

CHAPTER 1

INTRODUCTION

Consumer protection has become the central issue of public interest world-wide due to incidences of food poisoning and food-borne diseases which have shown no marked tendency to decline in recent decades (Harrigan, 1998; Jouve, 1998; Steinmceblj, 1995). Unfortunately, meat and meat products which form a major part of the current diet have been associated prominently with these food illnesses (Bryan, 1980). Research work has therefore been focused on the meat distribution chain to try and identify points at which problems might be arising and can be prevented (Ayres, 1955; Kapsrowiak & Hechelmann, 1992; National Advisory Committee on microbiological Criteria for Foods (NACMCF), 1993; Nortjé, 1987).

From these works, it has been noted that factors that impact on the microbiological safety of raw beef, range from the farm to the consumer. These factors can be divided into four segments namely: live animal practices, slaughter and processing operations (abattoir), distribution and retailing and consumer food handling practices (NACMCF, 1993). The abattoir is the main contributor as it is the point at which the initial translocation of microorganisms from the environment to the product occurs. This implies that it is also the initial point at which food-borne pathogens would be introduced into the carcasses (Gregory, 1996; Hechelmann, 1995b; Kapsrowiak & Hechelmann, 1992; NACMCF, 1993). This has led to interest in the bacteriological (especially food-borne disease causing organisms) status of beef carcasses, and hygiene in the abattoirs (Harrigan, 1998; Roberts, Hudson, Whelehan, Simonsen, Olgaard, Labots, Snijders, Van Hoof, Debevere, Dempster, Devereux, Leistner, Gehra, Gledel & Fournaud, 1984; Wood, Holder & Main, 1998).

The abattoir's vulnerability to potential food-borne pathogens comes from the fact that unlike most of the other food processing industries it has no microbial destruction step and therefore any hygiene deficiencies can lead to considerable contamination of carcasses. This potentially high level of accumulative contamination on the raw material cannot be compensated for even by the most rigorous hygiene measures during later processing stages hence, compromising safety of the products (Buchanan & Whiting, 1998;

Untermann, Stephan, Dura, Hofer & Heimann, 1997). To incorporate safety in the production of meat products, the Hazard Analysis Critical Control Point system (HACCP) seems an excellent means. HACCP represents a proactive approach to averting health hazards as it allows for a more comprehensive approach to dealing with all significant hazards of either biological, chemical or physical origin (Bernard, 1998; Jouve, 1998; Peters, 1998; Sperber, 1991; Stier & Blumenthal, 1995; Synder, 1992). South Africa is in the process of legislating the mandatory use of HACCP in the food industry (Ms Verna Carolissen, Assistant Director Department of Health, South Africa, 1999 - Personal communication).

1.1 STATEMENT OF THE PROBLEM

In South Africa over the past and at present “hygienic slaughter” has been and is still being implemented through visual inspection and supervision of skilled operatives by suitably qualified personnel such as meat inspectors and veterinarians. The role of the meat inspectors includes ensuring slaughter of wholesome animals, maintenance of plant sanitation and prevention of carcass contamination (Dr. Gerhard Neetling, Director of Red Meat Abattoir Association, South Africa, 1999 - Personal communication; Nortjé, 1987; Riemann, 1973; Vorster, 1994). This method of meat inspection has had a very important function of reducing food-borne diseases. However, the disease pattern in livestock has changed and some of the most important food-borne diseases eludes the efforts of the meat inspector (Wood *et al.*, 1998). The main problem with these food poisoning organisms is that in most cases animals are symptomless carriers. Hence, assumed “healthy” animals can easily infect other animals (Wood *et al.*, 1998).

Carcass contamination can be via personnel, faecal material, contents of the animal's alimentary tract or by contact with the hide whose cleanliness is impossible to assure (Bell, 1997; Roberts *et al.*, 1984). Contamination of the raw product represents a potential risk due to the expansion of the meat distribution chain with resultant hygiene strain at each level and changes in eating habits, like less severe internal end point cooking temperatures (Kasprowiak & Hechelmann, 1992; Grijspaardt-Vink, 1996).

There is a need therefore to determine the major points in abattoirs at which control can be exerted, to minimise pathogens. The choice of a small meat abattoir is because high

volume beef slaughter establishments tend to control microbiological contamination more effectively than small volume establishments (Hogue, Dreesen, Green, Ragland, James, Bergeron, Cook, Pratt, & Martin, 1993; Jericho, Bradley, Gannon & Kozub, 1993). This project will therefore be a measure of the usefulness of a HACCP system in a small (class C) abattoir and therefore help to determine if there is any potential for use of HACCP in small abattoirs.

EPIDEMIOLOGY OF FOODBORNE ILLNESSES ASSOCIATED WITH RAW BEEF

Food-borne diseases are increasingly being recognized as a major cause of morbidity in both industrialized and developing countries, and also of mortality in the latter. However, the full extent of the social and economic impacts is hard to measure due to underreporting of cases (Sofos, Berk & Smith, 1990; Todd, 1992). Analogously, South Africa is also caught in the same web but the underreporting in this case can be attributed to the current health regulation. The regulation states that notification is required only when five or more cases are reported by one physician or at one medical institution (Department of National Health and Population Development, South Africa, 1993).

Studies done by various authors indicate that the tissue of animal origin are the main vehicles of pathogens in human foods. These animal products mainly meat, fish, poultry, have been implicated in food-borne diseases as the live animals are exposed to a variety of potential sources of microorganisms at the various rearing points (Dean & Griffin, 1990; Sofos et al., 1990). The microorganism sources are diverse and include soil, water, feces, air and other animals (Ayres, 1955). In healthy animals the microorganisms are confined primarily to the gastrointestinal tract and exterior surfaces such as skin, hooves and hair. But during slaughtering and dressing the meat usually becomes contaminated with these microorganisms and the extent of contamination depends to a large degree on the basic good manufacturing practices of the abattoir (Ayres, 1955; Mosley & Derrick, 1970). However, there has been an increased safety concern with meat and meat products as there seem to be an increased occurrence of food-borne diseases with the consumption of these products (Dean & Griffin, 1990; Cross, 1990; Dean, 1991; Roberts et al., 1994; Tompkin, 1997; Wood et al., 1998).