**Chapter-1**

**INTRODUCTION**

Antimicrobials are widely used in commercial meat production in south and south east Asian countries including Bangladesh with the aim of preventive, prophylactive and therapeutic measures. Antimicrobials are also routinely used as feed additives for promoting growth of livestock (Okeman et al., 1998, Tollefson and Miller, 2000, Donoghue, 2003, Gaudin et al., 2004, Bergwett, 2005, Nisha, 2008, Peric et al., 2009). Approximately 80% of all food animals receive medication for part or most of their lives (Lee et al., 2001).Although no such published data are available in context of Bangladesh, it is believed that commercial production of livestock receive antimicrobials belong to beta lactams, tetracyclines, aminoglycosides, penicillins, quinolones, macrolides and sulfonamides, are used to prevent infection and promote more rapid growth of farm stock (Brogden et al., 2003, Hermes, 2003).

The safety of human food is threatened by various agents including pathogenic microorganisms, aflatoxins, pesticides, andantimicrobialagents. Pathogenic microorganisms constitute the most important food related threat to public health (Moat, 1988). Relatively, little is known about food safety in relation to antimicrobial agents, in the developing world. While pasteurization and other forms of heat treatment eliminate pathogenic microorganisms from animal source food, these procedures have limited or variable effects on drug residues in animal source food.

Behavioral practices such as overuse of drugs and lack of understanding about drug usage also contribute to food contamination. The presence of antibiotics in human food is associated with several adverse public health effects including hypersensitivity, tissue damage, gastrointestinal disturbance, and neurological disorders (Lee et al., 2000, Wassenaar, 2005). Additionally, the use of antibiotics in animal husbandry and its occurrence in related food, may lead to selection of resistance in bacterial populations that do not respond to treatment commonly used for human illnesses (Lee et al., 2000).

Reported occurrences of antibiotics in human food vary widely among various countries and are known to be low or non-existent in places where quality assurance programmes are effective (EC, 2005). Such programmes include mainly educational programmes, widespread testing of foods for antibiotic residues, and financial penalties. Implementation of quality assurance programmes to protect public health against adverse effects of antibiotics is a major challenge for developing countries where there is veterinary misuse of such drugs, and sales of animal source food are primarily informal. Antibiotic residues in foods of animal origin may be the cause of numerous health concerns in humans. These problems include toxic effects, transfer of antibiotic resistant bacteria to humans, immunopathological effects, carcinogenicity (e.g., sulphamethazine, oxytetracycline, and furazolidone), mutagenicity, nephropathy (e.g., gentamicin), hepatotoxicity, reproductive disorders, bone marrow toxicity (e.g., chloramphenicol), estrogenic, neurotoxicological effects, teratogenicity, and allergy (e.g., penicillin) (Nisha, 2008).

Antibiotic residues, such as residues of other drugs, can remain in an animal’s body even after the slaughtering if the antibiotic withdrawal period is insufficient. Antibiotic residues in foods can influence the bacterial composition and the metabolic activity of the intestinal micro flora of the consumer as well as the consumers metabolism of endogenous compounds. Tetracycline residues in meat may stain the teeth of young children.

The presence of antibiotic residues in meat, milk and other food products may drive the development of resistant strains of bacteria due to the ingestion of sub therapeutic doses of antibiotics (Dayan, 1993). To ensure the human food safety, the World Health Organization (WHO) and the Food and Agriculture Organization (FAO) have set standards for acceptable daily intake (ADI) and maximum residue limits (MRLs) in foods. Additionally, the European Union (EU), the United States of America (USA), Canada and some other countries have set their own MRLs. The acceptable MRLs for tetracycline residues (individually or in combination), as recommended by the Joint FAO/WHO Expert Committee on Food Additives, are 200, 600 and 1200 ng/g for muscles, liver and kidney, respectively (WHO, 1999).

To detect antibiotic residues, different kinds of methods were developed. These consist of screening methods and chromatographic techniques to detect as many antibiotics as possible. The screening method is generally performed by microbiological, enzymatic and immunological methods. The screening methods are based on the various susceptibility of bacteria to different antibiotics. The antibiotic residue detection assays that are currently available use different methods and test microorganisms (Mitchell et al., 2002). Microbiological assays for the detection of antibiotic residues utilize bacteria such as Bacillus stearothermophilus because of its high sensitivity to the majority of antibiotics. Both microbiological and chromatographic methods have been described for monitoring tetracyclines, chloramphenicol, and penicillins in milk and animal tissues. Although the microbiological assay techniques have been recommended as official and conventional methods because of their simplicity, the bioassay methods lack specificity and provide only semi-quantitative measurements of residues detected and sometimes produce false positives, they are also time consuming. Therefore, chromatographic techniques, such as thin layer chromatography (TLC), and high performance liquid chromatography (HPLC), and capillary electrophoresis (CE), have been developed to replace microbiological assays also because they are quantitative, accurate and give reliable measurements of antibiotic residues in animal tissues or muscles. Among all those methods TLC is the best approved worldwide method for detection and quantification of antibiotic residue.

In our countries 25% peoples are directly engaged in livestock sector and 50% peoples are partly associated in livestock production. Last year, the contribution of livestock sub-sector to the GDP was 2.9%, which was estimated about 17.3% GDP to agriculture. Last year, the growth of livestock in GDP was 7.2%. In 2006-07 the population of Livestock and Poultry raised to 4 crore 75 lac and 24 crore 60 lac respectively (DLS, 2011).

Bangladesh possesses 20.75 million goats at present (DLS, 2007). Daily needs for protein is 280 gm/day. Cheavon play a pivotal role in bridging the protein gap of animal origin in most countries of the world. Due to indiscriminate use and unawareness of the withdrawal periods of drugs, the treated goats are known to possess their residues in meat. Such meat is undoubtedly unfit for human consumption and poses serious threats to consumers’ health. For this regard this research was undertaken to detect the antimicrobial residues from marketed raw meat (Cheavon) at Chittagong metropolitan area with the following objectives:

**Specific Objectives:**

1. Detection of commonly used antibiotic (Tetracycline, Amoxicillin, Ciprofloxacin and Sulfanilamide and Penicillin) residues in goat meat by Thin Layer Chromatography (TLC).
2. To detect the residue level of antimicrobial in different state of tissues.

**JUSTIFICATION:**

Antibiotic residues are considered public health hazards (Kabir et al., 2004). Levels of the drug and their metabolites may persist at unacceptable levels and consumers can be exposed to them. The presence of residues may result from failure to observe the mandatory withdrawal periods, illegal or extra-label use of drugs and incorrect dosage levels. Unauthorized antibiotic use may result in residues of these substances in beef and mutton.