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## Country Reports

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### Australia

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This country overview paper reports on the incidence of zoonoses, food borne diseases and antimicrobial resistance in Australia.

#### **Zoonoses<sup>2</sup>**

The zoonoses notifiable to the National Notifiable Disease Surveillance System (NDSS) included in this report are anthrax, Australian bat lyssavirus infection, brucellosis, leptospirosis, ornithosis and Q fever.

#### **Anthrax**

Most cases of anthrax in livestock tend to occur in a belt within two states in Australia: namely New South Wales and Victoria. Since 2010, there have been seven anthrax incidents in livestock in New South Wales and none in Victoria. In all instances, properties were subject to the recommended protocol of quarantine, disposal of carcasses, and vaccination and tracing of at-risk animals and their products.

Over the previous 10 years, only two human cases of anthrax were reported in Australia—one in 2006 and one in 2007. Both cases were cutaneous anthrax. Australia has never recorded a human case of gastrointestinal or inhalational anthrax.

#### **Australian bat lyssavirus**

Classical rabies virus does not occur in Australia, although a related virus called Australian bat lyssavirus was identified in 1996 and is present in some Australian bats and flying foxes. Only three known cases of ABL infection in humans have been reported in Australia, in 1996, 1998 and 2013. All cases are presumed to have occurred after close contact with an infected bat and all have been fatal. Surveillance indicates that ABLV may have been present in Australian bats for a considerable period of time before its first detection. Sick and injured bats and changes in bat ecology pose an increased public health risk. Public awareness message about not handling bats are an important component of the overall risk management strategy for this zoonoses in Australia. In 2013, two horses were confirmed to be infected with ABLV. This is the first detection of ABLV in a species other than bats.

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<sup>2</sup> This section of the report is based on data and information published in recent editions of the Animal Health in Australia Reports (<http://preview.tinyurl.com/k4mvspm>) and on data and information in the *Communicable Diseases Intelligence* Volume 36 No 1 - March 2012 which is produced by the Australian Government Department of Health and Ageing. (<http://preview.tinyurl.com/ny9vq7n>)

### **Brucellosis**

Several *Brucella* species can infect both animals and humans including *Brucella melitensis* from sheep and goats, *Brucella abortus* from cattle and *Brucella suis* from pigs. *B. abortus* was eradicated from Australian cattle herds in 1989 and *B. melitensis* has never been reported in Australian sheep or goats. All human cases of *B. abortus* or *B. melitensis* in Australia have been related to overseas travel. Evidence suggests that *B. suis* is primarily confined to some areas of Queensland, where it occurs in feral pigs.

Internationally, brucellosis is mainly an occupational disease of farm workers, abattoir workers and veterinarians, who work with infected animals or their tissues. Feral pig hunting is the most common risk factor for infection. In Australia, 83% of cases since 1991 have been reported from Queensland.

In 2010, there were 21 notified cases of brucellosis reported to the NNDSS; a 49% decline in notifications compared with the 5-year average of 41 cases. Seventy-six per cent of notifications were from Queensland (n = 16). Most cases were in males (81%, n = 17) aged between 15 and 49 years (85%, n = 18). The species of the infecting organism was available for 38% of notifications (n = 8), of which seven were *B. suis* (all from Queensland, and all in males aged between 27 and 43 years). There was one imported case of *B. melitensis*, which was acquired in Iraq.

### **Leptospirosis**

Leptospirosis is caused by spirochaetes of the genus, *Leptospira*, which is found in the genital tract and renal tubules of domestic and wild animals. Exposure to infected urine of domestic and wild animals in affected areas is a risk factor for infection. The disease is recognized as an occupational and recreational hazard (such as certain agricultural sectors and wading or swimming in contaminated water).

In 2010, there were 131 notified cases of leptospirosis reported in Australia; giving a rate of 0.6 per 100 000 population compared with the 5-year mean of 128.0 notifications. Cases were reported in all states and territories, but Queensland accounted for most notifications. Eighty-seven per cent (n = 127) of leptospirosis cases were male and 82% (n = 120) of all cases were aged between 15 and 54 years.

The WHO/FAO/OIE Collaborating Centre for Reference and Research on Leptospirosis provides an annual surveillance report of leptospirosis cases that are sent for typing. In 2010, the reference centre typed 94 cases of leptospirosis. The most frequently identified serovars were Arborea (21% n = 20), Australis (16%, n = 15), Zanolis (15%, n = 14), and Hardjo (15%, n = 14). In 2009, Serovar Arborea was the most frequently reported serovar, accounting for 29% of all notifications. The last reported death in Australia attributed to leptospirosis was in 2002.

### **Ornithosis**

Ornithosis (or psittacosis) is caused by infection with the bacterium *Chlamydophila psittaci* and is transmitted to humans by exposure to waterfowl, shore birds, seabirds, pigeons and doves and many species of parrot. Birds can become carriers of the disease without showing clinical signs. The mode of transmission to humans is by inhaling

bacteria, usually from contaminated dried faeces, dust from infected birds and nasal or eye secretions. Person-to-person transmission is rare.

In 2010, there were 56 notified cases of ornithosis reported; giving a rate of 0.3 per 100,000 population. The number of ornithosis notifications has declined steadily in recent years, and case numbers in 2010 were the lowest since 2001.

Notifications were from all states and territories except the Northern Territory, but the majority of notifications were from Victoria (64%, n = 36). This represents a change from the previous 5 years, where the majority of cases were from New South Wales (53%, 312/589). Sixty-six per cent of cases in 2010 were male (39 cases). All cases were aged 20 years or older and 83% were aged 40 years or older. Cases of ornithosis over the previous 5 years were mainly in adults, with a median age of 54 years.

Individuals at risk of contracting ornithosis include bird owners, veterinarians, poultry-processing workers, pet shop employees, zoo workers and taxidermists. Pregnant women and older adults may experience a more severe illness.

### **Q fever**

Q fever is caused by infection with the bacterium, *Coxiella burnetii*. The primary reservoirs of these bacteria are sheep, goats and cattle. *C. burnetii* is resistant to environmental conditions and many common disinfectants. The organism is carried in dust contaminated with tissue, birth fluids or excreta from infected animals and Q fever is most commonly transmitted via the airborne route. The disease may also be transmitted via direct contact with infected animals and other contaminated material.. Very few organisms may be required to cause infection and human are therefore very susceptible to the disease. Person-to-person transmission is rare. Prior to vaccination programs in Australia, approximately half of all cases in New South Wales, Queensland and Victoria were amongst abattoir workers. The National Q Fever Management Program was funded by the Australian Government between 2001 and 2006 for states and territories to provide free vaccine to at risk groups (such as abattoir workers). The Australian Government has secured the supply of vaccine through to 2016.

In 2010, there were 323 notified cases of Q fever reported to the NNDSS; a rate of 1.4 per 100 000 population. Between 1991 and 2001, and prior to the introduction of the National Q Fever Management Program, Q fever notification rates ranged between 2.5 and 4.9 per 100 000 population.

In 2010, the highest notification rates were from Queensland (151; 3.3 per 100 000 population) and New South Wales (136; 1.9 per 100 000 population). Cases also occurred in Victoria (n = 16), South Australia (10 cases) and Western Australia (n = 8). There was 1 case each in the Australian Capital Territory and the Northern Territory.

Adults at risk of Q fever infection, including abattoir workers, farmers, veterinarians, stockyard workers, shearers and animal transporters should be considered for vaccination. The administration of the vaccine requires pre-vaccination screening test to exclude those recipients with a previous (unrecognized) exposure to the organism. Q fever vaccine may cause an adverse reaction in a person who has already been

exposed to the bacterium. Vaccine is not recommended for children under 15 years of age.

### **Food-borne Disease<sup>3</sup>**

#### ***Campylobacter species***

Campylobacter infection is notifiable in all Australian states and territories except in New South Wales. In 2012 Campylobacter was the most frequently notified foodborne infection in Australia, with a rate of 102.3 cases per 100 000 population (15 664 cases). This was a decrease from the previous 5 year mean of 112.8 cases per 100 000 population (ranging from 107.4–119.9 cases per 100 000 population per year).

The incidence of Campylobacter infections is known to be associated with seasonal changes in many countries. Campylobacter infection is most prevalent during spring in Australia. *C. jejuni* is one of the most commonly reported agents associated with foodborne illness in many developed countries, including New Zealand, the United Kingdom (UK) and the USA. Foods associated with Campylobacter spp. outbreaks include poultry meat, raw (unpasteurized) milk and milk products, beef, pork and shellfish. Outbreaks of campylobacteriosis linked to consumption of raw milk have been increasingly reported in the USA. Campylobacter infections generally occur sporadically, rather than being associated with outbreaks.

Poultry meat is generally as a primary source of Campylobacter infection in humans. The reported incidence of Campylobacter spp. on raw meat products from other food animal species tends to be lower than those reported for poultry. Chicken and cattle were the principal sources of *C. jejuni* pathogenic to humans, with wild animal and environmental sources responsible for the remaining 3% of human disease.

In an Australian baseline survey carried out during 2007–2008 on the incidence and concentration of Campylobacter and Salmonella in raw chicken, 84.3% of post-processing carcass rinse samples (n=1,104) were positive for Campylobacter spp. These results were similar to those from a retail baseline microbiological survey carried out in 2005–2006 in South Australia and New South Wales, which found that 90.0% of retail poultry samples (n=859) were contaminated with Campylobacter spp.

#### ***Hepatitis A virus***

In 2010, 55.1% of Hepatitis A virus (HAV) cases reported in Australia were acquired overseas.

HAV has a worldwide distribution; however, the prevalence of infection is related to the quality of the water supply, level of sanitation and the age of the individual when infected. In most developing countries, where HAV infection is endemic, the majority of people are infected in early childhood and virtually all adults are immune. In developed countries, HAV infections are less common due to improved sanitation. As a result very few people are infected in early childhood and the majority of adults remain susceptible

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<sup>3</sup> This section of the report draws directly on information and text from the Food Standards Australia New Zealand (FSANZ) 'Agents of Foodborne Illness'. 2nd ed, published in June 2013. (<http://preview.tinyurl.com/konlvyyw>)

to infection. Hence in developed countries the risk of epidemics and the occurrence of severe disease may increase as the majority of people infected during an outbreak would be adults (children are often asymptomatic).

Hepatitis A is a notifiable disease in all Australian states and territories. The incidence of HAV infection notified in Australia in 2012 was 0.7 cases per 100 000 population (164 cases). This was a decrease from the previous 5 year mean of 1.3 cases per 100 000 population per year (ranging from 0.6–2.6 cases per 100 000 population per year). In north Queensland in 1996–1999 the average annual HAV notification rates in Indigenous and non-Indigenous people were 110 and 25 cases per 100 000 population, respectively. In 1999 a HAV vaccination program for Indigenous children in north Queensland was introduced. Consequently, in 2000–2003 the average annual HAV notification rates for Indigenous and non-Indigenous people were 4 and 2.5 cases per 100 000 population, respectively. HAV is now included as part of the National Immunisation Program Schedule for Aboriginal and Torres Strait Islander children younger than 5 years of age living in Queensland, the Northern Territory, Western Australia and South Australia. HAV vaccination is also recommended for travellers to endemic areas and those at increased risk because of lifestyle or occupation.

Foodborne outbreaks of HAV have been recognized for over 40 years, but are infrequently reported. This is because the 2–6 week incubation period for HAV makes it more difficult to associate the source of infection with a particular food.

Cold cuts and sandwiches, fruits and fruit juices, milk and milk products, vegetables, salads, shellfish and iced drinks have been implicated in HAV outbreaks.

### ***Listeria monocytogenes***

*Listeria monocytogenes* is a bacterium that causes listeriosis, a disease that can have severe consequences for particular groups of the population. It can cause miscarriages in pregnant women and be fatal in immunocompromised individuals and the elderly. In healthy people, listeriosis generally only causes a mild form of illness. *L. monocytogenes* can be found throughout the environment. It has been isolated from domestic and wild animals, birds, soil, vegetation, fodder, water and from floors, drains and wet areas of food processing factories.

Listeriosis is a notifiable disease in all Australian states and territories. The incidence of listeriosis notified in Australia in 2012 was 0.4 cases per 100 000 population (93 cases). This is a slight increase from the previous 5 year mean of 0.3 cases per 100 000 population per year (ranging from 0.2–0.4 cases per 100 000 population per year). In Australia the fatality rate in 2010 was 21%, which was an increase from the 14% fatality rate of the previous year.

Invasive *L. monocytogenes* infections can be life threatening, with average fatality rates being 20–30% among hospitalized patients. Most cases of listeriosis are sporadic. Despite this, foodborne outbreaks due to *L. monocytogenes* have been associated with cheese, raw (unpasteurized) milk, deli meats, salad, fish and smoked fish, ice cream and hotdogs.

### ***Salmonella (non-typhoidal)***

*Salmonella* spp. are bacteria that cause salmonellosis, a common form of foodborne illness in humans. Outcomes from exposure to *Salmonella* spp. can range from mild symptoms to severe disease and can be fatal. *Salmonella* spp. are carried by a range of domestic and wild animals and birds and have been widely isolated from the environment.

Salmonellosis is one of the most commonly reported enteric illnesses worldwide, being the second most frequently reported cause of enteric illness in Australia (behind campylobacteriosis). It is a notifiable disease in all Australian states and territories, with a notification rate in 2012 of 49.8 cases per 100 000 population (11 273 cases). This was an increase on the previous 5 year mean of 46.9 cases per 100 000 population per year (ranging from 38.6–54.2 cases per 100 000 population per year). The salmonellosis notification rate varied between jurisdictions from 40.5 cases per 100 000 population in New South Wales to 180.1 cases per 100 000 population in the Northern Territory in 2012 (NNDSS 2013). Children between 0–4 years had the highest notification rate, with 218.3 and 160.2 notifications per 100 000 population for males and females, respectively, in 2010.

The distribution of *Salmonella* serovars in Australia varies geographically, however *S. typhimurium* was the most commonly reported serovar in 2010, representing 44% of all notified *Salmonella* infections in Australia.

Internationally, *S. enteritidis* is frequently reported as causing human illness; however it is not endemic in Australia. In 2010, 93% of *S. enteritidis* cases reported in Australia were acquired overseas.

Outbreaks attributed to *Salmonella* spp. have predominantly been associated with animal products such as eggs, poultry, raw meat, milk and dairy products, but also include fresh produce, salad dressing, fruit juice, peanut butter and chocolate.

### ***Shiga toxin-producing Escherichia coli (STEC)***

*Escherichia coli* are bacteria that form part of the normal gut flora of humans and other warm-blooded animals. Although most *E. coli* are considered harmless, certain strains can cause severe illness in humans, particularly Shiga toxin-producing *E. coli* (STEC). Infection with STEC is the main cause of haemolytic uraemic syndrome, a condition which can be fatal in humans.

Infection with STEC is a notifiable disease in all Australian states and territories. The incidence of STEC infections notified in Australia in 2012 was 0.5 cases per 100 000 population (112 cases), which includes both foodborne and non-foodborne cases. This is the same as the previous 5 year mean of 0.5 cases per 100 000 population per year (ranging from 0.4–0.6 cases per 100 000 population per year). *E. coli* O157 was the most common STEC identified in Australia in 2010 (58.8% of cases), the next most common was *E. coli* O111. There was 1 case of STEC-associated HUS reported in Australia in 2010.

The incidence of STEC infections has a seasonal association, with the number of cases increasing during the warmer months. In Australia STEC is most prevalent from

November to April. Foods associated with outbreaks of STEC include undercooked ground beef, fresh produce, unpasteurized juices, salami, cheese and raw (unpasteurized) milk.

Recently, there was a large outbreak of enterohemorrhagic Shiga toxin-producing *E. coli* (EHEC) in Brisbane, Queensland. As of the 19 September 2013, 40 people were confirmed to have EHEC (specifically *E. coli* O157). Five people had been hospitalized and discharged. The outbreak was associated with visits to a large animal nursery (referred to by some as a petting zoo). The outbreak has been reported on ProMED (<http://www.promedmail.org/>).

### ***Shigella species***

*Shigella* spp. are bacteria that cause shigellosis, also known as bacillary dysentery. They are a highly infectious organism, with foodborne outbreaks often involving infected food handlers. Unlike other common foodborne pathogens, humans are the only natural hosts of *Shigella* spp.

Shigellosis is a notifiable disease in all Australian states and territories. The incidence of shigellosis in Australia in 2012 was 2.4 cases per 100 000 population (549 cases), which includes both foodborne and non-foodborne cases. This was a decrease from the previous 5 year mean of 2.8 cases per 100 000 population per year (ranging from 2.2–3.9 cases per 100 000 population per year). The Northern Territory had the highest notification rate in 2012 with 46.9 cases per 100 000 population. This was a significant reduction from the 2005–2009 average annual notification rate of 70.1 cases per 100 000 population. The decline in cases may be attributed to a marketing campaign to raise awareness about the importance of hand washing implemented in 2007/2008 targeting both Indigenous and non-Indigenous people, including remote communities. Children between 0–4 years had the highest notification rate in 2010, with 7.5 and 8.3 notifications per 100 000 population for males and females, respectively. The higher rate of notified cases in this age group could be due to increased susceptibility or may be the result of other factors such as reduced personal hygiene practices, an increased likelihood of exposure and increased likelihood to seek medical care.

Foods generally associated with outbreaks of *Shigella* spp. are those that are consumed raw or ready-to-eat foods that have substantial handling during production, such as salads.

### ***Staphylococcus aureus***

*Staphylococcus aureus* is a bacterium that causes staphylococcal food poisoning, a form of gastroenteritis with rapid onset of symptoms. *S. aureus* is commonly found in the environment (soil, water and air) and is also found in the nose and on the skin of humans.

Staphylococcal food poisoning is not a notifiable disease in Australia. There were two reported outbreaks of staphylococcal food poisoning in Australia in 2011 and two outbreaks reported in 2010. It is generally recognized that there may be significant under reporting of staphylococcal food poisoning due to the short duration of illness



and self-limiting symptoms. In Australia it is estimated that *S. aureus* accounts for 1% of foodborne illness caused by known pathogens.

The incidence of staphylococcal food poisoning is seasonal. Most cases occur in the late summer when temperatures are warm and food is stored improperly. Foods associated with outbreaks of staphylococcal food poisoning include meat and meat products, poultry and egg products, milk and dairy products, salads, cream-filled bakery products and sandwich fillings. Foods that require extensive handling during preparation and are kept above refrigeration temperature (4°C) for extended periods after preparation are often involved in staphylococcal food poisoning. Foods high in starch and protein are believed to favour staphylococcal enterotoxin production.

### ***Bacillus cereus***

*B. cereus* related food poisoning is not a notifiable disease in Australia and therefore incidence data is extremely limited. *B. cereus* illness is generally mild, short duration and with self-limiting symptoms, and so it is likely that there is significant underreporting of cases. In Australia there was one reported outbreak of *B. cereus* foodborne illness in 2011 and one outbreak reported in 2010. It has been estimated that *B. cereus* accounts for 0.5% of foodborne illness caused by known pathogens in Australia.

### ***Toxoplasma gondii***

*Toxoplasma gondii* is a protozoan parasite that causes the disease toxoplasmosis. It is a very common parasitic infection in humans and other warm-blooded animals, with approximately a third of the world's human population estimated to have been exposed to the parasite. Toxoplasmosis can be asymptomatic (no clinical symptoms).

Or can have more severe consequences such as congenital birth defects, eye disease, or potentially fatal toxoplasmic encephalitis in immunocompromised individuals.

Toxoplasmosis is one of the most common parasitic zoonoses worldwide. It is estimated that around a third of the world's population have the parasite, with the majority of cases being asymptomatic. Despite a large proportion of the population being seropositive for *T. gondii*, scientific literature indicates that the seroprevalence is decreasing in several countries including France, Belgium, the United Kingdom and the USA. The incidence and prevalence of toxoplasmosis in Australia is difficult to estimate since toxoplasmosis is not a notifiable disease and most *T. gondii* infections are asymptomatic. Reliable estimates of incidence tend to come from high risk groups such as newborn infants. However, not all new cases can be attributed to foodborne exposure during pregnancy since environmental, water and cat exposure also result in transmission to the mother. Similarly, incidence of toxoplasmosis during pregnancy is not necessarily representative of the wider population. In a small study from south eastern Australia, incidence of congenital toxoplasmosis from 2001–2009 was estimated at 0.17 cases per 10 000 live births. International estimates of incidence or prevalence at birth tend to be higher than Australia, but caution should be exercised in drawing conclusions since many European countries have prenatal screening programs.



A study of birth prevalence in non-immune mothers in Western Australia found 2.3 cases per 10 000 live births. It is widely accepted that outbreaks of toxoplasmosis involving more than a single family or small group are rare and infrequently reported. Globally, water and undercooked meat have been associated in *T. gondii* outbreaks.

### **Antimicrobial Resistance (AMR)<sup>4</sup>**

In Australia, human AMR infection is most common among returning travellers and people who have been in hospital. However, people from community settings, including farmers, also present with AMR infections and the relative contributions of AMR acquired from community settings, food animals and companion animals is not known.

AMR is a bidirectional zoonosis. It also has multidirectional links to other environmental compartments, including aquaculture, food plants and drinking water. The ease with which AMR genetic material can be transferred between organisms means we are 'all swimming in the same gene pool' and all sources of AMR organisms need to be taken seriously.

#### ***The evidence***

The science of antibiotic selection of AMR organisms, amplification, spread and transfer of genes between organisms is well understood in humans. The same principles apply for antibiotic use in animals. This is supported by case studies published overseas and reported anecdotally in Australia.

There is considerable uncertainty in Australia and elsewhere about what and where the 'hot spots' are for AMR selection, amplification and dissemination. Collection of data is critical to fill this information gap, prioritise risks, target resources, inform policy and focus communications.

#### ***The knowledge gaps and data collection requirements***

To assess the risks arising from antibiotic use in animals, data is needed on:

- antibiotics — animal species treated, quantity, type (class/mechanism of action), why used and route of administration
- AMR bacteria — species, number, type, location and potential for spread
- AMR resistance genes — properties of gene construct, ability and opportunity to transfer genetic material to other organisms.

To meet these requirements Australia needs reliable baseline and ongoing data on:

- antibiotic use in animals (prescriptions, sales), and pattern of usage (what, where, why, when, how)
- where and how many AMR bacteria there are in food animal and companion animal populations, food products and farm environments.

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<sup>4</sup> This section draws directly on text from 'A report of the Australian One Health Antimicrobial Resistance Colloquium' due for release later this year

Australia also needs information on:

- imported AMR bacteria (such as in food, returning travellers, immigrants)
- non-animal sources of AMR (plant foods, wastewater, etc).

Australia needs targeted research to further understand AMR gene transfer, including the potential for genes to be transferred to and from microorganisms of companion animal; and development of new diagnostic tools for AMR bacteria and genes in different laboratory settings and at the point of care.

The data requirements summarized above can be addressed by a broadly based, systematic surveillance program to complement the proposed improved surveillance and monitoring of human use. Ideally, such a program should cover all parts of the food chain: live animals, animal products, other agricultural and environmental products involving live animals. Interpretation would be aided by development of a universal measure for antibiotic use in animals (equivalent to a defined daily dose in humans).

To succeed, surveillance and monitoring for AMR need to have:

- clear purpose agreed upon by all parties (based on the One Health program as an ‘umbrella’)
- clear ownership of data (including the role of regulation to allow access to data)
- meaningful data sets
- robust industry partnership and engagement
- appropriate analysis and interpretation
- timely collection and analysis of data
- cost-effective and sustainable methods
- flexible, agile programs that can adapt to emerging issues
- sustained and reliable funding.

### ***The key priorities for action***

The One Health approach to action provides an opportunity to find common ground across sectors and develop a unified management plan guided by ‘5Rs’ (reduce use, refine use, replace antibiotics, regulate, research alternatives) and underpinned by risk assessment and outcome effectiveness measures.

It is vital to harmonise control of use regulation of veterinary medicines across Australian states and territories and develop systems to identify and react to emerging threats, including triggers for review and powers that regulators have to investigate and take corrective action. Critical points for further regulation include: registration, prescription and use of antibiotics (through regulatory agencies, professional boards and state and territory health departments); import of food and medical products such as vaccines (through review and modification of current arrangements to better meet AMR needs); and guidelines for infection control and prudent antibiotic use.

Regulation needs to be supported by targeted education programs, which can also drive action by linking professional development with specific outcomes (e.g. linking prudent-use guidelines with auditing of prescribing and accreditation). Robust, sustainable

research programs are needed across the AMR development and dissemination chain, vaccines, antibiotic alternatives and more rapid and reliable diagnostic methods.

### ***The One Health approach to communication***

AMR affects the whole community and audiences include practitioners and professionals, food producers, pharmaceutical and food industries, government, researchers and educators, media and the public. One Health provides a golden opportunity for community and interdisciplinary dialogue to create communications with a consistent approach across all sectors (doctors, vets, farmers, industry, community).

Messages need to stress judicious use of antibiotics, infection prevention, containment and control in animal and human sectors as well as emphasizing the benefits of vaccines and improved diagnostic methods.

### ***In-country actions to address AMR***

The Australian Antimicrobial Resistance Prevention and Containment (AMRPC) Steering Group was established in February 2013 to provide high-level governance and leadership on antimicrobial resistance (AMR). The steering group is jointly chaired by the Secretaries of the Department of Health and Ageing (DoHA) and the Department of Agriculture, Fisheries and Forestry (DAFF). The Australian Chief Medical Officer and Chief Veterinary Officer are also members. The group will also oversee the development of a comprehensive National AMR Prevention and Containment Strategy for Australia.

AMR extends across both animal and human health and Australia's response must take a whole-of-system perspective and be joint, coordinated and workable across governments, industries, educators, health and veterinary professionals, and the community. The Australian Government recognises that responding effectively to the challenges of AMR will involve a combination of regulation, monitoring and surveillance, targeted activity on specific organisms, research and education. To this end, the steering group recently endorsed the overarching framework for the development of the AMR prevention and containment strategy. The key elements of the framework are:

- Governance
- Surveillance
- Infection prevention and control
- Regulation
- International engagement
- Communication (which includes Education, Stakeholder engagement and Partnerships)
- Research

To develop the strategy, the steering group will consult widely with stakeholders. In July 2013, the Australian One Health AMR Colloquium was convened by the Australian Commission on Safety Quality in Health Care (ACSQHC) to start this process. The colloquium brought together food animal, animal health and human health experts to discuss key 'One Health' priorities and strategies to address AMR in Australia, with

particular reference to surveillance strategies, regulatory measures and the most significant zoonotic AMR risks. The outcomes of the colloquium are being used to assist DoHA and DAFF to identify gaps and set priorities for action, and to develop advice to the steering group on next steps.

## **Bangladesh**

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### **Zoonotic Diseases in Bangladesh**

Major zoonotic diseases reported in Bangladesh are:

- Anthrax
- Rabies
- HPAI
- NIPAH

Anthrax is sporadic both in animals and human, but only animal mortality is observed in the outbreaks. While human deaths are not reported, human infection always causes a great panic in public due to panic creating news.

Rabies is a silent killer of animal and human both. At least 2000 human death takes place in the country each year, and although animal death is as much as about 10 to 15 thousand.

HPAI is a great public health concern because of its zoonotic nature. The disease is epidemic since April 2007 to till date. Huge damage to poultry has had reported and poultry business was gone under most vulnerable situation, because of stamping out of huge bird to reduce virus concentration in the environment. Six human cases have been reported along with fatality.

NIPAH is a latest public health hazard in Bangladesh, in the last one decade this disease has claimed as much as 133 lives, and children are most affected by exposure.

### **Food-borne Diseases in Bangladesh**

A wide range of food borne diseases (FBD) is reported to occur in the country. Basically those are transmitted through staples and cereal foods, fruits, vegetables, meats, milks, eggs, water and wide range of cooked and non-cooked foods are considered as the major source of food borne diseases. Recently there have been reported six human cases of avian flu in the country with one fatality, but the real cause of human infection with avian flu is not determined through specific research, it might be the contact of infected poultry or through the blood of infected birds or from eating infected eggs or meat might contribute the human flu cases with virus type H5N1. It is presumed, that poultry meat and eggs have the potential to cause human infection. Thus avian flu is considered to be a potential zoonotic disease and also identified as a food borne disease.

Anthrax has both the natures; one way it is zoonotic disease, in the another way it is a good food borne disease, When it transmits through meat, thus it comes as a good food borne disease, when it transmits through blood and air, thus it comes to say a potential

zoonotic disease. In Bangladesh anthrax is epidemic. In 2010, as many as 607 human cases were reported and in 2011, as much as 278 human cases were reported, but no human fatality of anthrax has occurred. As human infection with anthrax was not determined that, whether the cases were food borne or the cases were from contact with the organism, on these considerations anthrax might be considered as a food borne disease, and in the other hand it is also a zoonotic disease in the country.

A good number of NIPAH incidences have been reported in Bangladesh. On a gross view, NIPAH is popularly known as a zoonotic disease; on consideration of pattern of disease transmission, it is best to say a potential food borne disease. Because it is basically transmitted through bat bite fruits and bat sucking palm juice. Thus food plays potential role to transmit this disease. Since 2001 to 2012, a big number of human fatalities have occurred in the country. In this period as much as 171 human cases of NIPAH virus infection have occurred with 133 fatalities.

Diarrhea caused by contamination of water and food by a wide range of bacteria, most commonly *E. coli*, *Salmonella* and other enteric bacteria is another food borne disease. Bacterial toxins also play role in developing diarrhea. This disease is a great concern in the health service system. Govt. surveillance report depicts huge human death of diarrhea especially under five children are the worst victim of the disease. Every year at least 1.7 to 2.0 million people suffer from these major public health diseases and death toll at least 3 to 4 thousand around the year.

Bangladesh is highly epidemic with *Salmonella* infection in human; it is basically complex syndrome of gastro-enteritis, enteric fever, and bacteremia. Basically eggs, meat, fruits and wide range of foods can carry this infectious causal agent.

Cholera is another major food borne disease caused by *V.cholerae*. Major vector is un-boiled water for the urban areas.

A wide range of food borne diseases is reported from other nature of contamination, basically those are antimicrobial residues, residues of preservatives and highly toxic residues of pesticides.

### **Antimicrobial Resistance in Bangladesh**

Antimicrobial Resistance (AMR) is very upcoming issue not only in Bangladesh but a global scale as well as a consequence of under dosing, frequent, unethical and inadvertent uses of antibiotics against animal and human diseases. This issue has become a growing concern as there is a good linkage between antibiotic residues in food of animal origin and the consumers. Accordingly the antimicrobial resistance problem in human health has been escalated many folds due to indiscriminate uses of antibiotics in animals. In Bangladesh, concerned people are using antibiotic in producing food of animal origin for some common reasons such as:

- animal welfare grounds
- economic grounds in sense of improving growth and productions
- farm hygiene and disease control situation (biosecurity ground)

- public health grounds to reduce excretion of zoonotic organisms
- therapeutic grounds (in controlling some diseases – necrotic enteritis in chicken, swine dysentery etc.)

Factors contributing to antimicrobial resistance:

- unregulated dispense and manufacture of antimicrobials
- truncated antimicrobial therapy
- inadequate access to effective drugs
- drugs of questionable quality
- over use or frequent use of antibiotics as growth promoter
- lack of purchasing capacity
- overall socio-economic conditions

### ***Antimicrobial resistance in animal isolates of bacteria***

There has been little systematic study of resistance in animal isolates of bacteria, except for *Salmonella spp.* and *E. coli*. In spite of that some available information in this regard are furnished here as follows:

- *E. coli*: resistance is seen with tetracycline, aminoglycosides, sulphonamides and ampicillin.
- *Salmonella spp.*: resistant to tetracycline, sulphonamide and streptomycin.
- *Campylobacter*: erythromycin, tetracycline resistant isolates are found.
- *Enterococci*: found to be resistant against vancomycin, macrolide-lincosamide streptogramin group (tylosin)
- *Staphylococci and other non-enteric bacteria*: antibiotic resistance is quite common

## **Impacts**

Under the socio economic perspective of Bangladesh the trio of zoonoses, FBDs and AMR are of greatest value for their negative impact on food safety, food security, animal and public health. The magnitude of loss both in animal and human health sectors, as presumed by the experts, is in alarming situation. Apart from economic loss, there has been a societal impact as well resulting from long-term silent destructive effect and dismay. Some specific consequences are categorically furnished as follows:

### ***Zoonoses***

- cause loss of life- human and animal every year.
- squeeze or wind-up of the entrepreneurship.
- diminish production or cause to face challenges.
- increase public health concerns
- ensue societal shock and lower down people's confidence.
- increase consumer hesitation and cause to decline food-intake.
- cause to decline rural health and rural economy.



- cause to dropout or wind-up of traditional small enterprises(e.g. date-sap related business threatened by NIPAH).

### ***Food-borne diseases***

- unsafe food and loss of production.
- health hazards (morbidity) and case fatality (mortality).
- infant mortality rate increases.
- nutritional status lowers down.
- food trade –export and import is confronted.
- foreign exchange earning squeezes.
- child’s disability develops.
- implementation of sectoral national policy gets slow motion.

### ***Antimicrobial resistance***

- infectious diseases do not respond to antibiotics.
- public sufferings and in discrepancy in health management prevail.
- Treatment cost, morbidity and mortality increase.
- food of animal origin treated with antibiotics posing threat to human health via food chain.
- animal and human health concern is increasing alarmingly.
- production level falls and cause to incur huge loss of capital invested.

## **Interventions**

The country is quite well established with its health and livestock services except some limitations. Thus every incidence gets a good address by the efficient hands basically in the government system. A good number of NGOs play vital role in doing applied research and field studies. Major UN bodies are providing their assistance to combat and control the situation. Although Bangladesh enhanced its intervention capacity and tools to address the aforementioned problems there are still some limitations in this context.

Important interventions made by the government so far are:

1. Establishment of an epidemiological unit in DLS.
2. Strengthening support services for disease surveillance and monitoring activities through development projects.
3. Introduction of SMS gateway system for quick reporting and following interventions to limit the disease.
4. Regular and frequent coordination meetings between animal and human health sectors.
5. Coordinated approach in surveillance and monitoring of zoonoses under One-Health concept.
6. Encouragement and support relevant research.

7. Enforcement of food safety act is imminent.
8. Strengthening biosecurity practice in farming, marketing and processing of food of animal origin.
9. Enforcement of animal disease and control act.
10. National response plan for emerging and re-emerging diseases.
11. Up-grading laboratory capacity and disease diagnostic system of CDIL, FDIL and DVH.
12. Setup of national reference laboratory at BLRI (BSL-2 enhanced aiming at BSL-3).
13. Up-gradation of LBM/WBM.
14. Establishment of poultry disease surveillance check-posts at important points of inter district link roads to limit the possible spread of disease through transport of live poultry and its products.
15. Certification system for safe food of animal origin is under way.
16. Awareness building training, workshop and campaigning program through mass media and local traditional system.

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## Bhutan

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### Introduction

Livestock is crucial for Bhutanese communities and more than 90% of the people practice subsistence farming. Zoonotic diseases like rabies, anthrax, taeniasis, neurocysticercosis hydatidosis, salmonellosis are of public health importance and have been reported in Bhutan. To enhance food security for the population, livestock production activities like intensive livestock farming are initiated across the country and these activities have paradoxically increased the use of antimicrobials either to control infections or as preventive measures against outbreak of diseases. With steady increase of demand for livestock products, role of livestock is getting oriented more towards food functions, thereby, driving livestock farming system from subsistence to intensified system. To enhance internal production more intensification is desired. But, one of the undesirable consequences of intensification is exposure of food animals to antimicrobials for various purposes.

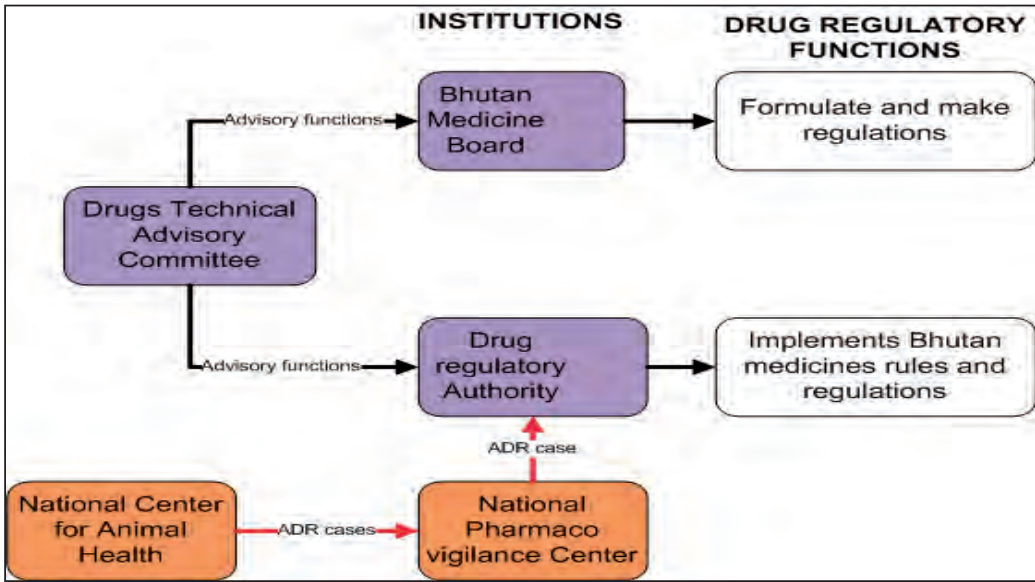
Use of antimicrobials in Bhutan is largely regulated and guided, however, a huge quantity of imported meat to Bhutan comes from an unknown source. Bhutan has imported 10768 metric tons & 10386 metric tons of meat (fresh beef, pork, chicken and fish) in 2011 and 2012 respectively (BAFRA 2012). The extent of use of antimicrobials in the production process of these imported meat is largely unknown. In-house studies on antimicrobial use and its consequences in Bhutan are scant, which perhaps could be due to the lack of appropriate technologies, inadequate infrastructures, and competent human resources to strengthen the national food safety standards and usage of drugs. Study of the prevalence of *Salmonella spp.* and drug resistant in imported chicken carcasses in Bhutan by Dahal, Ellerbroek et al. (2008) shows prevalence of *Salmonella* of 13% with *Salmonella enteritidis* as the most frequently isolated serotype (84.62%) followed by *Salmonella typhimurium* (15.38%). Among the seven antimicrobials tested, resistance for nalidixic acid was highest, followed by amoxicillin and cephalixin.

There is a clear evidence of risk associated with use of antimicrobials in food animals and it is essential to have enabling legal framework and institutions in place to implement the food safety standards and monitor the use of antimicrobials in food animals.

### Legal Framework and Institutional Arrangements for AMR in Bhutan

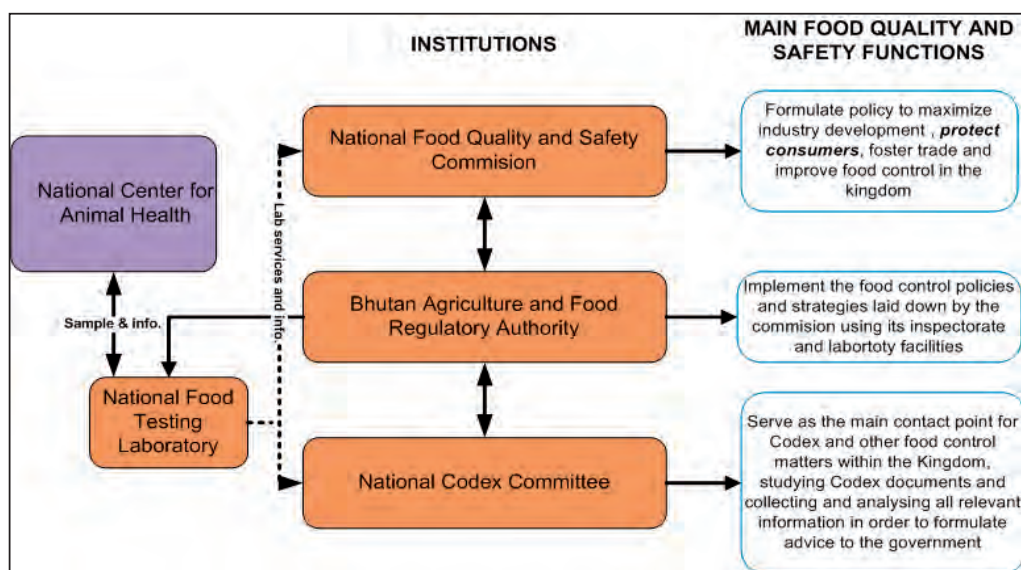
The broad legal framework on antimicrobial use and its resistance is provided by the acts and regulations related to drugs (RGOB 2003 ; RGOB 2012) and food safety (BAFRA 2005 ; BAFRA 2007). Under the framework of Bhutan Medicines Rules and Regulations, National Centre for Animal Health – the apex body for all animal health services in the

country – has developed the approved list of antimicrobials to be used in veterinary sector in the country (NCAH 2013). For each approved antimicrobial, specific guidelines is provided on its use. Regulation on drugs is effectively implemented and monitored spearheaded by Drug Regulatory Authority of Bhutan (DRA). Institutional arrangement on Drug regulation is illustrated in figure 1.



**Figure 1.** Arrangements for regulation of drugs  
\*ADR: Adverse Drug Reaction

Similar to drug regulation, there is a sound legislation and institutional arrangement to regulate food safety for the consumers. Food Act of Bhutan (2005) and Food Rules and Regulation of Bhutan (2007) provide the legal basis for implementing food safety standards.



**Figure 2.** Institutional arrangements and food safety functions

Despite having a good institutional arrangement and strong legal instruments, it is unable to operate and deliver sophisticated and yet important services, such as analysis and monitoring of antimicrobial resistance and prevalence in food animals due to lack of technical capacity, adequate human resources and a guiding framework. National Food Testing Laboratory under BAFRA has to upgrade its capacity to deliver laboratory services to the public.

### Monitoring of Antimicrobial Use and Surveillance of AMR in Bhutan

Although it may not suffice complete requirements, Bhutan has developed an interim arrangement for monitoring of antimicrobial use. Reports on drug use and its performance are collected every six months by the Essential Veterinary Drug Program under the National Centre for Animal Health. Sensitivity tests are conducted to find out the appropriateness of antibiotic usage to pathogen. Type of antimicrobials to be used is broadly guided by Bhutan Medicines Rules and Regulations 2012 and National Veterinary Drug Formulary 2013. Antimicrobial surveillance at national level has never been carried out but there is a system to tackle any adverse drug reactions noted in the field. Adverse drug reactions are reported to National Pharmacovigilance Center (NPVC), which forwards the report to Drug Regulatory Authority (DRA) for further actions.

Regulations on the use of drugs are improving under the guidance of DRA, but there is limited capacity to test residues in food products at National Food Testing Laboratory (NFTL), which needs to be improved simultaneously to effectively monitor and analyze antimicrobial use and resistance in pathogens. Besides strengthening the capacity of existing laboratories, there is a need to have additional facilities at different regions in

the country with adequate and competent human resources to conduct sensitivity tests of drugs and residues in food products. In general, awareness on effects of injudicious use of antibiotics is lacking among public and even among the decision makers. Although drugs for animals are procured, distributed and dispensed by professionals, there is still a need to advocate on sensible use of drugs.

## **Recent Developments in the Use of Antimicrobials and AMR in Bhutan**

### ***Establishment of a National Steering Committee on AMR***

A high level committee meeting on Antimicrobial Resistance and Antibiotic control in Bhutan was conducted recently. The committee, involving all the relevant stakeholders, developed a consensus that the existing Drug Technical Advisory Committee (DTAC), which acts as an advisory body to the Bhutan Medicine Board, will shoulder the additional responsibilities of National Steering Committee on Antimicrobial Resistance. The respective ministries will nominate additional members in the DTAC as required by the AMR relevancy. The DTAC will include the role of the National steering committee on AMR as one of their mandates. The National Steering Committee on AMR will then take up the responsibilities of developing a national action plan for AMR activities including public awareness and education, information material development and campaigns to improve awareness on AMR.

### ***Review of veterinary antimicrobials and guidelines on AMU in livestock production***

The Drugs, Vaccines and Equipment Unit of the National Centre for Animal Health have revised the essential veterinary drugs for use in the country and have produced a National Drug Formulary 2013. This formulary includes necessary guidelines for the users. The unit is also responsible to monitor and evaluate the usage of veterinary drugs in the country including quality control and adverse drug reactions. Further, the unit is drafting standard treatment guidelines for the users.

### ***Improvements of livestock rules and regulations to model veterinary legislation at par with international standards***

Based on the evaluation of the performance of veterinary services (PVS) through OIE missions, the Royal Government of Bhutan formed a task force to review the existing livestock legislation vis-à-vis with other closely related legislation such as the Food Act (2005) and its rules and regulations (2007) as well as the Bhutan Medicine Act of 2003. The revised livestock legislation although in draft stage at the moment will address issues such as developing guidelines and regulations to encourage responsible and prudent use of antimicrobials.

### ***Establishment of a Veterinary Statutory Body***

Currently Bhutan does not have a veterinary Statutory Body (VSB). Veterinary Council Act is in draft stage and is being pursued strongly by the Department. VSB is foreseen and will be developed using OIE as a relevant guide. The VSB will eventually require a legislative framework giving required authority over all veterinarians; the role of para-

professionals and community animal health workers who will form part of this framework. Thus the development of regulations and guidelines to promote responsible and prudent use of antimicrobials and improvement on policy is expected.

### ***Laboratory capacity development***

The National Centre for Animal Health, which is also the National Referral Laboratory currently carries out some of the functions of Antimicrobial Resistance. The unit is equipped to carry out Antimicrobial Sensitivity testing using disc diffusion method utilizing CLSI protocol. However, most of the antimicrobial sensitivity testing performed by the unit is treatment based. Very few planned surveys are carried out for antimicrobial resistance. None of the Regional Veterinary Laboratories in the country are equipped to carry out the AMR functions. Therefore, strengthening of these laboratories in terms of skilled human resources and facilities is proposed in the 11<sup>th</sup> Five Year Plan, which ends in 2018.

### **National Currency Fund**

As per the financial obligations to Regional Animal Production and Health Commission for Asia and the Pacific, the amount due for Bhutan for the year 2013 is USD 2 128.00. Accordingly, the authorities in the ministry had been appraised and the budget is proposed in the financial year 2013-2014. The budget is under discussion in the current parliament and the payment shall be done once approved.

Bhutan kept a provision of Nu. 1.00 million for APHCA activities for the current fiscal year. An expenditure of Nu. 850 000 is foreseen in the current workshop which leaves a balance of Nu. 150 000 for the remaining APHCA country activities.

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## India

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### Situational Analysis

The impact of AMR on human health has been recognized by the stakeholders in India. These include Ministry of Health & Family Welfare (Directorate General of Health Services), Ministry of Agriculture (Department of Animal Husbandry, Dairying & Fisheries (DADF), Indian Council of Agricultural Research (ICAR), Council for Scientific and Industrial Research (CSIR), etc, which have initiated programmes considering the relevance of AMR and are motivated to implement projects to address AMR developing very widely amongst microbes isolated from human, livestock, poultry and fishes. Other regulatory bodies responsible for the manufacture, standards and use of antimicrobials are motivated to take up the AMR issues at their levels.

### National Task Force

In the National Policy for Containment of Antimicrobial Resistance, India 2011, a multidisciplinary and cross sectoral National Task Force Committee was constituted comprising experts from the following agencies:

- a. Central Council for Scientific and Industrial Research (CSIR) (Chairperson: DG, CSIR)
- b. Ministry of Health and Family Welfare
- c. Ministry of Agriculture
  - (i) Indian Council for Agricultural Research
  - (ii) Department of Animal Husbandry
- d. Food Safety and Standards Authority of India (FSSAI)
- e. Agricultural and Processed Food Products Export Development Authority (APEDA)
- f. Marine Products Export Development Authority (MPEDA)
- g. Drug Controller General of India (Member Secretary)

During the last one year this multidisciplinary committee has met several times to make guidelines on the activities such as review of available data regarding the use of antimicrobials, generation of data by undertaking studies on the use of antimicrobials as animal growth-promoters, specify the antibiotics for use in livestock, review of current laws on use of AGPs in other countries and feasibility of their implementation in India, development of regulations on usage of antimicrobials in poultry and other animals as well as the requisite labeling requirements in food, review of Prevention of Food Adulteration Rules, 1955-part XVIII: Antibiotic and other pharmacologically active substances, if required, to enhance the scope of inclusion of other food products and antimicrobials), etc, which will be finalized very soon.

## **Raising Awareness**

India has a huge network of veterinary institutions, research institutions under Indian Council of Agricultural Research Institute (ICAR, under Ministry of Agriculture), State Veterinary and Agricultural Universities, which would be directed to initiate awareness about threats of misuse and over use of antimicrobials leading to AMR and the impact human health among farmers and farmer organizations; veterinarians, para-veterinarians, veterinary faculty staff members; policy-makers; consumers and civil society. ICAR has a total of 633 Krishi Vigyan Kendras in all districts of the country, which contain multidisciplinary teams that also include animal science, veterinary and fisheries science subject matter specialists, who may initiate awareness programme amongst farmers once the guidelines are finalised.

## **Practical Regulation and Regulatory Framework including National Policy and Guidelines**

In India, Legislation and regulatory frameworks exist in the forms of Central Drug Standards Control Organization (CDSCO) under Drugs and Cosmetics Act of 1940, Food Safety and Standards Authority of India (FSSAI) under the Ministry of Health and Family Welfare wherein Food Safety and Standard Act, 2006 (FSSA, 2006) and its sections (16 (2b), 16 (3b), 21(1), 2.3.2), Export Inspection Council (EIC), and other amendments from time to time for manufacture, standards, use, permissible limits, etc, with respect to antimicrobials.

The Directorate General of Health Services, Ministry of Health & Family Welfare, Govt. of India, New Delhi has already made a National Policy for Containment of Antimicrobial Resistance, India 2011 by constituting a National Task Force Committee. The task force has recommended inter-sectoral coordination committee comprising experts from the several stakeholder agencies as stated at point no. 2. This committee is in the process of finalization of guidelines.

## **Capacity Building (Human Resources and Infrastructure)**

There are 250 state laboratories at district and state levels to look after disease diagnosis and surveillance. In addition the ministry has one Central Disease Diagnosis Referral Laboratory and five Regional Disease Diagnosis Referral Laboratories for Eastern, Western, Northern, Southern and North-eastern regions. All are equipped with BSL 3 level facilities. These facilities are being regularly strengthened by the ministry. The ministry is also establishing and strengthening the existing veterinary hospitals/dispensaries by providing 75% of the total budget. In addition, the Indian Council of Agricultural Research (ICAR), State Veterinary and Agricultural Universities, Research Institutions and National Centers have adequate infrastructure and large numbers of competent human resources to take up various issues relating to AMR.

## Monitoring and Surveillance

Studies with regard to data on the use of antimicrobials as well as antibiogram / anti microbial resistance have been undertaken in different institutions throughout the country. The Ministry of Health & Family Welfare is in the process of developing a national programme. There are also mechanisms to send the primary isolates to specialized laboratories for advanced microbiological and molecular work. There is also a mechanism to deposit important characterized cultures at Veterinary Type Culture Collection Centre (VTCC) at Hisar recently established by ICAR.

Studies have been regularly conducted in India that revealed the pattern of antimicrobial use (AMU) for treatment of livestock diseases and antibiogram and antimicrobial resistance (AMR) on the isolates of livestock origins. A few examples are mentioned here for reference. In a study, more than 80% strains of enterococci of equine origin were found resistant to Vancomycin and 99.6% were multiple-drug resistant in Northern India (Singh et al., *J Infect Developing Countries* 2009; 3(7):498-503). In a most recent study, it was observed that a large portion of *Staphylococcus* spp. isolates of pigs, pig handlers and sheep origins were found to be resistant (44-83%) to penicillin in addition to showing variable resistance to other antibiotics (Shome and Shome, 2013, PD-ADMAS Annual report-2012-13, pp31-34).

## Alternatives to AMU

India is rich in ethno-veterinary medicine and indigenous traditional knowledge (ITKs) with regard to prevention and cure of human and animal diseases. This knowledge has been documented by ICAR institutions and some of them were also scientifically rationalized. This documentation also contains some antimicrobial preparations that have potential to be used as antimicrobials in animals.

Several herbal preparations are also available. For example a few formulations for the treatment of diarrhea in calves and subclinical mastitis developed by IVRI have shown encouraging results in animals. Such work can be further taken up to develop alternatives to antimicrobials. ICAR has a network project on Ethno-veterinary medicine with several centers in the country. They have reported certain herbs showing strong antimicrobial activities against a few reference bacterial cultures.

In addition, various stakeholders in the country are vigorously taking up improved animal husbandry practices, control programmes and bio-security measures to reduce use of antimicrobials.

## Public Awareness

India has a huge network of human resources in the form of extension functionaries to take up the cause of public awareness. Programmes are being arranged to create public awareness as well as awareness amongst physicians, veterinarians, etc. for judicious use of antimicrobials.

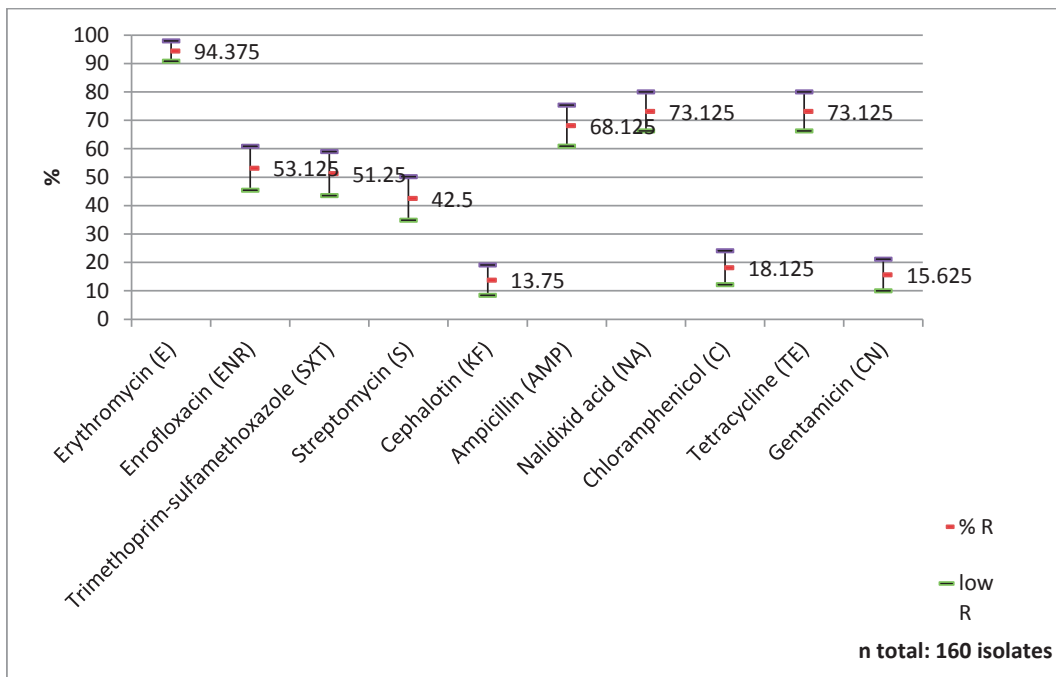
## Indonesia

Dr Imron SUANDY

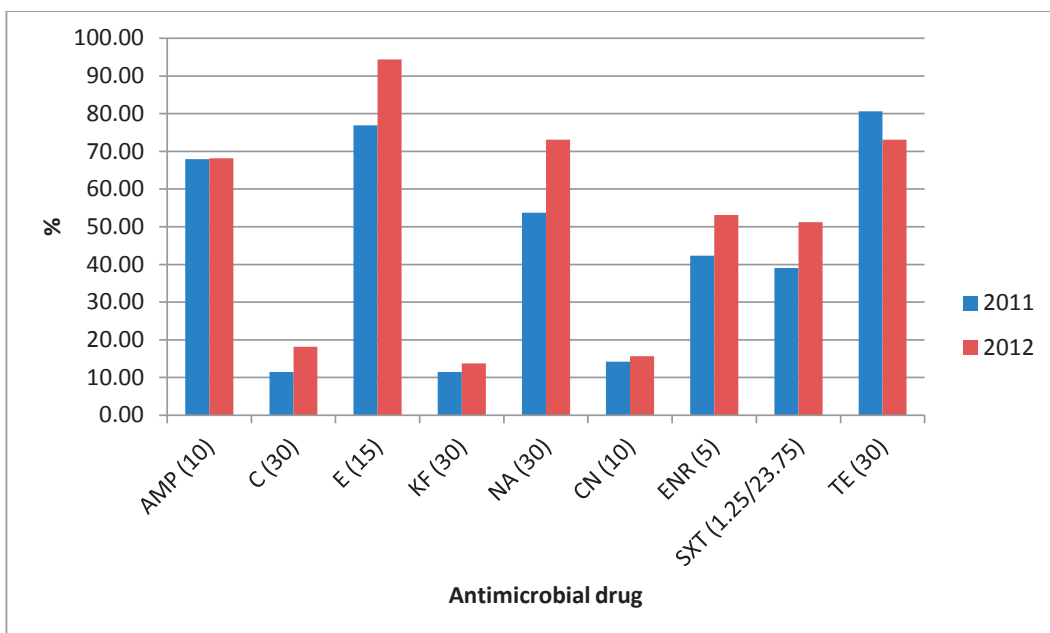
Directorate General of Livestock and Animal Health Services

### Initiation of AMR Monitoring in Indonesia

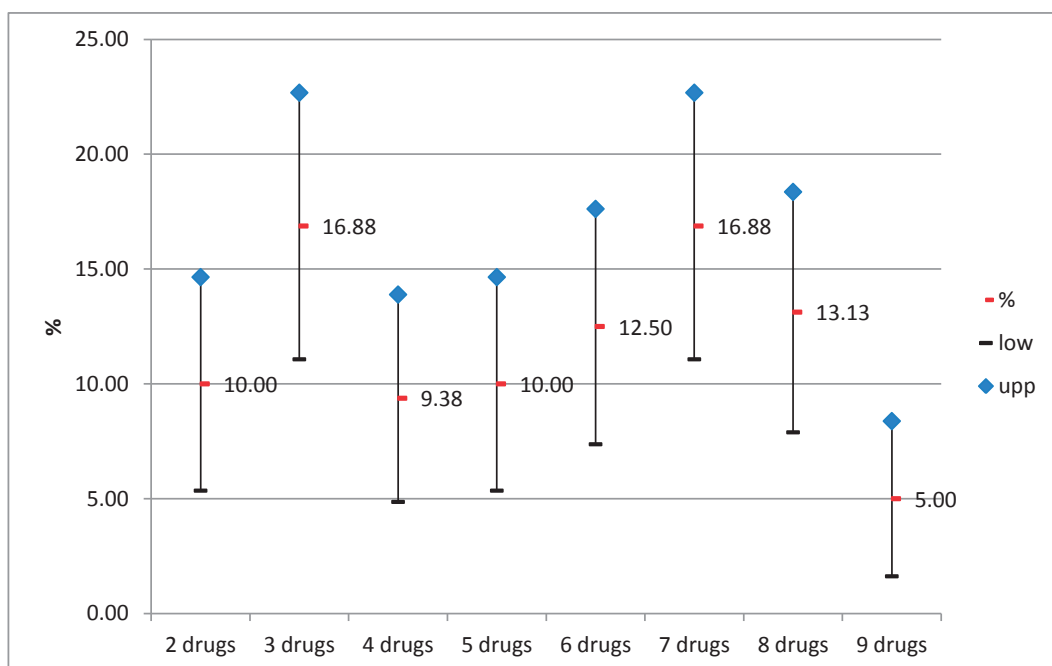
An initial pilot AMR monitoring programme was continued in 2012 and 2013, but is still not recognized as programme to monitor antimicrobial resistance in indicator bacteria (*E. coli* & *Salmonella* spp). Bacterial isolates were collected from samples of the National Monitoring Programme for Microbial Contamination of Food of Animal Origin (particularly chicken meats) limited to Java Island area. Isolates identified as *E. coli* and *Salmonella* spp were tested for susceptibility to selected antimicrobial drugs (as recommended by OIE). Laboratory testing was done in the National Quality Control Laboratory for Livestock Products. The results are shown in figures below.



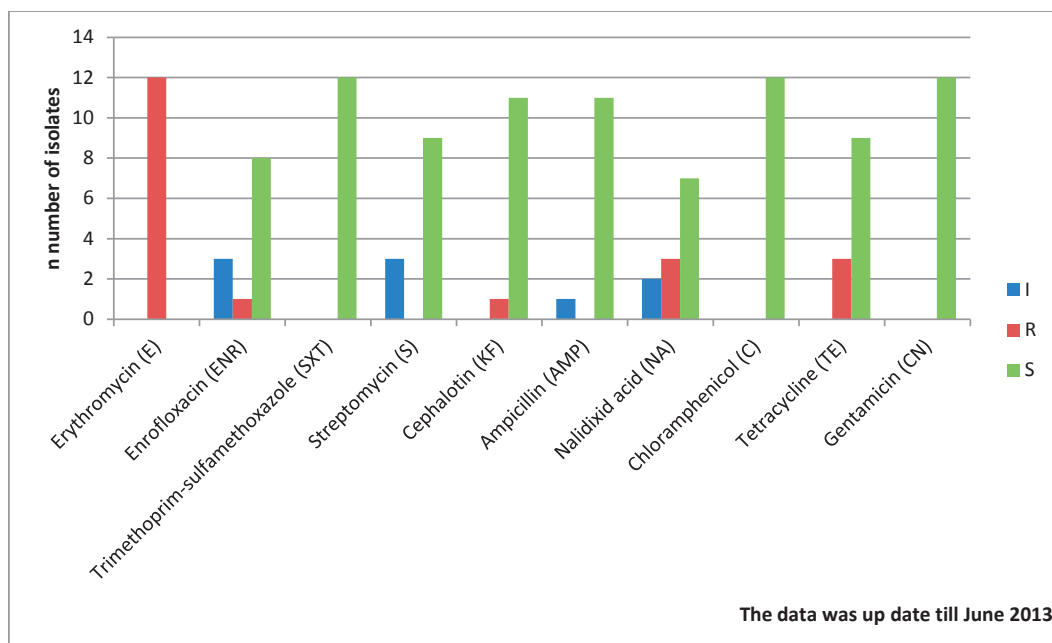
**Figure 1.** Monitoring of AMR in *E. coli* isolated from chicken meats in Java Island, year 2012.



**Figure 2.** Trend of AMR in *E. coli* isolated in 2011 and 2012.



**Figure 3.** Prevalence of multi drug resistance of in *E. coli* isolated in 2012.



**Figure 4.** AMR in *Salmonella* spp isolated in 2013 (update to June 2013).

## Collaborative Research

A research proposal in eco-health approach to develop a strategy for prudent use of antimicrobials to control antimicrobial resistance in human, animal, and environmental health was developed by a collaborative, multi-disciplinary group of researchers in the Asia region during 2011 to 2012. In 2013, the proposal was approved and funded by IDRC for a three-year research program. The program will start at the end of this year. The collaborative research team, which will be involved in this project consists of veterinarians, medical doctors and socio-economic experts.

This project arose from our understanding that AMR is a complex, multi-dimensional and multi-factorial problem which involves various socio-economical levels of the community from farmers, public and private industries, consumers to decision makers at local, regional, and national levels. Therefore, a trans-disciplinary approach and a wide range of stakeholders must be involved to solve this problem. The integration of veterinary science and human public health, epidemiology and socioeconomics are important elements to develop and recommend solutions and strategies.

The objectives want to achieve through the project are:

- To describe and assess the current AMR situation and antibiotic usage in veterinary and human medicine;
- To gather/assess evidence on antimicrobial resistance at study sites (animal, human, and environment);

- c. To compare the costs of livestock raising by traditional methods using antimicrobials and by prudent use of antimicrobials (as a baseline economic assessment of the costs and benefits of the use of antimicrobials) in layer farms and pig farms;
- d. To identify the factors that influence decision making on using or not using antimicrobial agents on farms and the general public;
- e. To identify and develop a potential intervention strategy; and
- f. To demonstrate to policy makers the results of reduction in use of antimicrobials (total and individual agents) over time in the selected communities in both humans and animals.

From our perspective, this project could be a recommendation to encourage the decision makers to set up necessary action to control the development of AMR in Indonesia.

### **Coordination between Veterinarians and Medical Doctors**

Communication with regard to AMR between veterinarians in the Ministry of Agriculture and medical doctors from Ministry of Health is being initiated under the Indonesia Antimicrobial Watch program.

### **National Currency Fund**

Indonesia has not established a specific National Currency Fund in support of APHCA activities. However, in 2014 we have Rp. 65.000.000 for the establishment of the sampling plan for the Monitoring Program of Microbiological Contamination and Antibiotic Residues in Food of Animal Origin.



## **Lao PDR**

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### **General Information**

Lao People's Democratic Republic (Lao PDR) is a land-locked Least Developed Country (LDC) in the center of Indochina, with a human population of about 6 million. Lao PDR shares borders with China to the North, Myanmar to the North-West, Thailand to the West, Cambodia to the south and Vietnam to the east with 5 083 km land boundaries (Myanmar 235 km, Cambodia 541 km, China 423 km, Thailand 1,754 km, and Vietnam 2 130 km. With a total land area of 236 800 km<sup>2</sup>, Lao PDR is one of the least densely populated Asian countries (23.3 people km<sup>2</sup>). Climate: tropical monsoon; rainy season (May to November); dry season (December to April).

The country is administratively subdivided into 16 provinces, the Capital City and one Special Zone. It counts 142 districts and 12 466 villages. Geographically, the country is divided into three zones namely lowland, highland and plateau. 70% of the terrain is mountainous and water (the Mekong Rivers, dams) covers about 6 000 km<sup>2</sup>.

Lao PDR is a multi-ethnic country. The diversity of people is represented by 68 ethnic groups, which can be divided into four major categories (linguistic groups):

- Lao Loum (Tai Kadai), occupying the lowland plains and the Mekong river valley, comprise 68% of the population
- Lao Theung (Mon Khmer), occupying the mountain slopes, comprise 22%
- Lao Soung including Hmong (Meo), Yao (Mien), Black Thai, Dao, Shan and Tibeto-Burman (Akha), settling on the mountain tops over 1 000 m, claim about 9% of the population
- Vietnamese/Chinese (1%)

It is a predominantly rural society with over 70 % of the population living in rural areas and 76.5% of the population depending on agriculture for their livelihood. Subsistence farming is common and 94 % of households produce food mainly for their own consumption. 51% of the population is female, 49% male; in particular in rural areas women outnumber men.

With a GDP per capita of 455 US dollar Lao PDR is among the poorest countries in Asia (40% of the population live below the poverty line). According to the United Nations, in 2003, Lao PDR ranked 135<sup>th</sup> out of 175 LDCs in the UNDP Human Development Index (HDI), making it one of the poorest countries in Asia.

Though less than 10% of the land is suitable for agriculture, agriculture contributes for about 47% of GDP. Livestock and fisheries contribute 16% of the agricultural GDP.

## **The Role of Livestock Production**

Livestock are an important component of smallholder farms in the Lao PDR with sales of livestock accounting for more than 50% of cash income in many upland areas. Over 95% of all livestock is produced by smallholders. Commercial pig and poultry operations are found near population centres such as Vientiane, and are mostly small cottage industries with few employees. Livestock provide direct benefits on farms such as draft power for land cultivation and transport, manure for agriculture crop production and constitute an important source of food. Livestock are also an important means of accumulating wealth and are regarded as a safety net for the family, which can be liquidated when cash is needed. Livestock are considered a crucial steppingstone for sustainable development, particularly in the uplands. Livestock are found on most farms in Lao PDR with 89% of all farm households raising one or more livestock types. The Livestock population in 2012 was 1.18 million buffaloes, 1.6 million cattle, 2.8 million pigs and 26 millions of poultry. Estimated average meat and fish consumption is 50.4 kg per person per year.

Livestock production systems are mostly smallholder farms, accounting for over 95 % of all animals raised, mainly operate mixed farming systems, growing crops and at the same time rearing animals. The 'typical' Lao smallholder farmer has 0-4 large ruminants, 2-4 pigs and 20-30 chickens. Large ruminants are grazed and crop by-products are only rarely used as animal feed. In rice growing areas animals are grazed on the vacant cropping area, utilizing rice stubble, re-growth of rice after harvest and grasses and weeds. The management system is extensive with animals grazing in large herds. During the rice growing season animals are grazed in smaller groups in upland and forest areas with minimal management inputs.

## **Animal Health Issues**

The main constraint to livestock production is animal disease. Annually, a large proportion of all poultry die in disease epidemics. In upland villages, farmers reported that more than 80% of all chicken die every year. Similarly, pig diseases often occur as epidemics, killing many / most pigs in a village in a single outbreak. The incidence of mortality caused by diseases is lower in cattle and buffalo, except for a high mortality of buffalo calves (30-40%) due to internal parasites.

- Lao PDR has limited qualified staff; most specialized in animal husbandry either livestock husbandry or veterinarians.
- 881 people from government staff are involved in animal production and disease control services at central, provincial and district level.
- 8 468 village veterinary workers (VVs) distributed in over than 2 000 villages throughout the country.
- VVs work as the coordinators for the district staff.
- The main duty of the VVs is field vaccination and surveillance as well as working closely with the head of the village to look after animal health status at grass roots level

**Table 1.** Importance of livestock diseases in Lao PDR

Disease	Rank in Southeast Asia	Importance in Lao PDR	Impact		
			Lost Production	Mortality	Trade barrier
Ectoparasites	High	Medium	*	-	-
Foot and Mouth Disease	High	Medium	*	-	*
Gastrointestinal helminthes	High	Medium	*	*	-
Newcastle Disease	High	High	*	***	-
Toxocariasis	High	High	*	***	-
Haemorrhagic Septicaemia	High	High	**	**	-
Duck Virus Enteritis	High	Medium	**	**	-
Fowl Cholera	High	Medium	*	***	-
Fowl Pox	High	Medium	**	**	-
Classical Swine Fever	High	High	*	***	*

## Zoonoses

In Lao PDR, human disease and livestock disease are linked in three ways: a) transmission of infection between humans and livestock; b) poor human health caused indirectly by poor livestock performance and c) better control of both human disease and livestock disease by increased understanding by communities of how infectious diseases are caused and transmitted. There are many zoonoses in Lao PDR. An example, which may be of significance in the uplands, is cysticercosis. Consumption of undercooked beef and pork allows the cysts of tapeworms to establish in the human intestine. These tapeworms rarely cause serious illness. However, the eggs of the tapeworm (*Taenia solium*), acquired from pigs by eating undercooked pork, when ingested, can form cysts, especially in the brain, causing a range of serious disorders. One abattoir survey in the Lao PDR detected this parasite in 1.5% of pig carcasses. The prevalence of this parasite in humans and pigs has not been studied but the free-range management of pigs and poor sanitation seem to provide ideal conditions for transmission.

Zoonoses have also been considered and ranked for their impact on poor livestock keepers in Southeast Asia (Perry et al., 2002). The status of several of these diseases is unknown in Lao PDR but it is likely that diseases more closely associated with dairy production are of low importance. The top 10 zoonotic diseases, ranked by their impact in Southeast Asia with their status in the Lao PDR are shown in the below table.

Zoonotic Disease	Rank in Southeast Asia	Status in the Lao PDR
Anthrax	High	Frequent small outbreaks
Bovine tuberculosis	High	Unknown but usually associated with dairy production
Brucella abortus	High	Unknown but usually associated with dairy production
Brucella melitensis	High	Unknown
Buffalo Pox	High	Unknown
Cysticercosis	High	Present but importance unknown
Leptospirosis	High	Associated with rat populations, more likely in lowlands
Brucella suis	High	Unknown
Japanese B encephalitis	High	Unknown
Trichinellosis	High	Unknown

## Antimicrobial Resistance

Livestock producers in Lao PDR use antibiotics in their practice and antimicrobial agents are essential tools for protecting animal health. However it is recognized that antimicrobial resistance is a global human and animal health concern that it is influenced by both human and non-human usages of antimicrobial agents. Lao PDR considers this new issue as important and sees the need to revise the implemented measures to improve good governance practices including national legislation and regulatory frameworks for import, marketing, production, distribution (including transport and storage) and use of quality veterinary medicinal products.

Currently, Lao PDR has the laws and regulations that relate to the pharmaceutical drug and veterinary drug control such as:

1. Drug and Medical Products Law (effective as of 21 Dec. 2011)
2. Livestock and Veterinary Law (effective as of 18 Aug. 2008)
3. National Medicine Policy (effective as of 13 Aug. 2003)
4. Manual of Drug Therapeutic Indicator (effective as of 1 Oct. 2008)
5. Ministerial Decision on Management Animal Clinics and Veterinary Products Shops.

These five legal documents contain comprehensive provisions that focus on control in production, importation, exportation, distribution and use but lack a statement for implementing AMR monitoring and control as recommended by international organizations. Lao PDR has also established a food and drug committee, which consists of multi-sectoral agencies including representatives from human and animal health sector since 2003. However this committee was not well functioning and this year its role is under revision.

Lao PDR understands the recommendation of OIE, WHO and FAO that AMR is a global issue and that there is a need to increase the capacity to conduct surveillance of antimicrobial resistance and monitoring of quantities of antimicrobial agents used in food producing animals. Moreover, we need to harmonise standards and guidelines in

accordance with international regulations (e.g. Codex Alimentarius). Therefore we would like request to international agencies to help us to develop a good model for the implementation of measures for responsible and prudent use of antimicrobial agents in animals in Lao PDR.

With OIE, Lao PDR has assigned National Focal Points for Veterinary Products. However to enhance cooperation with OIE we are still facing many constraints, such as: lack of capacity and facilities as well as the internal translation of OIE guidelines to the local level. The coordination and networking on this at ministerial level are also weak.

In practical every day circumstances we still use both narrow and broad spectrum antibiotics namely: Penicillin, Ampicillin, Streptomycin, Oxytetracyclin, Gentamycin, Kanamycin, Neomycin, Lincomycin, Erythromycin, Terramycin, Trimethoprim, Niacin, Tylosin, Colistin, Enrofoxacin, Thiamphenicol, Sulphonamide, Dexamethasone, etc. Most of these products are imported from Thailand and Vietnam at an estimated cost of about US\$500 000 per year.

For combating AMR Lao PDR still lacks:

- Microbiology laboratory facilities
- Competency of human resources (lab technician, clinical microbiologist)
- Sufficient budget for AMR monitoring/surveillance
- Coordination between parties (government, hospitals, research institutions and clinicians) to develop an integrated system of AMR management

Our overall expectation is to develop our system that can survey and collect the data on antimicrobial resistance in relevant animal pathogens and quantities of antimicrobial agents used in food producing animals at the national level according to the OIE standards. We also need to provide data to the global database hosted by the OIE.

### ***Livestock projects related to AMR in Lao PDR***

Lao PDR has several projects, which are active in the livestock sector. However specific projects dealing with AMR study or control are very limited. Currently we have two projects:

- Improved Sanitary and Phytosanitary (SPS) Handling in the Greater Mekong Subregion (GMS) Trade (2012 to 2016).
- Study on prudent use of antimicrobials to control AMR in human, animal and environment in the region (6 countries: Thailand, Indonesia, Vietnam, China, Lao PDR and Cambodia.

This first project aims to:

- Improve the control of veterinary drugs,
- Conduct a baseline survey on the quality and use of veterinary drugs,
- Support the implementation of regulations,
- Provide test kits,
- Upgrade animal feed laboratory facilities,
- Improve food safety by testing of animal products.

## **National Currency Fund**

Lao PDR recognises that a NCF is very important source of funding for technical cooperation in combating disease or any risk nationally. However, to date Lao PDR has not established this specific fund. In order to set up this fund, the department of livestock and fisheries or ministry of agriculture and forestry would need to convince the government as every establishment of a national fund in Lao PDR requires endorsement from the national parliament. The conclusion is, we need more time to convince higher agencies to set up this fund.

## **Conclusion**

- Livestock is very important for the livelihood of Lao people.
- Infectious diseases are the main problem in livestock production in Lao PDR.
- Antimicrobial agents are essential tools for protecting animal health, welfare and increasing food in the country.
- Antimicrobial resistance has become a global human and animal health concern that is influenced by both human and non-human usage of antimicrobial agents.
- Lao PDR needs to develop systematic monitoring and surveillance on AMR and effectiveness of antibiotics.

Lao PDR is highly committed to AMR risk management and requests FAO, APHCA, OIE, WHO to search for opportunities to assist Lao PDR to develop AMR monitoring system meeting international requirements.

# Malaysia

Dr Maswati Binti Mat Amin  
Director, Regional Veterinary Laboratory

## NATIONAL ACTION PLAN FOR AMR IN MALAYSIA

Thimphu, Bhutan  
22-26 September 2013

### IMPLEMENTATION OF ACTION PLAN

Action Plan	Target	Achievement
1. Establishment of awareness campaigns on AMR	3-4 campaigns / year	Two awareness campaigns conducted: 1. Current veterinary public health issue 2013 – 19 Mar 2013 (public and the people in the industry) 2. Preparation of biologic control and veterinary drugs (DVS personnel)- 14-16 May 2013. 3. Awareness campaign in Oct -AMU and AMR -Target groups: farmers / public / DVS personnel

### IMPLEMENTATION OF ACTION PLAN

Action Plan	Target	Achievement
2. Establishment of AMR test method	December 2013	To establish MIC method at laboratory level- Oct 2013- a workshop on Minimal Inhibitory Concentration (MIC) for all the lab personnel from respective laboratories
3. Establishment of info-sharing on AMR (published through website)	2013/2014	To be initiated

### IMPLEMENTATION OF ACTION PLAN

Action Plan	Target	Achievement
4. Research collaboration on AMR ▪ To establish steering committee between DVS, MOH and University.	2013 to 2014	To be initiated
5. Capacity building – ▪ Lab method harmonization ▪ AMR risk analysis ▪ AMR risk assessment	2013 to 2014	Harmonization of lab testing (Disk Diffusion Agar method) To establish Minimal Inhibitory Concentration method (MIC)

### IMPLEMENTATION OF ACTION PLAN

Action Plan	Target	Achievement
6. Develop National AMR monitoring/surveillance plans poultry- a. Farms b. Processing plant /abattoirs	Year 2013	a. (Preparation stage) incorporate in the current National Disease Monitoring and Surveillance Program) b. Established in National Food Safety Program.
7. Establishment of TWG between DVS and MOH	1-2 meeting/year	Until Jun 2013- One meeting was held between DVS and MOH on AMR- Outcome: to start collaboration on AMR between the antimicrobial used in both animals and humans.

### LEGAL BASIS FOR AMR ACTIVITIES

- Poison Act 1952 (revision 2006)
- Animal Feed Act 2009
- Animal Act 1953 (revision 2006)
- Standard Operating Procedure (SOP)
  - Veterinary Drug Prescription (APTVM 15(b):1/2011)
  - Monitoring of Veterinary Drug & Biologic Products (APTVM 23(d):1/2011)
  - Veterinary Medicine (APTVM 22(c):1/2010)
- Veterinary Surgeon Act (1954)
- Food Act 1985



## TARGETED SAMPLES & PATHOGENS

Sample	Species	Pathogen
1. Food Animals	Poultry	<i>Salmonella spp.</i> , <i>E. coli</i>
	Chicken/Duck	<i>Salmonella spp.</i> , <i>E. coli</i> , <i>Campylobacter</i>
2. Foods	Cattle/Buffero	<i>Salmonella spp.</i> , <i>E. coli</i> O157
	Sheep/Goat	<i>Salmonella spp.</i> , <i>E. coli</i> O157
	Pig	<i>Salmonella spp.</i> , <i>E. coli</i>

## SOURCE OF SAMPLES

Sample	Source/Programme
Food Animals	National Monitoring and Surveillance Disease Programme
Foods / end products	National Food Safety Programme Manual*

\*already established

## FOOD ANIMALS

- **National AMR monitoring/surveillance plan**
- Currently, source of samples are based on National Disease Monitoring and Surveillance programme - HPAI/ ND/Salmonella (chicken)
- Improving the monitoring/surveillance plan by revising the list of commercial poultry farms from the State Veterinary Department

## FOOD PRODUCTS

Type of meat	Source
Chicken/duck	Processing Plant (22)
Cattle/buffalo	Slaughterhouse (30)
Sheep/goat	Slaughterhouse (30)
Pig	Slaughterhouse (6)

( ) no. of processing plants/slaughterhouses

## LIST OF ANTIBIOTIC DISK & METHOD

### ANTIBIOTIC DISK

- 47 different types of disk
- Both gram negative & positive bacteria

### METHOD

- Disk Diffusion Agar / Minimal Inhibitory Concentration (MIC)

## NATIONAL CURRENCY FUND

- Not implemented in Malaysia
- Expenses of AMR and Zoonoses based on Management Budget
- (RM- Malaysian Ringgit) (Budget of Disease Control Division, DVS Malaysia)

Activities	Year 2011	Year 2012	Year 2013
Compensation	470,000.00	400,000.00	500,000.00
Rabies vaccines	50,000.00	50,000.00	50,000.00
Dog licensing	50,000.00	50,000.00	50,000.00
World Rabies Day	10,000.00	15,000.00	15,000.00
Training	-	-	130,000.00
Awareness campaign		80,000.00	60,000.00

# Myanmar

Dr Maung MAUNG  
Regional Veterinary Officer  
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## Introduction

Upgrading livestock production in Myanmar is a major concern of the new government and it is a basic step to develop the country. 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). The use of antimicrobials in livestock production is still an important issue for appropriate care of food animals in Myanmar. In food-producing animals, the main reasons of antimicrobial use 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, a legal framework and institutional arrangements for regulating antimicrobial use in livestock production and instruments for enforcement still need to be established. 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, chlortetracycline, 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 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 poultry farmers use

antimicrobials without any consultation from veterinarians. Most poultry producers use antimicrobials as preventive measures for bacterial diseases. Nobody considers withdrawal periods of antibiotics, which they use in their food animals. Therefore, antibiotic residues are frequently encountered in poultry meat and eggs. Chlortetracycline is still used as feed additive for growth promotion by some poultry feed producers.

The pattern of antimicrobials used in cattle and pig production are quite similar. In cattle and pig production, penicillin, streptomycin, lincomycin, enrofloxacin, gentamycin and kanamycin are the 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 was conducted by the University of Veterinary Science, Yezin, Myanmar. Since poultry meat is consumed by the majority of people, irrespective of race and religion 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. 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 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.

According to a study with *Escherichia coli* isolates 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). In another study, thirteen

strains of *Escherichia coli* were isolated from broilers with typical post-mortem lesions of colibacillosis from commercial broiler farms in Mandalay region. Serological typing by rapid slide agglutination test indicated 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 were 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 markets were positive for antibiotic residues (Khin Thida San, 2005). In another 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 residue 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 used antibiotics was 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 based 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 used antimicrobials was tested with isolated *E. coli* O157. Resistance of *E. coli* O157 isolates to ciprofloxacin (5µg), gentamycin (10 µg), and trimethoprim-sulfamethazole (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).

## **AMR In-Country Actions**

Research on AMR has been ongoing at the University of Veterinary sciences but not much has been done to undertake a nationwide situational analysis. A National Task Force has not yet been established within the country and its establishment is still in the organizing phase. Nevertheless, a few activities have been carried out for the improvement of good husbandry practice and farm bio-security at some poultry industrial zones such as in Monywa, Shwe Bo and Nyaung Hnin Pin townships of Sagaing and Yangon Regions respectively. The development and implementation of communication and public awareness on AMU and AMR is under negotiation within the department. In addition, the review and development of improved practical legislation and regulatory framework are in process. However, although the legislation has not yet been updated, the national assay laboratory has been upgraded by increasing staff and providing training and other facilities have been equipped for the detection of AMR. Systematic monitoring and surveillance of AMU and AMR is under discussion within the department.

## **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 faced in the 21<sup>st</sup> 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 in human pathogens.

## **Pakistan**

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### **Introduction**

Pakistan is endowed with a large livestock population well adapted to the local environmental conditions. The national herd (2009-10) consists of 34.3 million cattle, 30.8 million buffaloes, 27.8 million sheep, 59.9 million goats and 1.0 million camels. In addition, there is a vibrant poultry sector in the country with more than 942 million birds produced annually. These domestic farm animals produce 45 million tons of milk, (making Pakistan 4<sup>th</sup> largest producer of milk in the world after India, USA, and China), 1.6 million tons of beef, 0.6 million tons of mutton, 0.7 million tons of poultry meat and 11.84 billion eggs. Other valuable livestock products include wool, hair, skins and hides.

From animal health and disease control point of view, the major issues and challenges consist of high incidence of infectious diseases (HS, FMD, PPR, ND, HPAI, etc); weak system of disease surveillance, monitoring and reporting; insufficient institutional capacity and delivery of veterinary extension services to farmers; outdated regulatory framework for the control of trans-boundary and zoonotic diseases and lack of National Contingency Plans for control of animal diseases.

Diseases are one of the important factors causing low productivity of livestock in Pakistan. Treatment and control of diseases still remains the most crucial point for the success of any livestock productivity enhancement initiative or application of an improved production technology. Diseases with high mortality deprive the farmers from their livelihood whereas those with high morbidity cause huge economic losses to the farmers.

Common diseases of livestock in Pakistan can be classified into bacterial, viral, parasitic/protozoan and metabolic. The bacterial diseases having considerable economic importance include Haemorrhagic Septicemia (HS), Brucellosis, Black Quarter (BQ), Enterotoxaemia (ET), Contagious Caprine Pleuropneumonia (CCPP) and Mastitis. The important viral diseases include Foot & Mouth Disease (FMD), Pest de Petits Ruminants (PPR), Avian Influenza (AI) and Newcastle Disease (ND). A fatal viral disease of livestock i.e Rinderpest has been eradicated from Pakistan since 2007.

### **Zoonoses**

Zoonosis is the phenomenon of mutual transmission of infectious diseases between animals and humans. The term “emerging zoonotic diseases” is used for those diseases which are caused by a totally or partially new agents i.e. unknown or less-known micro-organisms. Re-emerging zoonotic diseases are those, which are caused by previously known micro-organisms but now occurring at new places and in new species. It is

generally agreed that 60% of known human pathogens are zoonotic, 80% of known animal pathogens have multiple hosts, 75% of all emerging infectious diseases are zoonotic and nearly all emerging diseases of humans originate from animal reservoirs.

The common zoonotic diseases include Brucellosis, Bovine Tuberculosis, Anthrax, Rabies and Highly Pathogenic Avian Influenza. The diseases important from the point of view of international trade (Trans-boundary Animal Diseases-TAD) include FMD, PPR, CCP, HPAI and ND. Presently, the control strategy for almost all animal diseases is based on vaccination. There are four Veterinary Research Institutes (VRI) established by the provincial livestock departments which produce vaccines against most of the animal diseases. However, because of limited capacity of the VRIs, vaccine supply is far below the requirements and the vaccination cover remains only 20-25%. Moreover, the quality of locally produced vaccines is also sometimes questioned.

Effective control of zoonotic diseases can be achieved through “One Health” approach. One Health is a contemporary term describing the collaboration of various scientific disciplines in the pursuit of better health for all i.e. humans, animals, and the interlinked ecosystems. The history of the One Health concept dates back to the 19<sup>th</sup> century when Rudolf Virchow, a German physician and pathologist, formally recognized the connection between human and animal health and stated *“Between animal and human medicine there is no dividing line, nor should there be. The object is different, but the experience obtained constitutes the basis of all medicine.”* In the early 20<sup>th</sup> century Canadian physician William Osler became the first practitioner of this collaborative-medicine concept. An American Veterinarian, Calvin Schwabe, first time coined the term “One Medicine” in his 1984 book *Veterinary Medicine and Human Health*. The One Health Concept was revitalized in the 21<sup>st</sup> century. In 2004, a meeting of health experts in USA formulated its guiding principles. Later, One Health Symposia were held in Thailand (2004), China (2005) and Brazil (2007) in order to develop strategy and implementation mechanisms for the One Health approach.

By most measures, the condition of many of our ecosystems is changing dramatically. Over time, the wildlife-livestock-human interface is increasing. One Health seeks to shift the paradigm from the current “individual” or “disease centered,” approach to a “system” or “community based,” approach. It is a creative way to view human, animal, and ecosystem health as a cooperative endeavor between health practitioners and environmental scientists in a collaborative and synergistic effort. Coordination of wildlife, environmental, human, and domestic health sectors improves our ability to *prevent* disease events rather than simply reacting to them.

Implementation of the One Health approach is still at the infancy stage in Pakistan and the major challenges faced by it include (i) devolution of human health and animal health functions to provinces, (ii) poor coordination between human health and animal health departments and lack of SOPs for joint epidemiological investigations, (iii) difficulties in the adoption of biosafety and biosecurity measures in research and diagnostic labs, (iv) evolution of mutant pathogens under the vaccination pressure and difficulty in developing specific diagnostics and vaccines, (v) shortage of trained

epidemiologists, virologists and vaccinologists, and (vi) shortage of resources and expertise in controlling diseases of animal and/or public health significance.

### **Control of Zoonoses Through One Health Approach in Pakistan**

The first initiative under the One Health approach was taken by the Government of Pakistan in 2006 for the control and prevention of HPAI (H5N1) or bird flu. This program was implemented by the federal ministry of Food, Agriculture & Livestock in collaboration with National Reference Laboratory for Poultry Diseases (NRLPD) of NARC, twelve satellite Provincial Veterinary Diagnostic Laboratories and National Institute of Health (NIH) of the federal ministry of Health. Forty (40) Regional Surveillance Units (RSU) were established throughout the country, which collected and tested more than 400 000 samples of blood, tissue & swab. Sixty-six (66) Rapid Response Teams were constituted, which successfully handled 26 outbreaks of bird flu in 2006, 59 outbreaks in 2007 and 9 outbreaks in 2008. As a result of this collaborative effort, HPAI was successfully contained and no H5N1 outbreak has been reported in Pakistan since June 2008.

At present, four research projects using the One Health approach are being implemented in Pakistan. The first project focuses on the “Surveillance, Pathogenesis and Management Strategies against Major Emerging Avian Diseases”. This project is implemented by NRLPD of NARC in collaboration with international institutions (SEPRIL, GA, USA and IAH Campton UK) and eight provincial veterinary diagnostic laboratories in Pakistan.

The second project is a part of the SAARC/FAO Regional Cooperation Program on HPED in South Asia. Its objective is to enhance capacity and capabilities of SAARC to prevent, control and eradicate HPED including HPAI through improved veterinary and public health services and inter-sectoral collaboration at regional level.

The third project is supported by FELTP/CDC USA. NRLPD of NARC and NIH are jointly implementing this project in collaboration with six provincial public and animal health institutions. Its objectives are (i) to strengthen zoonotic animal health status by employing specific surveillance system, laboratory diagnostics and data management, (ii) to train the veterinarians, para vets, farmers in basic applied epidemiology, disease surveillance, bio-security, outbreak response and animal health management and (iii) to enhance institutional capacity for conducting zoonotic health investigation, for devising animal-human interface interventions and for supporting existing disease prevention/detection and control efforts.

The fourth initiative using the One Health approach, is the establishment of a One Health Hub in Pakistan. This is a part of Massey University New Zealand Regional Project with a focus on the control of brucellosis and Congo-Crimean Haemorrhagic Fever (CCHF). Under this project, three Medical and five Veterinary Doctors from Pakistan have completed MS degree training in epidemiology from Massey University, New Zealand; four sentinel sites in Khyber Pakhtoon Khwa and Balochistan have been set-up and joint training sessions of veterinarians and medical officers are being organized.



A meaningful outcome of the abovementioned One Health initiatives in Pakistan greatly depends on a well thought out strategy for inter-sectoral cooperation to control zoonotic diseases. Following are some of the recommendations for incorporation in this strategy:

1. Establishment of disease reporting and early warning systems by public health authorities and sharing of disease status with animal health authorities.
2. Setting up a joint Task Force to coordinate between human and animal health sectors for developing joint response strategy against zoonotic disease outbreaks.
3. Development of coordination mechanism between two sectors for sharing data of disease prevalence in different parts of the country.
4. Undertaking joint efforts for launching disease awareness campaign through national and international agencies.
5. Developing SOPs of a rapid response mechanism and organizing joint training for the professionals and field staff of both sectors for sharing in handling of zoonotic disease outbreaks.

## **Food and Waterborne Diseases**

The food and water borne diseases recorded in Pakistan are described below:

### ***Hepatitis A***

A viral disease, that interferes with the functioning of the liver. It is spread through consumption of food or water contaminated with fecal matter, principally in areas of poor sanitation. The victims exhibit fever, jaundice, and diarrhea. About 15% of victims will experience prolonged symptoms over 6-9 months; vaccine available.

### ***Hepatitis E***

A water-borne viral disease, that interferes with the functioning of the liver. It is most commonly spread through fecal contamination of drinking water. The victims exhibit jaundice, fatigue, abdominal pain, and dark coloured urine.

### ***Typhoid fever***

A bacterial disease, that spreads through contact with food or water contaminated by fecal matter or sewage. The victims exhibit sustained high fevers. If left untreated, mortality rates can reach 20%.

### ***Leptospirosis***

A bacterial disease, that affects animals and humans. The infection occurs through contact with water, food, or soil contaminated by animal urine. The symptoms include high fever, severe headache, vomiting, jaundice, and diarrhea. If untreated, the disease can result in kidney damage, liver failure, meningitis, or respiratory distress. Fatality rates are low but left untreated recovery can take months.

## **Antimicrobial Resistance**

There is a long history of use of antibiotics for treatment of bacterial infections in animals and human beings in Pakistan. With the passage of time, their use has become more frequent and they are given to even those animals which might not be suffering from any bacterial infection. In addition, the antibiotics are also used as feed additives and growth promoters. Under the current practices, there is no or little control on the type and quantity of antibiotics to be used. This results in frequent over-dosing of the animals.

Because of the irrational and non-judicial use of antibiotics, there has been a gradual development of drug resistance in various pathogens of livestock and poultry. The phenomenon of anti-microbial resistance (AMR) is transferable from animal to human infecting bacteria through the contamination of human food chain at the animal-human interface.

AMR is currently not recognized as a major issue in Pakistan. Some recent reports have, however, indicated that a number of pathogens are becoming resistant to drugs used in animal production. The development of AMR has been observed specifically for the treatment and recovery time of the animal diseases like mastitis, staphylococcal and streptococcal infections, foot rot, navel illness, pneumonia, uro-genital tract infections, etc. Such pathogens have developed resistance even to third generation antibiotics. The situation has become more complicated because some zoonotic pathogens originating from animals have also acquired resistance against several drugs used for their treatment in human patients.

## Papua New Guinea

Dr Nime R. KAPO

Chief Veterinary Officer & Chief Quarantine Officer  
National Agriculture Quarantine and Inspection Authority

### Incidence of Zoonoses

An accurate and objective record of incidences of zoonotic diseases in PNG is not available due mainly to the inefficiencies of proper surveillance and coordination between the animal and public health authorities partly stemming from out-dated legislative and structural alignments.

From the animal health perspective, parasitic (trichinellosis, porcine cysticercosis) and bacterial (leptospirosis, brucellosis, tetanus, ringworm) zoonoses occur in wild and domestic animals. Hence, it is believed that some of these zoonoses occur in humans where the respective pathogens are prevalent in animals. Lack of proper diagnostic capacity in isolated regions may lead to tentative diagnosis and treatment of symptoms. Japanese encephalitis has also been recorded in certain parts of PNG. Hospitals and health centres do treat humans for tetanus, ringworm and JE.

### Food-borne Diseases

Typhoid fever has been endemic in PNG for a while and is associated with poor sanitation and the growth and sustenance of the informal sector, whereby food safety standards may not be applied by with food stalls operating under informal sector arrangements.

Cholera was detected for the first time in 2009 and has spread to most population centres

### Antimicrobial Resistance

Incidence: The incidence of antimicrobial resistance is not quantifiable in PNG, given that both the public health and animal health sectors are not properly resourced and empowered to address the problem. However since AMR is a global issue, there is momentum in PNG currently to address this through policy developments such as the National Medicines Policy, the Food Safety Policy and the Public Health Act review that are currently underway. The animal health sector is fully engaged in these developments to ensure that issues of AMR are properly addressed.

In-country actions to reduce the risks of AMR (as agreed at 36<sup>th</sup> Session): The 73<sup>rd</sup> Executive Committee reviewed and adopted the agenda of the 36<sup>th</sup> Session and associated workshop on antimicrobial use (AMU) and resistance (AMR) in the Asia-Pacific Region. Further Delegates endorsed certain in-country action plans. As reported above, certain policy developments are actually conducive for PNG to address the issues of AMU and AMR discussed by APHCA. At this stage, PNG would report the positive

development in policy, which will form the basis for further actions to address AMU/AMR.

### **APHCA National Currency Fund**

The 73<sup>rd</sup> Executive Committee meeting discussed the issue of National Currency Funds (NCF) which in the past have been very useful for financing in-county activities in support of APHCA activities and suggested that member countries investigate and report on the status of their NCFs at the next Session. Further, Delegates endorsed that Member countries replenish / establish the respective NCFs and report on the status at the next Session.

Unfortunately, PNG has no established NCF and would explore the concept further and its potential use to support national initiatives on relevant APHCA-related activities. Given current experience in securing funding for other pertinent activities, e.g. emergency disease response funds, the difficulty in securing a specific NCF for APHCA as a separate and readily available funding is acknowledged. However, as and when required, funding can be sought through normal government submissions.

## Philippines

Dr Rubina O. CRESENCIO  
Director, Bureau of Animal Industry

### Zoonotic Diseases

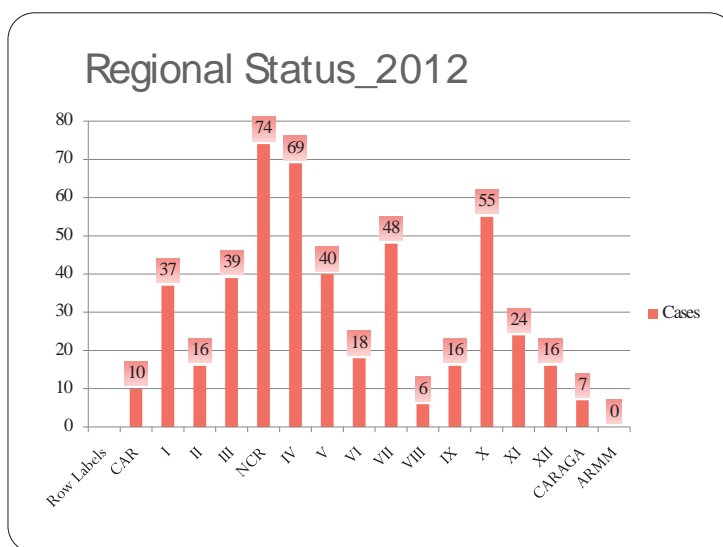
#### **Rabies**

Rabies is considered as the major zoonotic and public health concern in the country. The disease is highly fatal which affects the nervous system. It is transmitted mainly through the bite of infected animal and is characterized by muscle paralysis, hydrophobia and aerophobia.

*Rabies in the Philippines:* Human cases of rabies occur in the Philippines and are caused principally by dogs through bites. Based on records, there was an average of 236 human cases and deaths from 2008 to 2011 (Infectious Disease Office, National Center for Disease and Control, WHO Philippines). In 2012, 213 human rabies cases and 414 553 animal bites were recorded. Most of the bite victims were observed to be below 15 years old.

The dog population was estimated at 9 million for the entire country. Animal rabies cases were reported in most of the regions of the country. The highest dog rabies cases were recorded in 2001 with 2 550 cases. A decreasing trend was noted with a total of 475 cases diagnosed in 2012.

Most of the cases in 2012 were reported in dogs (98.3%), followed by cats (1.5%) and cattle (0.2%). National Capital Region (NCR) had the highest number of cases (15.6%) followed by Region IV–A (14.5%), Region X (11.6%) and Region VII (8.6). Majority of the rabies positive cases affected household dogs (76.5%) followed by stray dogs (19.8%) and neighborhood dogs (3.7%).



**Chart 1. Animal Rabies Cases in 2012**

For 2013 (as of September), there were 357 animal rabies cases reported which occurred in 15 of the 17 regions of the country. NCR (17.4%) had the highest number of cases followed by Region III (14.3%) and Region IV-A (11.5%).

**Policies and Program to Control Rabies:** Realizing the loss of lives due to this deadly disease, the Anti-Rabies Act (Republic Act 9482) was passed in 2007. The primary objective of the law was to protect and promote the right to health of the people. The law prescribed for a system for the control, prevention of the spread, and eventual eradication of human and animal rabies and the need for responsible ownership.

Drawing the mandate from the law, a National Rabies Prevention and Control Program (NRPCP) was established. The program is implemented by a multi-agency /multi-sectoral committee chaired by the Bureau of Animal Industry (BAI) of the Department of Agriculture (DA) together with the Department of Health (DOH), Department of Interior and Local Government (DILG), Department of Education (Dep Ed), Local Government Units with the assistance of the Department of Environment and Natural Resources (DENR), Non-Governmental organizations (NGOs) and People's Organizations (Pos).

Activities include the following:

1. Mass vaccination of dogs;
2. Establishment of a central database system for registered and vaccinated dogs;
3. Impounding, field control and disposition of unregistered, stray and unvaccinated dogs;
4. Conduct of information and education campaign on the prevention and control of rabies;

5. Provision of pre-exposure vaccination treatment to high risk personnel and post-exposure treatment to animal bite victims;
6. Provision of free routine immunization or Pre-Exposure Prophylaxis (PEP) of schoolchildren aged five to fourteen in areas with a high incidence of rabies;
7. Encouragement of responsible pet ownership.

The law also defines the various responsibilities of the different organizations identified including the responsibilities of pet owners. Other responsibilities assigned to the DA-BAI include:

1. Improve and upgrade existing animal rabies laboratory diagnostic capabilities to ensure better services to the people
2. Ensure the availability and adequate supply of animal anti-rabies vaccine;
3. Undertake free anti-rabies vaccination of dogs giving priority to high risk depressed areas
4. Maintain and improve animal rabies surveillance system
5. Establish and maintain rabies free zone in coordination with the LGUs
6. Immediately facilitate for the approval of the sale and use of veterinary and human barbiturate drugs and veterinary euthanasia drugs by the DOH and the Philippine Drug Enforcement Agency (PDEA)
7. Strengthen the training of field personnel and the Information Education and Communication (IEC) activities on Rabies prevention and control, and responsible pet ownership.
8. Conduct research on Rabies and its control in coordination with other agencies
9. Formulate minimum standards and monitor the effective implementation of this Act.
10. Encourage collaborative activities with the DOH, DepEd, DILG, DENR ,NGOs, Pos and other concerned sectors.

***Rabies Free Areas/Free Zones:*** Using a set of guideline and mechanics, the BAI and the DOH declared several areas in the country as Rabies Free. For this year, six additional areas will be declared as rabies free. These are the province of Guimaras; islands of Coron, Busuanga and Culion in Palawan; Olympia Island in Bais City Negros Oriental; and Boracay Island in Malay, Aklan. It is being envisioned that the Philippines will be completely free from rabies in 2020.

### ***Leptospirosis***

As of 7 September 2013, 1 174 human leptospirosis cases have been reported nationwide, which was 78.7% lower compared to the same period last year (5 522). Majority of the cases were reported in the National Capital Region (17.8%), Region VI (17.7%), Region III (15.2 %), Region XI (11.41%) and Region II (8.94%).

Reported cases are between the ages of 2-83 years old with a median of 30 years of age. Most of cases occur in males (86.1%) and those in the age group greater than 40 years

old (27.2%). There were 86 deaths with a case fatality rate of 7.3%. In 2013, upsurge in cases are reported from June-August which is the rainy season. This period accounts for 53.2% of all the reported cases.

The National Epidemiology Center (NEC) of the Department of Health provides weekly updates online regarding the disease.

## **Food-borne Diseases**

In June 2012, the Province of Catanduanes was placed under the state of calamity due to the significant increase of diarrhea cases which affected all eleven municipalities of the province. There were 1 730 cases reported and 14 deaths. Of the 250 samples tested, 31 tested positive for *vibrio cholerae*. The suspected source of contamination was an improvised spring near a river which was used as a drinking water. The Center for Health Development of DOH worked with the local government in providing potable water as well as community education for proper hand washing and other control/prevention measures.

The Food and Waterborne Diseases Prevention and Control Program of the Department of Health focuses on prevention and control parasitic, fungal, viral and bacterial diseases acquired through ingestion of contaminated drinking water or food. In the Philippines, the most common cause of major outbreaks for the past two years are bacterial diseases such typhoid fever and cholera.

Parasitic organisms are also part of the program such as capillariasis, heterophyidiasis and paragonimiasis which are still endemic in the country. Another major problem is cysticercosis due to its neurological effects.

The program provides support to the local government units through the provision of water purification tablets and solutions; stockpile of medical supplies and medicines in the event of outbreaks; information campaign in prevention of food-borne illnesses (such as capillariasis due to unsafe cultural practice of eating raw aquatic products); and improved technical coordination between the national and regional epidemiology surveillance units.

## **Antimicrobial Resistance (AMR)**

Addressing the issue of AMR is a collaboration between DOH and DA which is based on the mandates and existing policies of both agencies. The following are the existing policies of DOH on AMR: Food, Drugs, Devices and Cosmetic Act (Republic Act 3720); Food and Drug Administration Act of 2009 (Republic Act 9711); Universally Accessible Cheaper and Quality Medicines Act of 2008 (Republic Act 9502); and Generics Act of 1988 (Republic Act of 6675)



For DA, the AMR is anchored in the Livestock and Poultry Feeds Act of 1956 and DA Administrative Order No. 24, Series of 2009 (Implementing Guidelines of the National Veterinary Drug Residues Control Program). The recently passed Food Safety Act of 2013 (Republic Act 10611) also further strengthen the current efforts of the national government agencies and other stakeholders regarding AMR.

As an off-shoot of the Nengombo Meeting in 2012, DOH and DA drafted a Presidential Executive Order (Developing a Comprehensive and Sustainable National Plan to Combat Antimicrobial Resistance in the Philippines). The drafted policy aims to provide an integrated, collaborative, and directed action against AMR in humans and animals.

An Inter-agency Committee on AMR (ICAMR) was also established to develop a national plan to prevent, control and eliminate AMR in the country. Aside from DA and DOH, members also include the Department of Interior and Local Government (DILG) and The Department of Science and Technology (DOST). The following were the offices involved in ICAMR in the different national agencies.

<b>National Agency</b>	<b>Offices</b>
<b>Department of Health</b>	National Center for Pharmaceutical Access and Management (NCPAM)
	National Center for Diseases Prevention and Control (NCDPC)
	National Epidemiology Center (NEC)
	National Center for Health Facilities Development (NCHFD)
	Health Policy Development and Planning Bureau (HPDPB)
	National Center for Health Promotions (NCHP)
	Research Institute for Tropical Medicine (RITM)
	Food and Drug Administration (FDA)
	Philippine Health Insurance Corporation (PHIC)
<b>Department of Agriculture</b>	Bureau of Animal Industry (BAI)
	Policy and Planning Service (PPS)
	National Meat Inspection Service (NMIS)
	National Dairy Authority (NDA)
	Bureau of Fisheries and Aquatic Resources (BFAR)
	Food Development Center (FDC)
	Bureau of Agriculture and Fisheries Products Standards (BAFPS)
<b>Department of Science and Technology</b>	Livestock Development Council (LDC)
	Philippine Council for Health Research and Development (PCHRD)
<b>Department of Interior and Local Government</b>	Local Government Units (LGU)

Existing field activities in BAI regarding AMR include the promotion of risk and HACCP based inspection for feeds; strengthening of regulatory activities such as on feed registration, laboratory analysis and inspection; and conduct of seminars regarding AMR to veterinary drug and feed suppliers.

NMIS conducts antimicrobial residue testing of meat while BFAR has a surveillance program on antimicrobial use in aquaculture. NDA, on the other hand implements mandatory pasteurization of milk before sale and distribution. Organic agriculture is another major thrust of DA and provides alternative farming system for livestock raising.

Funds to support the activities related to AMR have already been allocated for BAI as well in other DA agencies. The National Currency Fund is a possibility that can be further explored for future implementation of a national AMR program.

## Samoa

Dr Agnes T. MEREDITH

Principal Animal Health Officer, Animal Production and Health Division

### Existing Problems in Animal Health

The main problems within the Ministry as well as Samoa as a country, is the extensive lack of manpower to implement effective surveillance programs. Additionally there is also another island (i.e. Savaii) to consider for surveillance but there is a limited amount of resources to be able to carry this out effectively. At the moment, disease surveillance is carried out and funded by the Secretariat of the Pacific Community (SPC) or Food and Agriculture Organization (FAO). One of the major obstacles in trying to acquire the resources is the lack of technical capacity to run and maintain the facilities in the long run. Samoa has the potential to improve and function independently but the main issue is the lack of qualified personnel to facilitate the surveillance programs and operate the veterinary laboratory in terms of serology and microbiology testing. Samoa needs to focus on improving public awareness about the opportunities available within the agriculture sector to improve; whether that be crops, fisheries, livestock. There is an alarming lack of graduates for Agricultural Science as there is a growing culture for office jobs instead of field and laboratory work. However, I recognize that our current para-vets need to be trained on how to diagnose certain diseases so through this training course I hope to achieve a better understanding of practical methods to be able to educate my animal health team.

In terms of monitoring zoonotic diseases, there is a chronic and severe lack of veterinarians employed in Samoa (both private and public sectors) to assist in this aspect of public health surveillance. Once again, the main obstacle is the lack of qualified personnel. Samoa would need to outsource a qualified veterinarian to assist the Ministry of Health with their surveillance efforts in addition to helping run the Veterinary Program already in place within AH&R of APHD. If this was achieved, surveillance would be labor efficient and collaboration between two critical Ministries would be established.

Lastly, there is a poor collaboration between the Health sector and the Agriculture sector in terms of public health management. This results in situations where the surveillance efforts of one Ministry are doubled up by another resulting in an inefficient vehicle for disease monitoring and analysis. An example of surveillance MAF currently carries out is meat inspection of carcasses before they are sold to butcheries and retail supermarkets. The limitation with this process is that visual inspection of carcasses does not guarantee hygienic slaughter and quality meat being produced and sold to butchers or supermarkets. The only accredited laboratory in Samoa that can carry out microbiology testing of any meat sampled is an independent organization that charges for testing. The charges incurred are not so affordable. On the other hand, there is a

severe lack of policies to engage the public into adopting hygienic slaughter methods. In addition to this, there is also a lack of education programs in place to inform the public about the issues of current bush slaughter methods. This in turn perpetuates the problem of consuming low quality meat with a high risk of food poisoning and zoonotic disease transmission. The Ministry of Health does not carry out targeted surveillance for food poisoning from salmonella spp., coliforms and campylobacter spp. due to a lack of technical capacity and available resources. So in turn, there is a vicious cycle in this set up which can be broken by an improved legal framework and an increased awareness campaign of public health issues related to unhygienic slaughtering. This is only one example but it reflects the general way with which many Ministries work; often parallel but not in a mutual or collaborative manner.

### **In-Country Actions to address Antimicrobial Resistance**

The Ministry of Agriculture and Fisheries is undertaking a project funded by the World Bank that aims to establish an abattoir in the next 5 years. One of the main objectives of this project component is to address public health via ensuring food safety and public health surveillance. In the interim, this project will introduce mobile slaughter units that comply with minimum HACCP regulations to carry out slaughter and inspection of meat. The government is in the final stages of introducing relevant legislation to regulate these facilities, which will come into enforcement sometime in 2014. Through this new slaughter and inspection system, the Government is able to carry out better surveillance of meat going into the retail chain. For example, all animals that are to be slaughtered are accompanied by food chain information, which ensures that all animals receiving treatment with any antibiotics or drugs do not get slaughtered until the WHP are met. Secondly, all offal and meat carcasses are subject to post mortem inspection before they are approved for retail.

Secondly, a key recommendation that was raised in the 36<sup>th</sup> APHCA Session highlighted the need to introduce AMR as a technical issue for public awareness into existing mandatory food regulated authorities and committees. To date, there has been no effort by MAF to see this through. However over the last year, the Animal Production and Health Division, MAF, has made several attempts to link up with the Ministry of Health, particularly the Public Health Division. Unfortunately, there has been very poor feedback from MOH and a lack of willingness to share information and collaborate. The Ministry of Health would have received some training on the rational use and advocacy of AMR sometime in the last 3 years from WHO/IHR initiatives. An APSED workshop was held in 2012 of which several key activities involved linking up the animal health laboratory and the public health laboratory. To date, this has not been successful.

Samoa is very fortunate to be free of many notifiable diseases including rabies. The last national surveillance was carried out in 1999 and the Ministry recognizes that updating this information is one of its key activities over the next financial year.

Lastly, APHD is currently looking into developing a central database that links all information from Animal Health, Research and Animal Production sections. This will aim

to improve policy development as well as training for farmers especially concerning animal nutrition and record keeping.

There are three main sources of veterinary drugs in Samoa, which include the Ministry of Agriculture and Fisheries, Animal Protection Society (APS) and Agricultural Store. MAF uses veterinary medicines to treat sick or injured livestock at the discretion of the Government Veterinarian and trained para-veterinarians. The medicines include 5 main groups of antibiotics, which all require that individual cases complete the recommended course of antibiotics. The Agriculture Store only dispenses anthelmintics and vitamins. This has a low risk implication for AMR development, but instead implicate anthelmintic resistance, which is a separate yet common problem in the livestock industry in Samoa now. The APS deals mainly with small animals and also administers and dispenses antibiotics at the discretion of their veterinarian.

APHD aims to collect information from the latter two organizations on their dispensary of veterinary drugs and integrate this information into the Ministry's Animal health database.

There is currently no formal legislation to regulate the use and dispensation of veterinary medicines, which will be one of the key activities in APHD's annual work plan for 2013 – 2014.

# Sri Lanka

Dr Weligodage K. DE SILVA

Director General, Dpt. of Animal Production and Health

## SRI LANKA

### The use of Antimicrobials in Livestock Production and Antimicrobial Resistance in Pathogens from Livestock

*Dr. W K de Silva*  
Director General

Department of Animal Production and Health

37th APHCA Session  
Thimphu, Bhutan, Sept 2013

## SRI LANKA

### Main Livestock Production

Product	2011	2012
Milk (million litres)	286.7	336.2
Eggs (million eggs)	1,917.9	2,278.7
Chicken (million kg)	116.8	137.4

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## SRI LANKA

### Legal Framework

- Key legal instrument - Animal Diseases Act No 59 of 1992
- Antimicrobials have been categorized under pharmaceuticals
- Director General - empowered officer for the general administration of this Act

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## SRI LANKA



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## SRI LANKA

### Main Livestock Populations (in Millions)

Animal type	2012	2013
Cattle	1.191	1.250
Buffalo	0.475	0.478
Goat	0.396	0.397
Swine	0.085	0.089
Parent poultry	0.002	0.002
Layer	0.110	0.130
Broiler	0.880	0.910
Commercial	7.080	7.190
Layer	6.070	6.180

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## SRI LANKA

### Legal Framework cont.

- **Section 17** – Prohibits manufacture without proper authorization
- **Section 21** – Prohibits import without proper approval
- **Section 31** – No import without valid certificate from CVO at origin
- **Section 32** – Appoints Veterinary Drug Control Authority (VDCA)

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### Institutional Arrangements

- Veterinary Drug Control Authority (VDCA) (9 members)
  - **Chairman** - DG/DAPH
  - **Registrar** - Veterinarian employed under DAPH
- **Specialist Committee**  
*(clinical practice in State & Private Sectors, microbiology and immunology, Parasitology, pharmacology, nutrition, reproductive physiology and endocrinology)*
- **Representative** for pharmaceutical industry

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### Institutional Arrangements cont.

Animal Feeds: Animal Feed Act No 15 of 1986

Regulate, supervise and control the manufacture, sale and distribution of animal feeds

Animal Feed Advisory Committee has been established (6 Members)

Registrar - Veterinarian employed under DAPH

Director General functions as the Chairman

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### Imports 2012

Active Ingredient	2012	Up to Aug 2013
Enrofloxacin	2,696	38
Amoxycillin	6,130	4,532
Tylosine	3,026	(Mycoplasma outbreak) 30,995
Sulphadiazine	5,264	0.02
Trimethoprim	1,300	110
Oxytetracycline	1,032	34
Chlortetracycline	900	9,443
Neomycin	808	1,331
Bacterim	710	0
Doxycycline	658	1,260
Flumequine	560	541
Penicillin	76	88
Ceftiofur	8	0
Total	23,168	48,266

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### Institutional Arrangements cont.

Functions of VDCA

- Exercise control over the manufacture, import, export, sale and use
- Ensure the efficient and safe use of veterinary drugs
- Determine whether licenses shall be granted for the manufacture or importation
- Advise the Minister on any matter he may refer
- Promote field trials
- Disseminate information relating to the safe and efficient use

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### Antimicrobial Use in Livestock Production

Poultry sector main user - antimicrobials, anthelmintics, anti-coccidials - oral powder/liquid

Dairy sector - mainly udder infusions and anthelmintics

Swine sector - antimicrobials - parenteral, oral anthelmintics

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### Current (and planned) arrangements

- DAPH has well recognized the importance of issue of AMR and residues in animal derived food
- Updating process of regulations of the Act launched – regulate use, storage, sales
- Food safety has been identified as a discipline under veterinary public health program
- Education enhanced - prudent use, developing professionals for pharmaceutical vending

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## Patterns and Extent of AMR Animal Pathogens

Studies on antimicrobial resistance and sensitivity are largely limited to testing of milk samples taken from mastitis cases using ABST

VICs performed, in 2012, 1 609 and 1<sup>st</sup> half of 2013, 1 234 ABST

In 2012 - 790 milk samples & 819 other laboratory samples

In 2013 - 588 milk samples & 646 other laboratory samples

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## Actions taken in 2013 in parallel to the APHCA 36

1. Continuous screening of organisms, evaluate, implement proper therapeutic regime to minimize AMR.
2. Surveillance for AMR in targeted poultry pathogens (E. coli, campylobacter, C. perfringens)
3. Control of illegal free sales of antibiotics.
4. Animal Disease Act & Animal Feed Act amended (control of imports & feed additives)

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## Status of National Currency Fund

- Govt of Sri Lanka plan on AAA Economic development (Agriculture+Aquaculture+Animal Production)
- Finances allocated for residues, AMR, awareness
- Planned to develop people for pharmaceutical industry - diploma level
- Agree with APHCA, FAO, OIE in appropriate plans falls under National Development Agenda

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Antimicrobial Agent	2012	
	Total resistant (of 576)	% Shown resistance
Amoxycillin	101	17.53
Enrofloxacin	97	16.84
Gentamycin	18	3.13
Oxytetracycline	142	24.65
Cephalexin	143	24.83
Cloxacillin	161	27.95
Penicillin	205	35.59
Sulpha+Trimethoprim	27	4.69
Neomycin	8	1.39
Doxycycline	10	1.74
Ampicillin	59	10.24
Streptomycin	12	2.08
Sulphamethoxazole	10	1.74
Chloramphenicol	15	2.6
Tetracycline	4	0.69
Erythromycin	4	0.69

## Actions taken in 2013 cont ...

5. Prohibit use of therapeutic antibiotics in feed
6. Control of illegal free sales of antibiotics
7. National disease control programs launched (Salmonella - Poultry, TB)
8. One Health program – World Bank funded (leptospirosis, brucellosis)
9. Improve bio-security measures in livestock production value chain

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# THANK YOU



## Thailand

Dr Pennapa MATAYOMPONG  
Department of Livestock Development (DLD)

### National Task Force on Antimicrobials

#### ***Sub-committee on prevention, control and resolution of antimicrobial-resistant pathogens***

The threat of infection with antimicrobial-resistant pathogens is one of the major concerns on emerging infectious diseases. Therefore, in May 2013, the National Committee on Preparedness, Prevention and Resolution of Emerging Infectious Diseases appointed by Prime Minister in July 2012 and chaired by Deputy Prime Minister had established the Sub-Committee on Prevention, Control and Resolution of Antimicrobial-Resistant Pathogens. The Sub-Committee composes of relevant personnel working on animal health and public health from public, private and academic sectors. It is chaired by the permanent secretary of the Ministry of Public Health with the secretary team composed of the Directors General from Department of Disease Control, Department of Medical Services, Department of Medical Sciences and Department of Livestock Development and the Dean of Faculty of Medicine Siriraj Hospital. The responsibilities of the Sub-Committee include:

- (i) Recommendation on the development of monitoring and surveillance system for the antimicrobial-resistant pathogens in humans and animals;
- (ii) Coordination with the relevant agencies in implementing the monitoring and surveillance system for the antimicrobial-resistant pathogens in humans and animals;
- (iii) Recommendation on the development of control and prevention system for infection and spreading of antimicrobial-resistant pathogens in hospitals and communities;
- (iv) Coordination with the relevant agencies in implementing the control and prevention system for infection and spreading of antimicrobial-resistant pathogens;
- (v) Recommendation on the implementation following the related National Strategic Plan for Preparedness, Prevention and Resolution of Emerging Infectious Diseases (2013-2016);
- (vi) Establishment of working groups for specific task as necessary;
- (vii) Other duties as assigned.

#### ***DLD working group on antimicrobial-resistant organisms and genetics in animals, animal products and farm environment***

The DLD is amending the existing DLD Working Group on Antimicrobial-Resistant Organisms and Genetics in Animals, Animal Products and Farm Environment which was established in 2011 to include more relevant private and academic sectors in order to

support and put into practice the action plan of the Sub-Committee on Prevention, Control and Resolution of Antimicrobial-Resistant Pathogens in the field of animals. The working group performs the analysis of the data on antimicrobial-resistant organisms and genetics detected from animals, animal products and farm environment, the establishment and revision of standards relevant to antimicrobial-resistant organisms and genetics in animals, animal products and farm environment and provision of planning, evaluation, management of antimicrobial-resistant organisms and genetics in the field of animals including communication for public awareness.

### **Capacity Building of the DLD Laboratories for AMR Testing**

The DLD in collaboration with the Center for Antimicrobial Resistance Monitoring in Foodborne Pathogens (in cooperation with WHO), Faculty of Veterinary Science, Chulalongkorn University organized a workshop to harmonize the laboratory techniques for AMR testing of the 9 DLD laboratories. The AMR tests conducted in the DLD laboratories are for the treatment of diseased animals, the surveillance of antimicrobial-resistant pathogens in animals and animal products (meat, milk and eggs)

### **Improvement of Legislation for AMU**

Meanwhile, Ministry of Agriculture and Cooperatives is going to issue a Notification under the Feed Quality Control Act to prohibit mixing of animal feed with pharma chemicals, salt of pharma chemicals and semi-processed pharma chemicals which are used for manufacturing of medicines for treatment, relief, cure or prevention of human and animal disease or illness. The draft notification has already passed the public hearing. The rationale of the notification is that there is evidence of animal feed mixed with inappropriate and unnecessary pharma chemicals and semi-processed pharma chemicals, which pose a threat of chemical residues, drug resistance and unsafe food for human consumption.

### **Communication and public awareness on AMU and AMR**

- Training on antimicrobial resistance in foodborne pathogens for ASEAN universities, 26-30 Aug 2013 by the Faculty of Veterinary Science, Chulalongkorn University
- International seminar “Strides on antimicrobial resistance in livestock” in Thailand Lab 2013 exhibition, 29 Aug 2013 at BITEC Bangna, Bangkok

### **National Currency Fund**

The Thai National Currency Fund allocated to support APHCA activities in country currently amounts to THB 1 294 453.50 (app. US\$43 000).

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## Speeches

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### **Welcome by Offg. Director, Department of Livestock**

Dr Tashi DORJI

Your Excellency, Lyonpo Yeshey Dorji, Hon'ble Minister, Ministry of Agriculture and Forest, Royal Government of Bhutan;

Dr de Silva, Director General, Department of Animal Production and Health, Government of Sri Lanka and Current Chair of Asia Pacific Commission for Animal Production and Health (APHCA) ;

Dr Martin Joachim Otte, Senior Animal Production and Health Officer/ Secretary APHCA;

Dr Hirofumi Kugita, OIE Regional Representative for Asia and the Pacific;

Mr Chadho Tenzin, Assistant Resident Representative, FAO Bhutan Office;

Mr Tenzin Dhendup, Director General, Department of Agriculture / Former Director General, Department of Livestock, Bhutan;

Mr Karma Dukpa, Chief Executive Office, Natural Resources Development Corporation/ Former Director General, Department of Livestock, Bhutan;

Dr Tashi Samdrup, Director, Council for Renewable Natural Resources Research of Bhutan (CoRRB);

Mr Dorji Dhradhul, Director, Department of Agriculture Marketing and Co-operatives (DAMC);

Distinguished Delegates from APHCA member countries;

Representatives from OIE, WHO, CIRAD, FAO, ILRI.

Ladies and Gentlemen! A very Good Morning!

Today, on this auspicious 19<sup>th</sup> day of the 8<sup>th</sup> Bhutanese Month, in the Bhutanese calendar; we are gathered here in Thimphu, to grace the start of three important events:

- The 74<sup>th</sup> Executive Committee Meeting of the Asia Pacific Animal Production and Health Commission;
- The 37<sup>th</sup> Session of APHCA;

- The Technical Workshop on “Zoonoses, Food Borne Diseases and Anti-Microbial Resistance”

It is for the first time that Bhutan is hosting the APHCA Session, and we are delighted to be associated with this event.

On behalf of the Organizing Committee and Department of Livestock, Bhutan; I wish to extend a warm welcome to all the distinguished delegates and participants to Bhutan and to this event.

In particular, it is my honor to welcome His Excellency, Minister, Ministry of Agriculture and Forests, Bhutan as a Chief Guest to this occasion. We know that His Excellency is currently busy with the on-going Parliament in Session. Lyonpo's presence here this morning with us is an indication of your strong support and commitment in dealing with Livestock Production and Health issues. Indeed, we are grateful for kindly sparing your valuable time with us today.

This year we have representation from 14 member countries and more than 5 International Organizations. It is an excellent representation, and we wish to extend a Special Welcome once again to all our distinguished country delegates, observers and experts representing various regional / international agencies.

With your gracious presence and blessings, we are optimistic that that the event held here in Thimphu will be a big success.

It is also my privilege to welcome two former Director General's of the Department of Livestock, Director DAMC/CoRRB and other heads of agencies to this opening session.

Let me once again extend hearty welcome to our chief guest, His Excellency and to all the distinguished delegates and guests.

Thank you and Tashi Delek

## **Welcome Address by FAO**

Hiroyuki KONUMA, FAO ADG and RR Asia-Pacific, delivered by Joachim OTTE

Your Excellency, Lyonpo Yeshey Dorji, Minister, Ministry for Agriculture and Forests,  
Royal Government of Bhutan

Director Generals, Directors, Senior Officials;

Dear colleagues;

Ladies and Gentlemen,

It is my honour and pleasure to speak some words of welcome on behalf of Dr Hiroyuki Konuma, FAO Assistant Director General and Regional Representative for Asia and the Pacific.

APHCA is one of five regional technical commissions hosted by FAO's Regional office for Asia and the Pacific. These commissions, Forestry, Fisheries, Plant Protection, Statistics and APHCA, were established upon the request from member countries to have an enabling platform, at which to discuss and find solutions to technical matters of common concern.

Establishment of these regional commissions goes back a long way, to the 1960s and 70s, and they have survived many changes in FAO, some of which have been to the better, some to the worse. Similarly, the Commissions have had highs and lows, but they have worked steadily over more than 40 years under at times adverse conditions establishing a track record of continuity and partnership.

Globally, but particularly in Asia, dramatic changes have taken place over the past decades: technological advances and investments have been tremendous, take the internet and mobile phones, human and animal populations have grown considerably, movements of people, animals and animal products have increased exponentially, public institutions have in many instances weakened and the climate is getting rougher.

The Commissions thus have to adapt and take on new challenges. Unfortunately many of the old challenges still persist. In the livestock world, in addition to the 'classical' infectious diseases that occupied much of the agendas of previous Sessions, we now face 'new' diseases that seem to be emerging ever more rapidly, many of them being of zoonotic nature. Undoubtedly this is a consequence of increased animal populations and changed husbandry systems. Antimicrobial resistance, propelled by imprudent use of antimicrobials, both in humans and animals, is another looming threat, which urgently needs to be addressed if we do not want to run the risk of succumbing to what

used to be 'simple' infections. Excessive livestock populations furthermore contribute to pollution, land degradation and climate change.

These challenges come along with an institutional environment that is gaining in complexity. Bi-, tri- and multilateral free trade agreements, overlapping regional economic communities, multinational corporate businesses, international NGOs and NGO alliances, a proliferation of international agencies, etc. make our work more difficult still, not to mention the ever-present crises demanding an immediate response.

Against this background, I believe, a level-headed APHCA, whose members are committed to the original ideal of collaboration and mutual assistance, can be of great benefit to the region. The vision of the founder fathers of this Commission as a platform for coordination of self-determined collective action, financed mainly by the countries themselves through national funds, is as valid today as it was 40 years ago.

My hope is that APHCA can expand its membership and coverage and deepen collaboration with other international and intergovernmental Organizations relevant to livestock sector development. I am therefore very pleased that we can welcome Drs Kugita and Ishibashi from OIE and Dr Cokanasiga from the Secretariat of the Pacific Community as observers to the Session.

At this point I should mention that within FAO, the regional technical commissions have become the priority setting bodies in the areas of their technical expertise for FAO's regional conferences and that the recommendations from this and the previous Session will be presented at the next Regional Conference for Asia and the Pacific to be held in Ulaanbaatar, Mongolia, in March 2014.

To end, I would like to express my personal appreciation to GoB for hosting this Session and I look forward to fruitful deliberations.

Thank you

## **Opening Address by the Guest of Honour**

H.E., Lyonpo Yeshey DORJI, Minister, Ministry for Agriculture and Forests, Royal Government of Bhutan

Chairperson of APHCA, Dr W.K. de Silva,  
Secretary of APHCA, Dr Joachim Otte,  
Representatives of FAO & OIE

Delegates, Participants,  
Ladies and Gentlemen

Kuzuzangpo, “good morning”, a very warm welcome to Bhutan and the “37<sup>th</sup> Session and 74<sup>th</sup> Executive Committee meeting of APHCA and the technical workshop on zoonoses, food borne diseases and antimicrobial resistance”

We are indeed delighted and honored to host this important event in Bhutan with funding support from OIE, FAO and APHCA.

Of the 18 member countries of APHCA, 15 countries are able to participate in this session. This is an indication of solidarity among member countries. I, on behalf of the Royal Government of Bhutan, would like to thank the delegates for their participation.

The Asia – Pacific region is home to more than two-thirds of the global livestock population and is also one of the major producers of global livestock products. Intensive farming is evolving in the region, along with increasing trade and mobility of goods and services to fulfill the growing demand for food. Along with intensive farming and trading, there is growing possibility for emergence of new pathogens and development of AMR, requiring concerted efforts to frame up appropriate preventive and remedial measures. This technical workshop is, therefore, organized at the right moment.

The role of APHCA is more crucial now than ever before to enable developing suitable measures in combating zoonosis, food-borne diseases and AMR. Of late, APHCA has notably facilitated strengthened collaboration among member countries through Livestock Policy Networking, Asian Dairy Networking and formulation of National Feed Assessment Systems. Besides, it has provided an avenue to enhance the technical capacity of individuals through technical collaboration and information sharing among member countries to tackle zoonotic diseases such as brucellosis, tuberculosis, rabies etc.

APHCA, as one of the leading regional bodies, has also enabled liaising with International organizations such as FAO, OIE and WHO, which are instrumental in initiating “One Health”; a holistic and collaborative approach to mitigate and counter

the emergence of zoonoses and other diseases. APHCA and its members are fortunate to be the part of reputed organizations in pursuing this holistic approach.

In Bhutan, we have been in pursuit of a holistic approach on all development aspects guided by the principles of GNH for almost four decades. But we are yet to grasp comprehensive solutions to deal with complexities of development and its needs.

Over the next three and half days of your deliberations, I expect that you would not only gain comprehensive understanding on the prevalence of zoonoses, food-borne pathogens and antimicrobial resistance in the region; but also come up with an effective framework to collectively tackle those rising threats that impact the public in general and livestock farmers in particular.

We are also confident that this gathering would enable strengthening of collaboration between research institutions in the region and international organizations and universities to enhance the technical capacity of stakeholders.

Through the merit of this congregation and deliberations, it is my wish and prayer that APHCA strengthen collaboration among countries in Asia and the Pacific Region and it becomes one of the premier organizations to deliver holistic development.

I wish all the delegates and participants a fruitful discussion on the issues and wish to all present at this important event a happy stay in Bhutan.

Thank you and Tashi Delek



## **Vote of thanks**

Dr Vinod AHUJA, FAO-RAP Livestock Policy Officer

Kuzu zangpo la.

Honorable Mr Chairman, invited guests, ladies and gentlemen!

On behalf of Animal Production and Health Commission for Asia and the Pacific and on behalf of FAO, it is my privilege to propose a vote of thanks on this occasion.

At the outset, I would like to express our profound gratitude to His Excellency, the Guest of Honour, Lyonpo Yeshe Dorji, Minister for Agriculture and Forests for sparing his valuable time to address the delegates, and for highlighting the challenges ahead, the unique solutions we need to find, the partnerships we need to forge and also recognizing the leadership role APHCA can play in this process. I'm sure delegates will take these words into account during their deliberations in the next few days.

I take this opportunity to express our sincere thanks to Dr de Silva, APHCA Chairperson for his presence today and for his guidance and support throughout the previous year.

I wish to place on record our most sincere thanks and appreciation for Dr Tashi Dorji, officiating Director General, Department of Livestock, Ministry of Agriculture and Forests for his leadership and personal attention in organizing this 37<sup>th</sup> APHCA Session.

I also wish to express our gratitude to Dasho Tenzin Dhendup and Dasho Karma Dukpa the former director generals, Department of Livestock, Royal Bhutan Government and other heads of department for their gracious presence this morning. Their presence is a source of encouragement and I thank them sincerely on behalf of all the delegates.

I would like to take this opportunity to place on record our heartiest thanks to Mr Naiten Wangchuk and all his team members for the perfect organizational support. Many of the team members have taken on the tasks beyond their comfort zones. It is a true team work and it shows. Thank you to the whole team.

Finally, I would like to thank all the delegates and invited guests for having travelled from near and afar to grace the occasion and to contribute to the discussions that will follow.

Kadrinchey and Tashi Delek.

## **Closing Remarks**

Dr Tashi DORJI, Offtg Director General and Chief Veterinary Officer

Distinguished delegates, ladies and gentlemen

Today, after four days of hard work, we have finally come to an end of the APHCA meeting and workshop 2013.

For small country like Bhutan, it has been our true honor and privilege to host this event. Thank you all for APHCA member countries and the Secretariat for giving this opportunity to host this august gathering.

Over the last few days, I guess we have successfully achieved our intended objectives of the meeting. At the APHCA business session, we have reviewed our past activities, and we noted with satisfaction the progress we made so far. For this we appreciate the most efficient secretarial services provided by Dr Joachim, Dr Vishnu, Dr Vinod and their team members at RAP, Bangkok for their dedication and commitment.

I understand that Dr Vishnu in particular has been associated with APHCA for many years, and has been instrumental in bringing APHCA to this level. We hope that you will continue to remain with us and help us shape the future of APHCA.

Let me also acknowledge the delegates from APHCA member countries for making it to Bhutan, and providing your valuable inputs to this Session. All of you have given Bhutan and me in particular the chair of our organization for the next one year. For me it is a singular honour to take up such position, and I thank you for this opportunity.

In my capacity as a new Chair, I wish to solicit support of my new Executive Committee members and focal points of all the member countries in strengthening our organization. During my brief exposure to APHCA in this Session I get the feeling that we need to better own APHCA as our own organization; unless we take ownership in APHCA affairs, I am afraid that it will be difficult to keep this platform relevant and purposeful.

In order to this, I believe that we need to engage our member countries meaningfully in APHCA activities; and let us hope that over the next few years, we will be able to engage our member countries more proactively in a systematic manner. It is only through working hand in hand that we can begin to appreciate our collaborative efforts. It can then help build solidarity and positive energy among member countries, which should further strengthen this regional Commission as platform for raising our concerns in the global forums.

Also, it is through such unity that we can attract new family members. And over the next few years, let us also endeavour through various means to bring additional members to our APHCA family. On this note, we are happy and honored by the interest shown by

SPC to join us. We welcome SPC members to join us and I am thankful to all member countries for kindly endorsing the application favorably.

Let me also appreciate international agencies (OIE, ILRI, CIRAD, WHO, FAO) and universities for making efforts to travel such long distances to participate in this APHCA Session and workshop here in Bhutan. I thank you for your wholehearted support and contribution in making this meeting a big success. I must say that we are truly honored by the presence of such large numbers of experts and professors at this forum. Indeed, it has given a good opportunity for me and all my staff sitting around in this hall to interact, discuss and share experiences. Thank you for giving us your precious time, and we hope that this would not be your last visit to Bhutan.

In particular, we are truly grateful to OIE for co-funding the back to back workshop for this year on “zoonoses, food borne diseases and AMR”, and we hope that OIE will continue to closely work with APHCA and in its member countries.

Finally, let me wish all of you a very safe journey back home. With a heavy heart, we would like to say good bye and *Tashi DELEK*.





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