Country Report Myanmar

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Introduction
Livestock production in Myanmar was gradually developed since 1991. Estimation of cattle, pig and poultry population was 14.02, 10.30 and 172.61 million, respectively, in the year 2011-2012 (LBVD Reports 2012). Antimicrobials have been widely used in livestock production for a quite long time and are a necessary tool for appropriate care of food animals in Myanmar. In food-producing animals, the main purposes of antimicrobial uses include treatment of diseases, prevention of infections and promotion of growth. While most antimicrobial agents are generally mixed into feed or water, some are also administered to individual animals. It has been well known that imprudent and overuse of antimicrobial substances is responsible for widespread of multiple drug resistance among bacteria of animal origins.

Legal framework
Although Food and Drug Authority (FDA) has been founded in Myanmar, it is still to be established a legal framework and institutional arrangements for regulating antimicrobial use in livestock production and instruments for enforcement. Up to date, therefore, antimicrobials have been broadly used in livestock production by consulting veterinarians and according to the experience of livestock farmers.

Antimicrobial use in livestock production
Most of antimicrobials used in livestock production are imported from Asian and European countries. The major classes of antimicrobials, used in livestock production in Myanmar are Beta-Lactams, Tetracycline, Fluoroquinolone, Aminoglycoside, Macrolides and Sulphonamides. Major sources of the antimicrobials are China, Thailand (Neo, Otta), Korea (Choong Ang Biotech, Samyang Anipharm), India (Cipla, Agio Pharmaceuticals), Bangladesh, Spain (Invesa, Dex Iberica), Belgium (VMD), and Germany (Bremer Pharma, Bayer).

The major antibiotics, used in poultry production, are oxytetracycline, doxycycline, chlorotetracycline, enrofloxacin, amoxicillin, colistin, erythromycin, sulphadiazine, trimethoprim and neomycin. While enrofloxacin is particularly used for prevention and treatment of bacterial diseases of the respiratory tract, amoxicillin and colistin are mainly used for prevention and treatment of bacterial diseases of gastro intestinal tract. Most of antimicrobials are given in drinking water. Anybody can buy antimicrobials freely in Myanmar. Therefore, the major existing problem, leading to inappropriate use of
antimicrobials, is that most of poultry farmers use antimicrobials without any consultation from veterinarians. Most of poultry producers use antimicrobials as preventive measures for bacterial diseases. Nobody consider withdrawal period of antibiotics, which they used in their food animals. Therefore, antibiotics residues are frequently encountered in the poultry meat and eggs. Chlortetracycline is still used as feed additive for growth promoter by some poultry feed producers.

The pattern of antimicrobials use in cattle and pig production are quite similar. In cattle and pig production, penicillin, streptomycin, lincomycin, enrofloxacin, gentamycin and kanamycin are major antibiotics used for parenteral administration. Some in feed antibiotics are still used as growth promoter in fattening pig production.

**Studies of AMR, drug residues and microbial contamination**

Since there is only one University of Veterinary Science in Myanmar, most of the research such as monitoring of antimicrobial use in livestock, antimicrobial residues in livestock products and surveillance for antimicrobial resistance (AMR) in animal pathogens were mainly conducted by the University of Veterinary Science, Yezin, Myanmar. Since poultry meat is consumed by the majority of the people irrespective of race and religious in Myanmar, most of the studies were conducted with poultry and poultry products.

Different species of Salmonella were isolated from poultry meat from retail poultry meat market. Among 36 *Salmonella* suspected isolates from different specimens of poultry, six isolates were identified as *Salmonella* by biochemical tests and serotype was confirmed by agglutination test with the specific antisera. The isolated *Salmonella* serovars were *Salmonella pullorum* (1), *Salmonella enteritidis* (2), *Salmonella senftenberg* (1), *Salmonella newport* (1) and one unknown serotype. Then the isolated *Salmonella* serovars were tested for susceptibility to five antimicrobial agents; Chloramphenicol (30 mcg), Neomycin (30 mcg), Norfloxacin (10 mcg), Tetracycline (30 mcg) and Streptomycin (10 mcg). All of the tested *Salmonella* serovars were most susceptible to Chloramphenicol (100%) and resistant to Tetracycline (100%). The degree of resistance to antibiotics varied with the tested *Salmonella* serovars (Su Su Khin, 2005). Another study also investigated antibiotic resistance to 6 antimicrobials with *Salmonella* isolates from chicken meat. Resistance percentage of *Salmonella* isolates were 79.5, 82.1, 87.2, 74.4, 33.3 and 100 to ampicillin (10 µg), chloramphenicol (30 µg), ciprofloxacin (5 µg), cotrimoxazole (25 µg), gentamycin (10 µg) and tetracycline (30 µg), respectively. Among the six antimicrobial drugs, tetracycline was found highly resistance by *Salmonella* species. Gentamycin showed the lowest resistance by *Salmonella* isolates from chicken meat (May Thet Hnin Oo, 2009).

According to the study with isolation of *Escherichia coli* from poultry meat, the isolated *E. coli* were resistant to chloramphenicol (30µg), ciprofloxacin (5µg), neomycin (30µg) and tetracycline (30µg). In this study, *E. coli* isolates were found to be the most susceptible to gentamycin and resistant to chloramphenicol. The degree of resistance to antibiotics varied with the tested *E. coli* serovars (Khin Nge Aung, 2005). Thirteen strains of *Escherichia coli* were isolated from the broilers with typical post-mortem lesions of colibacillosis from the commercial broiler farms in Mandalay region. Serological typing by rapid slide agglutination test indicates 4 serotypes namely O44:K74, O26:K60, O124:K72, and O55:K59. Antibiotic
resistance pattern of 13 isolates showed the highest resistance frequencies with ampicillin, chloramphenicol, oxytetracycline, and neomycin (69.23 to 61.53\%). Moderate resistance frequencies to antibiotics was observed with ciprofloxacin (46.15\%). Gentamycin showed the lowest resistance frequencies (7.6\%) (Khine Thwe Latt, 2005).

Since antibiotic residues in food animals always threaten to consumers’ food safety, Fluoroquinolone residues in chicken muscle were screened using microbial inhibition test. According to the survey data, 6.67\% of poultry meats from retail market were positive for antibiotic residue (Khin Thida San, 2005). In the other study, the presence of antibiotic residues in chicken muscle, liver and kidney purchased from three retail markets from central Myanmar were also investigated by using microbial inhibition test, Swab Test on Animal Food. Antibiotic residues positive samples were observed as 6/72 (8.3\%), 7/72 (9.7\%) and 0/72 (0\%) in liver, kidney and muscle samples, respectively, from all locations (Ohnmar Hnin, 2009).

The common pathogens of clinical and subclinical mastitis cases in crossbred and local cows were also investigated in the Mandalay region. The major isolates were *Staphylococcus aureus* (25\%), *Staphylococcus epidermidis* (2.5\%), *Streptococcus* spp (22.5\%), *Aerococcus* spp (32.5\%), *Corynebacterium* spp (7.5\%), and *Bacillus* spp (10\%). The frequency of isolations of genus *Staphylococcus*, *Streptococcus* and *Aerococcus* is significantly higher (*P<0.05*) than *Corynebacterium* and *Bacillus*. There is no significant difference among genus *Staphylococcus*, *Streptococcus* and *Aerococcus*. Sensitivity to the most commonly use antibiotics were also tested in this study. Among 6 different antibiotics, Norfloxacin and Streptomycin have a significantly wider range of spectrum (*P<0.05*) than Penicillin G, Oxytetracycline, Chloramphenicol, and Cephalexin base on the efficiency of antibiotic sensitivity to 13 different bacteria species (Aye San May, 2008).

Isolation of *E. coli* from fresh beef samples of retail market was carried out in the central parts of Myanmar. *E. coli* were isolated from 93.33\% of fresh beef samples. Serotyping of E.
coli by rapid slide agglutination test revealed that 37 out of 120 isolates (30.83%) were *E. coli* O157. Resistance to three commonly use antimicrobials were tested with isolated *E. coli* O157. Resistance of *E. coli* O157 isolates to ciprofloxacin (5 µg), gentamycin (10 µg), and trimethoprim-sulfamethoxazole (25 µg), were 25%, 87.5% and 12.5%, respectively (Yin Yin Kyawt, 2008).

Antibiotic resistance of *E. coli* isolated from rectal swab samples of piglets was also investigated in Nay Pyi Taw region, administrative city of Myanmar. *E.coli* isolates resistant to Ampicillin and Oxytetracycline was 100% constantly throughout the experimental period, while *E.coli* isolates resistant to Chloramphenicol, Ciprofloxacin, Gentamycin and Sulfamethoxazole/ Trimethoprim were 75%, 75%, 83.3% and 91.6%, respectively (Min Maung Cho, 2008).

**Conclusions**

For many decades, antibiotic resistance has been recognized as a global health problem. It has now been escalated by major world health organizations to one of the top health challenges facing the 21st century. The use of antimicrobials in livestock production is thought to significantly contribute to this phenomenon, but little is known about the true causes of antimicrobial resistance. Some of its causes are widely accepted, for example, the overuse and inappropriate use of antibiotics for nonbacterial infections and inadequate antibiotic stewardship in the clinical arena. The lack of relevant scientific data means that risk managers must take precautionary measures, even though the underlying causes of public health risks associated with resistant bacteria may not have been adequately identified. However, it has been widely accepted that resistant bacteria in animals are one source of antimicrobial resistance (AMR) for people.

**References**


