HACCP AND FOOD HYGIENE LAW IN ENGLAND: THE IMPLICATIONS FOR PEST CONTROL STRATEGIES

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Abstract - The European Union has by Directive 93/43/EEC required that member states adopt the main principles of HACCP, (Hazard Analysis of Critical Control Points). HACCP is a total quality management system for food safety which if implemented fully would result in a minimal level of contamination of food. The implications for pest control in a fully implemented HACCP system are extensive, but the picture is more complex than it might first appear. This complexity arises from both the nature of HACCP itself and the extent to which it is required by the law. Following some serious outbreaks of *Escherichia coli* food poisoning, the UK government is in the process of introducing a legal requirement for a full HACCP system in some classes of food business for the first time. This paper examines the consequences of the introduction of a legal requirement for HACCP for pest control strategies. Following on from this it considers the relationship between integrated pest management and a risk based approach to food safety. It is concluded that a legal requirement for HACCP is likely to have far reaching implications for food businesses and for the pest control industry. There will be a need, in future, to adopt an approach which considers all risks from pests and from pest control treatments.
Key words - Hazard analysis, food, food safety law

INTRODUCTION

Pests in food premises have long been recognised as a threat to human health. Despite the difficulties of precisely quantifying this risk, it is generally accepted that human health is prejudiced by the presence of pests in food premises. Food Hygiene Law in England and Wales has, until recently attempted to deal with this by prohibiting pest infestations. Thus an infestation of a detritus feeding species which is not especially attracted to human food, food waste or other potential sources of pathogens was considered by the law to be broadly equivalent to an infestation by a species attracted to human food, food waste and excrement which is known to harbour pathogens. Recently a more sophisticated legal requirement to analyse food hazards and control risks critical to food safety has been introduced. Following a serious outbreak of *E. coli* 0157 the UK Government has decided to introduce a formal requirement for HACCP for the first time. HACCP is a documented system for controlling all food hazards. This paper investigates the implications of this requirement for food businesses and the pest control industry.

HAZARD ANALYSIS AND CRITICAL CONTROL POINTS (HACCP)

Origins of HACCP

The concept of HACCP was developed three decades ago following the difficulties encountered in producing safe food for use in the manned flights of the U.S. space programme. The sterilisation of food and equipment inside a spacecraft may well not be practical due to the gravity and pressure circumstances which prevail. The Pillsbury Company working with NASA and the U.S. Army laboratories developed the original HACCP system. The philosophy of HACCP was based upon the principle of a careful examination of what could go wrong at every stage of a process, an examination of causes and effects, and the deployment of effective control mechanisms. This philosophy had originated in engineering from such systems as Failure, Mode and Effect Analysis (FMEA).

Principles of HACCP

HACCP is based upon seven key principles. These principles were listed by the Codex Alimentarius Commission, which was established by the United Nations Organisation (UNO), Food and Agriculture

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Organisation (FAO). The seven principles of HACCP are: 1) **Conduct a hazard analysis.** This usually involves preparing a flow diagram of the steps in the process, identifying and documenting the hazards and noting the existing control measures. 2) **Identify Critical Control Points (CCPs).** This involves deciding which of the hazards presents a risk which is critical to food safety. 3) **Targets and tolerances.** These are the levels and agreed tolerances which determine that a hazard is under control. 4) **Monitoring.** The CCPs must be monitored by testing or inspections and observations to ensure that targets are adhered to within the pre-determined tolerances. 5) **Corrective actions.** The corrective action which must be undertaken when monitoring indicates that the target level of control of a CCP is not certain to be met, must be decided. 6) **Documentation.** Documentation must record all procedures and records which are involved in the system. 7) **Verification procedures.** These must include procedures for review of the system and supplementary monitoring to ensure that the system remains valid (Based upon Codex Committee on Food Hygiene 1993).

The process of HACCP may be said to be a fully documented risk assessment system. In this system all hazards are analysed and controls implemented so that risks are reduced to a minimum. It is useful to note that although risks are minimised, they are not, eliminated as this is not possible. It is also useful at this stage to remind ourselves of the meaning of hazard and risk in this context. A *hazard* is something which could cause harm. A *risk* is a combination of both the probability of the hazard causing harm and the amount of harm caused (Health and Safety Commission 1993).

These definitions remind us that HACCP, although it addresses all of the hazards is in fact a risk based approach. This is because only critical control points are monitored and the degree to which these are controlled, that is the degree of tolerance in each case, is determined by risk.

Food Hygiene Law in England and Wales

The European Directive 93/43/EEC states that food business operators should identify any process undertaken which is critical to ensuring food safety and ensure that adequate safety procedures are identified, implemented, maintained and reviewed. Although the Directive refers to HACCP, it stops short of requiring a fully documented HACCP system in all food businesses. Furthermore Directive 93/43/EEC does not have direct effect as law in all European Union (EU) countries, rather, member states are expected to introduce national legislation to implement the requirements of the Directive in their own countries.

In the United Kingdom the concept of Hazard Analysis was introduced into Food Hygiene Law in England and Wales by the Food Safety (General Food Hygiene) Regulations 1995. Hazard Analysis equates to the first five steps of HACCP in that hazards must be analysed, points critical to food safety identified, and risks controlled, (Catering Industry Guide 1997). Unlike a HACCP system, however, Hazard Analysis does not require documented systems or records.

Following a serious outbreak of VTEC *Escherichia coli* 0157 in Scotland in 1996 in which several people died, the United Kingdom government commissioned an enquiry led by the microbiologist Sir Hugh Pennington. The Pennington report advocated the introduction of a legal requirement for a fully documented HACCP system in all food businesses, (Report of the Pennington Group 1997). The government has begun this process by consulting on new regulations which would require a fully documented HACCP system in butcher's shops.

Application of HACCP to various types of food business

From its origins HACCP has been intended for linear food production operations. In the space programme food was prepared on the ground to a standard where it could be safely rehydrated, heated etc. in space. In each case the process was linear in that the food was prepared from controlled raw ingredients, treated just before consumption and then eaten. It is easy to see how HACCP systems were readily introduced into food manufacturing processes. In these processes carefully controlled raw materials are treated and prepared in a standard, pre-determined way, then packaged and stored under

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fixed conditions. Although HACCP is ideal for food production operations in food factories it may be less applicable to catering operations. This is because, whereas food production or manufacture is a linear process, catering may be viewed as a circular process where delivery, preparation, cooking, re heating and storage may all be occurring in an irregular manner throughout the hours that the business is operating, (Howard 1998). This difference between food manufacture and catering operations is important in considering the role of pest management in HACCP systems.

HACCP and pest management

MacDonald (1996) pointed out that a HACCP system is concerned not only about the risks from pest infestations but from the pesticides themselves. It is clear, therefore, that a legal requirement for HACCP is not simply about more pest control treatments, rather, it is about a more focused and considered application of pest management strategies. Previous food hygiene laws have focused on pest infestations. (Statutory instrument 1970 No.1172). Under these an offence was created by the presence of a pest infestation. Using HACCP it will be necessary to determine the extent of the risk involved and adopt appropriate control strategies. More than this, it will be necessary to adopt integrated pest management approaches where collateral risks created by pesticide usage are also considered.

Pest control strategies for HACCP systems

In choosing an appropriate strategy for pest management in a HACCP system, food business operators must consider all of the risks which are present from pests and all of those which might potentially be created by the pest control strategies adopted. Many of the hazards which apply are well researched and documented. The consequential risks are more difficult to evaluate.

Hazards and risks

Pest insects are able to carry pathogenic bacteria on to food, (Morrell, 1911; Antonelli, 1930; Bitter and Williams, 1949; Alcamo and Frishman 1980). There is now a growing body of evidence that allergic reactions to insect tissue and frass is a significant health problem for some people. Kang and Chang (1985) and Kang *et al.*(1987) found evidence that exposure to German cockroach, *Blattella germanica* (L.) populations appeared to be responsible for atopic and allergic reactions in people living in infested environments. The problem of insect allergy is not restricted to cockroaches. Van Lynden *et al.*, (1996) reviewed the work of several authors who found allergic responses in people exposed to insect pests of food premises including cockroaches, flour moths and beetles, psocids, and silverfish. They also reported the work of a number of researchers who had found evidence of allergy caused by mite species common in food and food premises.

As well as risks from pest species, there are also risks from the pesticides themselves. Although it is easy to find demonstrated risks from early pesticides, it is very difficult to find reliable evidence for the degree of risk produced by pesticides. In this case it is appropriate to apply the precautionary principle, (UK Dept. of the Environment 1995). By this principle, pesticide application and the risk of pesticides contaminating food would be kept to a minimum. If insect pests are present in food premises, there is a risk of the food becoming contaminated. In the case of cockroaches, which have been shown to carry pathogens, the risk is considerable. In the case of other pests the risk comes from parts of the animals themselves entering the food. These body parts, although not pathogens, may be important in terms of allergy.

Strategies

Pest control strategies must be chosen very carefully. The pest status of each species, which may be present, must be assessed and a control strategy chosen which balances the risks from the pests against the risks from the control measures themselves. Environmental controls such as cleaning and screening must be considered, as must the choice and formulation of pesticides. Low mammalian toxicity pesticides can be used to reduce the direct toxic risks to humans and selective pesticides can reduce the amount of pesticide applied. Baiting reduces the risk of pesticide finding its way into the food. Physical

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control methods such as the use of heat have been suggested, (Howard and Oldbury, 1990; Nicholson and von Rotberg, 1996; Zeichner *et al.*, 1996).

IMPLICATIONS OF A LEGAL REQUIREMENT FOR HACCP

HACCP requires that hazards are analysed and that risks which are critical to food safety are controlled. It also requires that the methodology behind the system is documented and records kept. This will mean that food businesses will need to carefully assess the risks that will be produced by potential pest populations. This assessment will require a far greater level of expertise than was required by previous UK law which simply required premises to be kept free of infestations. Pest control strategies will have to be chosen carefully, ensuring that environmental and physical controls are applied when appropriate and to a proper level. Pesticide techniques such as baiting and the use of low mammalian toxicity pesticides will also need to be considered, perhaps to a greater extent than they are at present.

The above factors will mean that food businesses will require expert advice on whole strategies of pest control and will need to be able to understand these strategies themselves in order to integrate them properly into their overall HACCP systems.

CONCLUSIONS

The introduction of a requirement for a formal, documented HACCP system in food hygiene law in England and Wales will have important effects on food businesses in those countries. The effect upon pest control strategies will also be significant. HACCP will make it obligatory for food companies to determine the extent to which pests and pest control strategies are critical to food safety. This requirement will mean that food companies will need to adopt strategies more carefully focused on risk and may need more expert advice in interpreting and analysing hazards

REFERENCES CITED

Alcamo, I. E. and Frishman, A. M. 1980. The microbial flora of field collected cockroaches and other arthropods. J. Environ. Health 42: 263-6

Antonelli, G. 1930. La blatta nelle igiene domestica.Riv.Soc.Ital.Igiene (Milan) 52: 132-42.

Bitter, R. S. and O. Williams. 1949. Enteric organisms from the American cockroach J. Infect. 85: 87-90

Catering Industry Guide. 1997. Food Safety (General Food Hygiene) Regulations 1995, Food Safety (Temperature Control) Regulations 1995. Industry Guide to Good Hygiene Practice: Catering Guide. Chadwick Home Group Ltd. London.

Codex Committee on Food Hygiene. 1993. Guidelines for the application of the Hazard Analysis Critical Control Point system (HACCP) in training considerations for the application of the HACCP system to food processing and manufacturing. WHO/FNU/FOS. 93.3.11.

Health and Safety Commission. 1993. Management of Health and Safety at Work, The Management of Health and Safety at Work Regulations 1992 and Approved Code of Practice. HSE Books, London.

Howard, M. T. 1998. Food Poisoning and Food Hygiene Law in the UK. Proceedings of the second International Conference on Culinary Arts and Sciences, Bournemouth, UK June 1998.

Howard, M. T. and D. Oldbury. 1990. Management of a severe infestation of. *Blattella germanica* (Linnaeus) at Moss Side Market, Manchester, England. Proceedings of the National Conference on Urban Entomology. W. Robinson.

Kang, B. and Chang, J. L. 1985. Allergenic impact of inhaled arthropod material. Chin. Rev. Allergy 3: 363-75.

Kang, B. J. Johnson, and G. Jones. 1987. Analysis of indoor environment and asthmatic characteristics of urban bronchial asthma. Paper presented at the 43rd Annual Meeting of the Academy of Allergy and Clinical Immunology. Washington D.C.

Mac Donald, D. J. 1996. HACCP and Pest Control. In K. Wildey, ed., Proceedings of the 2nd International Conference on Insect Pests in the Urban Environment, Edinburg, Scotland

Morrell, C. C. 1911. The bacteriology of the cockroach. Br. Med. J. 1531-1532.

Nicholson, M. and W. van Rotberg. 1996. Controlled environment heat treatment as a safe and efficient method of pest control. In K. Wildey, ed., Proceedings of the 2nd International Conference on Insect Pests in the Urban Environment, Edinburg, Scotland.

Pennington Group Report 1997. The Pennington Groups: Report on the circumstances leading to the 1996 outbreak of infection with *E.coli* 0157 in Central Scotland, the implications for food safety and the lessons to be learned.

Statutory Instrument (1970) No. 19701172. Food Hygiene (General) Regulations 1970. UK Govt. Stationery Office.

Proceedings of the 3rd International Conference on Urban Pests.
Wm H. Robinson, F. Rettich and G.W. Rambo (editors). 1999.

UK Department of the Environment. 1995. A guide to risk assessment and risk management for Environmental Protection. UK Govt. Stationery Office. London.

Van Lynden - van Nes, A. M. T., L. Koren, M. Snijders, J. van Bronswijk. 1996. Medical Impact of Arthropod Allergens. In K. Wildey,. ed., Proceedings of the 2nd International Conference on Insect Pests in the Urban Environment, Edinburg, Scotland.

Zeichner, B. C., D. Wood, and A. Hoch. 1996. The use of heat for control of chronic German cockroach infestation in food service facilities - a fresh start. In K. Wildey, ed., Proceedings of the 2nd International Conference on Insect Pests in the Urban Environment, Edinburg, Scotland.