from the spreading of manure on neighbouring fields as the farm is enclosed by two roads, a stream on one side and by a Site of Special Scientific Interest (**SSSI**) (with a woodland between the farm and the SSSI).

Irrigation and water use

Crops on this farm are not irrigated. The chickens have access to the stream. The cost of excluding chickens from the stream have not been costed because this is good practice rather than a specific recommendation of the guidance.

Keep Livestock and pets out of growing crops

The 9 dogs on the farm join the farmer in a number of occasions in the area used for soft fruit production. The farmer has become aware of the risks and will consider reducing the amount of times the dogs enter the fields.

There are no costs involved with this change of management.

STAGE 3

Harvesting

The only machine used on the farm is that of a contractor. The machine is cleaned before entering the farm and also when leaving.

Baskets used for harvesting are re-used. Currently, the baskets are not cleaned between the different harvests.

In order to reduce the risks of contamination the baskets will be cleaned with water ("power washed") between every harvest. In the long term other equipment (crates) might be bought as they are easier to wash.

Extra costs: 15 minutes washing per week @ £7/hr = £75 per year (3 months harvesting the different fruit).

Any fruit that has come in contact with the ground is not sold.

STAGE 4

Records are maintained of applications of manures and livestock grazing. This is part of the record keeping is required by the organic certification body.

In addition, the farm has a farm waste management plan and animal health plan. These too are required for organic certification.

With the expansion of the fruit production, some time will be invested in reading relevant information on good agricultural practices and handling of manure.

Extra costs: 1 day @ £60.

3. Extra costs:

On-off costs

□ FSA guidance needs to be read: Extra costs: 2 hours @ £8.5	£17
□ Prepare analysis of food safety hazards: Extra costs as above	£17
□ Improve knowledge of GAP and manure handling	£60
Total	£94

If these one-off costs are amortised over ten years at 7% interest (annual charge of £142 per £1,000) it gives an annual equivalent cost of £13 per year.

Recurrent costs:

□ Hire of equipment/ tractor to move the manure: @ £17 per hour	£153
for a tractor and labour (Organic Management Handbook, 2007);	
1 hour per month needed nine additional times per year = 9 x £17	
□ Extra labour for applying manure: 1 day @£60	£60
□ 15 minutes washing of (harvest) baskets per week @ £7/hr	£75
Total	£288

Total Increase In Costs

Total Annual Equivalent Cost increase of £301 per year (£288 plus £13).

This business currently has total annual sales of about £42,400. This will increase this year as top fruit is sold. Profits are estimated at 30%.

4 Summary for Case 4

Note: For the top fruit production methods in this case study to meet the FSA guidance it is very important that the current practice continues where no fruit which comes into contact with the ground is sold.

The extra costs for this farm to meet the advice in the FSA guidance is modest. However, if the guidance was interpreted as requiring the chicken houses to be removed from the orchard then the costs would be significant when compared with the profits.

Calculation of the Cost of the Impact on Current Practice

The considerations explained above on the existing protocols for ready-to-eat crops suggest the proportions of RTE crops currently grown in 2007 in ways that do not follow the proposed guidance to be as in Table 6 below. A key assumption is that a higher proportion of organic crops are grown in ways that do not follow the proposed guidance. In Table 6 the nature of the way in which production does not follow the advice in the guidance has been indicated in terms of manure management not following the advice in the guidance or the interval from grazing to planting or harvest being insufficient.

Table 6. Estimated % of Grouped Crops Not Following FSA Advice

Crop Group	Problem	Conventional	Organic
Near the ground	Manure	8	40
	Grazing	1	15
Remote from ground (top fruit etc)	Manure	0.75	10
	Grazing	1.5	10
Remote fm ground protected	Manure	N/A	10
Near ground - protected	Manure	N/A	10

Source: Chambers et al (2001) and other estimates by ADAS

The sources for the above table are a paper entitled “Pathogen Transfer Risks from Farm Manure to Salad/Vegetable and Fruit Crops – Scoping Study Report”, produced by ADAS for the FSA in 2001 (Chambers et al, 2001), more recent data from the British Survey of Fertiliser Practice and estimates by ADAS consultants familiar with production of ready-to-eat crops. No more evidence is available.

Multiplying the areas of ready-to-eat crops by the proportions in Table 6 estimated to not be grown following the advice in the guidance gives the areas set out in Table 7.

Table 7 Areas (ha) of Grouped Crops Not Currently Following the Advice

Crop Group	Problem	Conventional	Organic
Near the ground	Manure	8,157	1,776
	Grazing	1,020	666
Remote from ground (top fruit etc)	Manure	107	19
	Grazing	214	19
Remote fm ground protected	Manure	1	12
Near ground - protected	Manure	12	6

Sources: Tables 1-4 and 6

Not all growers will change as a result of the publication of the guidance. It is likely that those who sell direct to the public (farm shops, pick your own, farmers' markets and box schemes) as well as those who sell through wholesale markets may be less likely to change to meet the voluntary recommendations of the guidance. These forms of marketing are more common for organic growers. In Table 8 below are ADAS estimates of the proportions of crop areas not currently grown in ways that follow the advice in the guidance and which might change practice as a result of publication of the guidance. This excludes other pressures to change such as the growing influence of major retailers and produce assurance schemes. Implicit in these assumptions is that organic certification bodies do not adopt the guidance and hence for organic producers the advice in the guidance remains voluntary. This assumption was made because if the organic certification bodies made following the advice in the guidance a requirement of their organic standards, they would effectively make them compulsory for the organic sector.

Table 8. % of Grouped Crops Not Currently Following the Advice and Changing Practice As a Result of Publication

Crop Group	Problem	Conventional	Organic
Near the ground	Manure	60	40
	Grazing	60	40
Remote from ground (top fruit etc)	Manure	60	40
	Grazing	60	40
Remote fm ground protected	Manure	60	40
Near ground - protected	Manure	60	40

Source: ADAS Estimates.

The reasons why many producers are likely to adopt the recommendations in the guidance are:

- Market pressure from buyers and crop assurance schemes due to publication,
- It will help producers show they are meeting the requirements of Food Hygiene Regulation 852/2004,
- In a more general sense it will demonstrate due diligence,
- If any outbreak of foodborne illness were traced to their produce, it might reduce their liability.

In Table 8 a lower proportion of organic producers are expected to change practice because of the inherently greater difficulties for them in so doing. It also recognises that they more frequently market through direct channels such as box schemes and farmers' markets and thus come under less pressure from the marketing chain.

In Table 9 below the areas changing practice as a result of publication of the guidance have been calculated from the information in Tables 7 and 8.

Table 9. Estimated Areas (Ha) of Grouped Crops Not Currently Following the Guidance and Changing Practice As a Result of Publication

Crop Group	Problem	Conventional	Organic
Near the ground	Manure	4,894	710
	Grazing	612	266
Remote from ground (top fruit etc)	Manure	64	7
	Grazing	128	7
Remote fm ground protected	Manure	1	5
Near ground - protected	Manure	7	2

Source: Tables 7 and 8.

In Table 10 below the different grouped crop areas have been given a code and in Table 11 the most cost effective methods by which growers can change practice to meet the advice in each situation is briefly described and costed.

Table 10. Cost Calculation Key - Calculation Code

Crop Group	Problem	Conventional	Organic
Near the ground	Manure	A	E
	Grazing	B	F
Remote from ground	Manure	C	G
(top fruit etc)	Grazing	D	H
Remote fm ground protected	Manure	L	J
Near ground - protected	Manure	M	K

Table 11. Calculation Description and Costs £/ha.

Code	Crop Group	Problem	System	Description of the Calculation	Calculation	£/ha
A	Near the ground	Manure	Convent.	Put manure onto another crop in the rotation. This will meet organic matter needs. If fresh produce crop needs more fertiliser – cost the additional application only N.	35 t/ha of cattle FYM with 1.5 kg/t of available N at 45 p/kg.	24
B	Near the ground	Grazing	Convent.	Give up grazing income. Chop crop residue.	Grazing income of 25 sheep per ha for three weeks at 40 per week. Also cost of rotavating at £60/ha	90
C	Remote TF etc.	Manure	Convent.	Stop using manure Some additional fertiliser cost	35 t/ha of cattle FYM with 1.5 kg/t of available N at 45 p/kg, 2 kg/t of P205 at 31 p/kg and 4kg K20 at 24 p/kg.	79
D	Remote TF etc.	Grazing	Convent.	Interval from grazing to harvest is insufficient. Lose grazing income, top grass in orchards.	Grazing income of 15 sheep per ha for 3 months at 40p/head/week plus £40/ha for mowing grass.	112
E	Near the ground	Manure	Organic	Ensure manure has been stored for 6 months - double moving	Move at 35 t per hour at £3.5/t for cattle FYM or 8t/ha for poultry litter	75
F	Near the ground	Grazing	Organic	For crops with a harvest interval of less than 6 months, grazing must stop earlier (period depends on length of harvest interval). Calculate loss of stocking capacity and sheep GM	Assume 3 months of grazing lost equivalent to 40% of annual grazing capacity. Sheep stocked at 9.1 per ha at GM (excl forage) at £41 per head	149
G	Remote TF etc.	Manure	Organic	Apply manure immediately post harvest. No significant cost.		0
H	Remote TF etc.	Grazing	Organic	Calculate loss of stocking density	Assume 3 months of grazing lost equivalent to 60% of annual grazing capacity. Sheep stocked at 9.1 per ha at GM (excl forage) at £41 per head	224
L	Remote Protected	Manure	Convent.	Use fertiliser in place of bought manure	Negligible cost	0
M	Prot. Nr Ground	Manure	Convent.	Use fertiliser in place of bought manure	Negligible cost	0
J	Remote Protected	Manure	Organic	Store manure for 6 months		75
K	Prot. Nr Ground	Manure	Organic	Store manure for 6 months		75

Sources: Least costly methods to follow the advice in the guidance: Costs: Nix, 2006, Lampkin et al 2006 and ADAS.

The costs per hectare in Table 11 have been multiplied by areas of crops where practice will change indicated in Table 9 to arrive at Table 12.

Table 12. Cost in £ per Year to Sectors to Adopt the Guidelines

Crop Group	Problem	Conventional	Organic
		£	£
Near the ground	Manure	115,623	53,458
	Grazing	55,058	39,758
Remote from ground (top fruit etc)	Manure	5,068	0
	Grazing	14,384	1,674
Remote fm ground protected	Manure	0	361
Near ground - protected	Manure	0	175
TOTALS		190,133	95,425
OVERALL TOTAL			285,559

Source: Tables 9 and 11.

Table 12 suggests that the cost of changing practice in respect of manure management and grazing of livestock will be about £286,000 per year once the guidance has had its impact on grower practice. All these costs are recurrent costs.

Administrative Costs

It should be noted that the additional administrative costs estimated here are not administrative burdens caused by regulation. The guidance is voluntary and where businesses choose to follow the advice, the additional administrative costs are normal costs associated with good commercial practice (so called “Business As Usual”), not administrative burdens as a result of regulation.

In Table 13 below the administrative costs to growers of publication of the guidance have been estimated. It has been assumed that once the guidance is published it will be widely and rapidly incorporated into produce assurance schemes and major retailer requirements – mainly by reference to the guidance and adding a requirement that it be followed. The impact of this will be that growers must obtain, read and retain copies of the guidance. Where their practice and records meet the advice in the guidance, no further action will be required. Where their practice and records do not meet the advice set out in the guidance they will have to change

practice and change their records. The cost of changes to practice has been estimated above but the costs of changing recording systems and keeping the augmented records is an administrative cost which is included below:

Table 13. Calculation of Administrative Costs

Total Number of Horticultural Businesses in UK =	11,200
Proportion currently complying - %	80
Proportion of those not complying that will do so - %	50
Proportion needing the Guidance - %	90
Number needing to obtain and read the Guidance	10080
Time to obtain, read and digest the guidance - hours per business	3
Average cost of labour, £/hour	11.61
Premium for management type time - say 50%	
Average cost of management input for administrative work:	17.42
Cost of obtaining reading and digesting the Guidance £/ business	52.245
Total sector cost of obtaining and reading the Guidance:	526,630
Proportion of businesses changing record systems and practice - %	10
Number of businesses changing records and practice	1,120
Cost of adapting field record systems - say 2 hours per business:	39,010
Cost of additional recording, say 10 records per business at 5 minutes each E.g. recording quantities and histories of manure applied, at £11.61/hr	16,254
TOTAL One-off cost:	565,639
Total recurrent costs per year	16,254
Appropriate write-off period for one-off costs - say (years).	10
Amortisation factor at 7% over 10 years, £ per £1,000	142
Annualised cost of one-off costs	80,321
Total Annual Equivalent Cost £/year for the sector	96,575

Sources: Number of businesses: Defra et al 2006, hourly labour cost: Nix 2006, remainder ADAS estimates.

Unlike the calculation of the cost of changing practice, which has been done on a crop area basis, the cost of administration has been calculated per business. This is because the actions (for example obtaining and reading the guidance) must be done once per business. In Table 13 the number of businesses in the UK affected is assumed to be 11,200 (Source AUK 2006, Defra et al). Of these, it is assumed that 90%, (10,080 businesses) have to obtain, read and digest the guidance. However, only 10% have to go on and change record keeping systems and keep additional records.

The cost of labour in agriculture of £11.61 per hour is assumed to apply to ongoing routine tasks. However a 50% premium to this has been assumed for management

time for tasks such as obtaining the guidance, reading and digesting it and making adaptations to record systems.

The total one-off administrative cost is estimated to be about £566,000. Total additional recurrent administrative costs are estimated to be £16,000 per year. Additional administrative burdens are nil.

Comparison of Case Study Results and Standardised CBA Calculation

The four case studies carried out to collect evidence for this RIA are unlikely to be representative of the whole ready-to-eat crop production sector. However it is instructive to compare the costs estimated by the standard CBA method and the costs collected from the case studies. These are shown in the table below.

Table 14. Case Studies and CBA Compared

Case Study	Assessed Cost £/year	Cost using Standard CBA Method £/year
No. 1, Large conventional root producer	7	7
No 2, Small organic vegetable producer on mixed farm	982	278
No. 3, Conventional leafy crop producer grazing sheep	6,271	9,088
No. 4, Small mixed organic farm with poultry and top fruit	301	246
TOTAL	7,561	9,619

The case study costs were assessed in total at £7,561 per year and the costs for these holdings using the CBA methods was £9,619 per year. The costs are in broad agreement but the CBA method slightly underestimates the costs for small organic holdings in these two cases. The particular issue of proximity of livestock units to ready-to-eat crops occurred on both the organic case study farms.

These four case studies cannot be expected to be representative of all fresh produce businesses. However this limited information suggests the assumptions for additional costs in the CBA are of the right order of magnitude.

Assessment of Impact on Public Health

The number of reported outbreaks of foodborne disease from 1992-2003 according to the Health Protection Agency are set out in Table 15.

Table 15: Reported outbreaks of foodborne disease in the UK from 1992-2003

Year	Foodborne outbreaks	Salad/fruit/veg. outbreaks	%
1992	224	21	9
1993	225	10	4
1994	192	19	10
1995	183	9	5
1996	169	18	11
1997	222	8	4
1998	121	9	7
1999	97	12	12
2000	98	10	10
2001	91	7	8
2002	70	5	7
2003	71	7	10

Source: FSA 2005

It can be seen that there has been a decline in the number of reported outbreaks which also correlates with FSA figures showing a reduction in number of reported cases. With such low numbers of reported outbreaks from salad, fruit and vegetables it is difficult to draw a firm conclusion but the trend appears to be downwards since 1996. This may be due to a wide number of factors, but one of these may be less contamination of crops pre-harvest (due to pressure from Assured Produce requirements) by better controls on contaminated manure and irrigation water. However other factors, such as better hygiene during processing and less cross-contamination in the kitchen if other foods are less contaminated (e.g. *Salmonella* contamination in chicken has been markedly reduced) could also be significant.

A paper on Disease Risks from Foods, England and Wales, 1996–2000 by Adak *et al* has produced estimates for annual cases of foodborne disease from a variety of foodstuffs including fruit and vegetables. This was based on reported outbreaks

where specific pathogens were isolated, using the information above. The figures were adjusted to take out the predicted effects from infected food handlers which are independent of the type of food.

The paper estimated the number of cases of foodborne illness as in Table 16.

Table 16: Estimated number of annual cases of foodborne disease in England and Wales 1996-2000

	Estimated annual cases	Estimated annual deaths
Salad vegetables	37,496	11
Fruit	5,275	1

Source: Adak *et al* 2005

Note: These figures are for England & Wales so need adjusting by a factor of 1.13 for the UK.

The number of deaths is likely to be more accurate than the number of reported cases although there may be some exceptional cases when cause of death is not determined and this may have been due to foodborne illness, however this will be ignored here.

The incidence of foodborne disease is thought to have reduced in the period from 1996 – 2000 to 2005. In the FSA Board Paper of November 2006 (FSA, 2006), the number of cases was reported as 765,000. This is only 44% of the number of cases in 1996 – 2000 so the estimated number of cases from salad and vegetables and fruit has been adjusted down in proportion.

Table 17: Estimated number of annual cases of foodborne disease in the UK 2005

	Estimated annual cases	Estimated annual deaths
Salad vegetables	18,759	5
Fruit	2,639	0.5

Sources: Table 16 and FSA 2006.

There appear to be no published studies that quantify the comparative risks of contamination of RTE produce from various sources such as contaminated seed,

soil, manure, irrigation water and pests in the pre-harvest phase; or from activities later in the chain that may cause contamination from handling, equipment, processing, washing, packaging materials, pests etc.

Based on information from various technical experts the two most likely sources of pathogen contamination of salad crops are irrigation water and use of contaminated manure. It is likely that fruit will be more affected by contaminated irrigation water than by manure. It is therefore assumed that contaminated manure may be responsible for 10% of the cases of foodborne illness in salad crops and 1% of cases in fruit crops, where contaminated manure is still used.

It is assumed that the controls on manure were already in place in the period 1996 – 2000 (when the above study was carried out) for those growers supplying crops following the guidance of Assured Produce and that this control was 100% effective. The reduction in cases of foodborne illness as a result of further voluntary controls on use of manure and grazing will only apply to the proportion of growers who do not currently produce crops in ways that follow the advice in the FSA guidance but are likely to do so in future.

Therefore the predicted reduction in cases and deaths from increased control of manure in GB will be:

$$\text{Salad and vegetable cases} - 18,759 \times a \times 0.1 = c$$

$$\text{Salad and vegetable deaths} - 5 \times a \times 0.1 = d$$

Where a = proportionate reduction in the area of salads and vegetables grown in ways which are not in accordance with the advice in the FSA guidance but which after the publication of the guidance are expected to change to follow the advice, c = reduced number of cases, d = reduced number of deaths

$$\text{Fruit cases} - 2,639 \times b \times 0.01 = e$$

$$\text{Fruit deaths} - 0.5 \times b \times 0.01 = f$$

Where b = proportionate reduction of the fruit area not currently, but which after the publication of the guidance is expected to follow the advice in the guidance, e = reduced number of cases, f = reduced number of deaths.

The value for “a” in the CBA assumptions is 55.8% and the value for “b” is 57.9%.

Table 18: Forecast Impact on Public Health

Crop	Cases 2005 Estimate for UK	% reduct. if risk eliminated	% of crop area not now following the advice but changing to follow it	Estimate of Reduct. in cases	UK Self-sufficiency %	Cases Attributable to UK Production
Veg/sal	18,759	10	55.8	1,046	61	638
Fruit	2,639	1	57.9	15	11	2

Sources: Self sufficiency, Agriculture in the UK 2006, (Defra et al 2007), remainder earlier tables.

In the table above the proportions of vegetables and fruit consumed in the UK which are grown in the UK has been used to estimate the UK cases which are attributed to home production rather than imports. The calculations assume that the frequency with which home produced and imported crops cause foodborne disease is equal. No reliable data is known to justify any other assumption although anecdotally it is sometimes suggested that imported crops may be riskier.

Value of Impact on Public Health.

The benefit of publishing the guidance has been based on the reduction in the number of cases. The cost per case takes into account a very small proportion of deaths per case.

The FSA Board Paper from October 2006 (FSA, 2006) gives figures for 2005 for the number of cases of foodborne disease in England and Wales of 765,000 at a total cost of £1,379 million. This is equivalent to a cost per case of £1,804. Using this value for the benefit of a reduction in one case gives the figures in Table 19 for the value for benefits from publishing the guidance.

Table 19: Estimated Benefits in £ per Year for the UK from Publishing the Guidance

Benefit	Benefit, £ '000s per year in the UK
NHS costs saved	21
Lost earnings and other expenses	89
Pain and suffering	1,044
Total estimated benefits	1,154

The NHS, lost earnings and other expenses are assessed at market prices. The pain and suffering caused by foodborne diseases have a direct effect on the well-being of individuals and therefore impose an economic cost on society. The Green Book, which provides guidance for policy appraisal across Government, recommends that this cost should not be ignored², and it is in fact common practice in many Government Departments (e.g., Transport, Health and Safety Executive) to monetise the avoidance of pain and suffering in cost-benefit analysis. For instance, the Department for Transport routinely makes use of a “Value of Fatality Prevention” in its assessment of road improvement projects³. The calculation of benefits in the RIA therefore monetises the welfare gain from the estimated reduction in the pain and suffering of individuals affected by food poisoning. The underlying methodology, which was first used by the Agency in the RIA of the 2006 Consolidation of the EU Hygiene Regulation, is explained in detail in Annex 6 of the October 2006 FSA Board Paper on the Foodborne Disease Strategy.

The estimates of the benefits of publishing the guidance are very uncertain because the estimates of the impact on foodborne disease involve a large element of judgement. The estimated benefits could easily be under or overstated by 50% or more. Another approach is to look at the breakeven reduction in impact which would

² Paragraph 5.12 states that: “Wider social and environmental costs and benefits for which there is no market price also need to be brought into any assessment. They will often be more difficult to assess but are often important and should not be ignored simply because they cannot easily be costed”. See <http://greenbook.treasury.gov.uk/annex02.htm>.

³ See Highways Economic Notes available at <http://www.dft.gov.uk/pgr/roadsafety/ea/>

equate the costs and benefits of publishing the guidance. Figures for these two approaches are in Table 20.

Table 20: Sensitivity and Breakeven Analysis

	Most Likely Estimate	Low Estimate -50% Benefit	High Estimate +50% Benefit	Break Even
Value of benefits £ million/yr	1.15	0.58	1.73	0.30
% Reduction of foodborne disease in veg/salads if all follow the advice	-10%	-5%	-15%	-2.6%
% Reduction of foodborne disease in fruit if all follow the advice	-1.0%	-0.5%	-1.5%	-0.26%

In the Table 20, the “most likely estimate” corresponds to the figures for benefits in Table 19 above. The two figures for the most likely reduction in foodborne disease (one for vegetables and salads and one for fruit) are the assumptions used in Table 18 to estimate benefits. The next two columns show the benefits which would occur if the reductions in foodborne disease are 50% lower or 50% higher than the assumptions made in Table 18. This suggests that the plausible range of benefits is at least from £0.6 million per year to £1.7 million per year. In the final column the break even benefits have been calculated. The recurrent costs to the industry are estimated to be £0.30 million per year. For the benefits to equal these costs the reduction in foodborne disease caused by vegetables and salad crops would be 2.6% and in fruit crops 0.26%. These can be compared to the most likely assumption of a reduction in foodborne disease of 10% in salad and vegetable crops and 1% in fruit crops. It seems likely that the benefits of publishing the guidance will be greater than the costs.

In Table 21 below the one-off costs are all administrative costs about £566,000 from Table 13. The additional annual recurrent costs of about £302,000 are shown in every year as are the benefits of £1.54 million.

Table 21. Discounted Value of Net Benefits

Year	One -off Costs	Recurrent Cost	Total Costs	Benefits	Net Benefits
	£	£	£	£	£
1	565,639	301,813	867,452	1,154,291	286,840
2		301,813	301,813	1,154,291	852,479
3		301,813	301,813	1,154,291	852,479
4		301,813	301,813	1,154,291	852,479
5		301,813	301,813	1,154,291	852,479
6		301,813	301,813	1,154,291	852,479
7		301,813	301,813	1,154,291	852,479
8		301,813	301,813	1,154,291	852,479
9		301,813	301,813	1,154,291	852,479
10		301,813	301,813	1,154,291	852,479
Total			3,583,767	11,542,915	7,959,148
Net Present Value discounted @ 3.5%			£3,056,569	£9,599,786	£6,543,218

The life of the guidance must be assessed to complete the CBA. The FSA has no plans for revising the guidance or for carrying out more research on the subject of contamination of ready-to-eat crops. However, given the pace of change in market conditions and regulation, it seems that 10 years is a reasonable predicted life for the guidance. In Table 21 the annual net benefits have been discounted at the Treasury test discount rate of 3.5% to give a Net Present Value of the benefits of £6.5 million.

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