Available online at www.sciencedirect.com
SCIENCE DIRECT®
Food Control 17 (2006) 497–510
FOOD CONTROL
www.elsevier.com/locate/foodcont

HACCP-based approach to the derivation of an on-farm food safety program for the Australian red meat industry

Peter M. Horchner [a,*], Denis Brett [b], Bruce Gormley [b], Ian Jenson [c], Andrew M. Pointon [d]

[a] *Alliance Consulting and Management, P.O. Box 1764, Milton, Qld 4064, Australia*
[b] *AUSMEAT, 9 Buchanan Street, South Brisbane, Qld 4101, Australia*
[c] *Meat and Livestock Australia, Locked Bag 991, North Sydney, NSW 2059, Australia*
[d] *South Australian Research and Development Institute, G.P.O. Box 397, Adelaide, SA 5001, Australia*

Received 8 July 2004; received in revised form 15 February 2005; accepted 17 February 2005

Abstract

The standard Codex HACCP approach was modified to allow a hazard analysis to be conducted at an industry level which could then be used to derive appropriate on-farm food safety control measures for cattle, sheep and goat production in Australia. Scientific information from a through chain risk profile of the red meat industry was used as a major resource for the hazard analysis. The process resulted in the identification of critical control points for control of bovine spongioform encephalopathy (BSE), prevention of violations of maximum residue limits with agricultural and veterinary chemicals and infection with *Cysticercus bovis* (Beef Measles). By applying this HACCP-based approach it was determined that the application of a simple set of good agricultural practices (GAP) on-farm would be effective in ensuring low risk. It was, therefore, concluded that on-farm food safety schemes may not warrant full HACCP plans at the individual enterprise level as long as appropriate GAP is in place. The results provide red meat producers with the elements of a HACCP-based food safety scheme that is scientifically justifiable, understandable and realistic to apply which are essential elements that underpin successful implementation and compliance by industry. Subsequently, an on-farm food safety program has been developed to provide an appropriate level of protection for consumers as well as to protect Australia's trade from food safety-related issues.

Keywords: HACCP; Meat safety; Farm

1. Introduction

The Australian red meat industry is comprised of approximately 25 million cattle and 120 million sheep. Australia is the world's largest exporter of beef (23% of total world exports) and the second largest exporter of sheep meats (42% of total world exports). Consequently, the development of risk management programs (Codex Alimentarius Commission, 2003a) in accordance with the appropriate level of (consumer) protection (ALOP) determined by the importing country under the 1995 World Trade Organisation Agreement on the Application of Sanitary and Phytosanitary Measures (FAO/WHO, 1995) is essential for market access. This approach requires hazards in foods to be managed by exporting countries. Generic frameworks for managing foodborne risks to human health have recently been proposed by the Codex Alimentarius Commission (Codex Alimentarius Commission, 2002). These principles are reflected in the Draft Code of Hygienic Practice for Meat (Codex Alimentarius Commission, 2003b) that requires consideration of risk management of hazards prior to slaughter based on application of HACCP (Codex Alimentarius Commission, 1999).

* Corresponding author. Tel./fax: +61 7 3367 1113.
E-mail address: phorchner@allianceconsulting.com.au (P.M. Horchner).

0956-7135/$ - see front matter © 2005 Elsevier Ltd. All rights reserved.
doi:10.1016/j.foodcont.2005.02.012

Methods to conduct a hazard analysis (Notermans, Zwietering, & Mead, 1994) and establish critical control points using risk assessment and foodborne outbreak evaluations (Panisello, Rooney, Quantick, & Stanwell-Smith, 2000; Serra, Domenech, Escriche, & Martorell, 1999; Todd, Guzewich, & Bryan, 1997) have more recently been supported by elaboration of the risk profiling approach. Risk profiling is one activity in preliminary risk management, and has recently been defined as 'a description of a food safety problem and its context developed for the purpose of identifying those elements of a hazard or risk that are relevant to risk management decisions' (Codex Alimentarius Commission, 2002). Risk profiling involves the systematic collection of information needed to make a decision on what will be done next and where resources should be allocated to more detailed scientific assessment. The risk profiling process typically provides information on: the hazard, exposure to the hazard, adverse health effects, public health surveillance information, control measures, and other information relevant to risk management decision-making. The provision of a comprehensive description of the food safety problem associated with the hazard(s):commodity combination(s) has more recently been advocated (Codex Alimentarius Commission, 2003a). As such, risk profiling provides a comprehensive review and evaluation of recognised hazards and the effectiveness of industry and regulatory risk management programs. With the foregoing in mind, a risk profile of Australian meat and meat products was developed to provide industry and controlling authorities with a risk rating of hazard:meat and meat product combinations, advice on the feasibility and advisability of risk assessments and research and development priorities (Meat & Livestock Australia, 2003a, 2003b; Pointon et al., submitted for publication; Sumner, Cameron, Tan, Jenson, & Pointon, submitted for publication; Sumner, Ross, Jenson, & Pointon, submitted for publication). In this context the risk profile report provided technical rigour for the hazard analysis (Principle 1) of a HACCP-based system for the red meat primary production sector.

The purpose of this paper is to describe the application of HACCP principles at an industry level to derive appropriate on-farm food safety control measures applicable at the enterprise level for cattle, sheep and goat production. Details of the HACCP team's deliberations are published separately (Meat & Livestock Australia, 2003c). This report summarises the key processes and application of the HACCP approach when applied at the on-farm level.

2. Methodology

2.1. HACCP approach

The term "HACCP plan" implies the Codex HACCP methodology (Codex Alimentarius Commission, 1999) should be used. The HACCP team modified the conventional layout of HACCP plans in order to meet the needs of this project (Codex Alimentarius Commission, 1999). Specifically, since this had to apply to a large number of cattle, sheep and goat enterprises, the approach included a risk profile at an overall livestock sector level rather than only an individual enterprise level. In addition consideration was given to interventions further along the food chain which deal with hazards identified as being introduced on-farm, where applicable. The HACCP plan had to be broad enough to cover all enterprises and, therefore, specific aspects may not necessarily pertain to a given enterprise. The team took a rigorous approach to the application of HACCP following the "Logic Sequence for the Application of HACCP" (Codex Alimentarius Commission, 1999).

For the purpose of this exercise the methodology was used to identify recognised and potential food safety hazards. The study addressed recognised hazards that cause disease as a result of eating meat or meat products. Foodborne hazards considered included biological (microorganisms, natural toxins, gross carcase abnormalities), physical (foreign matter) or chemical (residues, heavy metals) agents, in, or condition of, food with the potential to cause an adverse health effect. Biological hazards included microbiological and macrobiological hazards (i.e. gross carcase abnormalities resulting from organisms or pathology associated with certain animal parasites and disease). Chemical hazards included residues from chemicals in the environment and those used on-farm, including those which may be safe in small amounts but have a maximum residue limit (MRL) and/or Export Slaughter Interval (ESI) in place. Physical hazards considered were those which may enter during primary production—examples include lead shot (in feral stock) and broken needles. Potential hazards included those that may result in public health, social and/or economic impact but for which epidemiological evidence is lacking e.g. chemicals and toxins (World Health Organisation, 2003). Food safety-related market access risks are potential hazards related to food safety which may or may not be valid hazards but are technical requirements to trade perceived as food safety linked in Australia's major meat and livestock markets. In this context stock feeds possibly containing genetically modified (GM) crops and grains were not an issue at the time of conducting this study but were recognised by the HACCP team as an emerging issue and need to be reconsidered at a future time.

2.2. HACCP team (Step 1)

In order to develop the HACCP Plan an authoritative HACCP team with specialist training in HACCP methodology; veterinary public health; microbiology;