World Organisation for Animal Health

The National Report on Antimicrobial agents intended for use in Animals: Sri Lanka

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Message from the Director General/Department of Animal Production and Health

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I. INTRODUCTION AND CONTEXT

Antimicrobials are essential medications in veterinary medicine, primarily used for therapeutic purposes to treat bacterial infections. In addition, antimicrobials are used for prophylaxis and metaphylaxis purposes to prevent bacterial diseases. Furthermore, antimicrobials are also used as growth promoters in animal feed. However, growth promoter antimicrobial usage has been banned in some countries in the world. Reporting on national antimicrobial consumption and usage in both human and veterinary medicine serves as an indicator of livestock and animal husbandry practices in a country. Antimicrobial consumption and antimicrobial usage are vital parameters in the assessment of public health, veterinary health, and food safety in a given geographical location in the world.

In Sri Lanka, the Veterinary Drug Control Authority (VDCA), Department of Animal Production and Health (DAPH), compiles total antimicrobial consumption in veterinary medicine every year, which is the regulatory authority in the country under the Animal Disease Act, No. 59 of 1992. The VDCA regulates manufacturing, importing antimicrobials in animal health sector. However, no authority regulates the distribution of antimicrobials at farm shops, livestock farms and in the rest of the supply chain. This technical gap was highlighted in the Joint External Evaluation of 2023 by the Ministry of Health and WHO, and comprehensive solutions have been proposed in the National Strategic Plan for Antimicrobial Resistance (AMR) 2023–2028 in Sri Lanka.

The systematic monitoring of antimicrobial usage in the public health sector is not found in Sri Lanka. Furthermore, there is no information on environmental accumulation or bioaccumulation of antimicrobials, antimicrobial residues, or metabolites of antimicrobials in the environment and data on approximate quantities of antimicrobials disposed of in the country. Although antimicrobial consumption based on import data is tracked in the animal health sector, the actual usage of antimicrobials in the livestock sector is difficult and challenging task. In companion animals, the off-label use of human antimicrobial products is commonly practiced and they often prescribe antimicrobials that were originally imported for human usage.

As mentioned previously, the National Strategic Plan (NSP) for antimicrobial resistance (AMR) 2023-2028 is the primary regulatory document guiding efforts in this field. The NSP AMR 2023-2028 outlines the country's AMR strategic action plan, focusing on seven priority areas:1. Advancing the national response to AMR, 2. Raising awareness and understanding of AMR, 3. Assessing the burden of AMR and antimicrobial consumption (AMC), 4. Preventing and controlling infections, 5. Optimizing antimicrobial use, 6. Promoting research and innovation, and 7. Ensuring environmental safety. Furthermore, document emphasizes the activities and sub activities with indicators and responsible agency with the time frame. Under strategic action 3.3, it states, “Establish a national surveillance system for antimicrobial resistance and antimicrobial use in the animal sector for both terrestrial and aquatic environments”. Priority area 7 was not included in the NSP for AMR 2017-2022, and it was included in the updated NSP for AMR 2023-2028.

Antimicrobial resistance (AMR) surveillance is currently conducted only in the commercial broiler sector, where *Escherichia coli (E.coli)* serves as an indicator organism for detecting phenotypic antimicrobial resistance in isolates from commercial broiler slaughter establishments. Samples are collected annually from registered poultry slaughter facilities that account for over 80% of broiler production in the country. However, it has been recognized that AMR surveillance should be expanded to include other microorganisms such as *Salmonella, Campylobacter, Staphylococcus* as pathogenic bacterial species, and *Enterococcus* as an indicator organism for AMR. Additionally, AMR data are shared on the InFARM data-sharing platform to inform stakeholders both locally and internationally.

As the competent authority and regulatory body, Department of Animal Production and Health is dedicated to enhancing and promoting biosecurity practices, hygienic standards, animal welfare and good animal husbandry within the livestock industry. In addition, Department of Animal Production also facilitate certification in food management system throughout the livestock supply chain in the country, specially targeting the export market. Moreover, Department of Animal Production regulates biosecurity improvement in farms through special auditing, farm visits and further uninformed inspections visits. Vaccination of livestock and companion animals is recognized as a common practice to reduce the potential use of antimicrobials. In poultry, vaccination has been identified as a common practices for viral and bacterial diseases. Furthermore, alternatives to antimicrobials, such as prebiotics and probiotics, are strongly encouraged in production systems.

The use of antimicrobials as growth promoters has been banned in Sri Lanka's livestock sector since 2018. Feed advisory committee at Department of Animal Production and Health decided it in 2017 and the decision was implemented in 2018. Additionally, the use of colistin, gentamicin, streptomycin, chloramphenicol, and carbapenem in livestock production is prohibited. Sri Lanka imports 725 veterinary medicinal products, including antimicrobials, from over 31 countries worldwide. However, there have been very few suspicions of antimicrobial smuggling, although no cases have been officially reported. Furthermore, the dairy industry uses a limited amount of antimicrobials due to low cost existing farming practices, existing regulations, and the unavailability of suitable antimicrobial preparations in the country. Only phase dairy farmers use antimicrobials without consultation of veterinarians for the treatment of mastitis.

In Sri Lanka, farm shops where antimicrobials are sold have not disclosed or identified any requirement of professional qualifications or certifications. Consequently, the Department of Animal Production and Health (DAPH) has decided to launch a certification program (NVQ Level 3) aimed at farm shop owners and workers to enhance the quality of service delivery. This certification course will be introduced by DAPH in the near future. However, the Ministry of Health regulates pharmacies that sell both human and animal drugs. As a result, the issuance of antimicrobials without prescriptions has been minimized within the pharmacy network across the country. Nevertheless, instances of antimicrobials being dispensed without a standard prescription have still been observed.

II. PURPOSE AND OBJECTIVE(S)

The report on antimicrobial consumption in the veterinary sector provides important and vital information on antimicrobials imports in animal health sector for policymakers to make timely and right decisions on current situations and trends in the country. It benefits both the human and animal health sectors, as well as the environmental field and food sectors. Additionally, financial managers, entrepreneurs, investors, and other policymakers involved in the public health sector will find valuable background information in this report.

Although various presentation methods have been proposed to monitor antimicrobials in the livestock sector such as the total quantity of antimicrobials imported, the percentage of metabolic biomass, and the defined daily doses of antimicrobials per kilogram of body weight, all these approaches require further evaluation to assess their effectiveness and accuracy on calculations.

The purpose of this program collectively by DAPH and the industry with the support of WOAH is to significantly reduce antimicrobial usage in both terrestrial and aquaculture sectors. Based on previously defined purpose, the following objectives have been defined.

1. To reduce and limiting the use of antimicrobials in livestock by 20% over the next five years while accommodating ongoing animal health industry expansion.

2. To limit the use of antimicrobials solely for therapeutic purposes in livestock (terrestrial and aquatic) production systems in the country.

3. To limit the use of critically important antimicrobials, while promoting the appropriate use of those that are still required in livestock production systems.

III. METHODOLOGY

The total quantities of imported antimicrobials is extracted from the Sri Lanka Customs clearance records at the time of importation, in accordance with VDCA and DAPH regulations. Additionally, the manufacturing data is obtained directly from the domestic manufacturers. The total quantity is calculated for each class of antimicrobials and then summed to determine the overall amount. Using the total livestock population, the total biomass is calculated following the methods outlined by the WOAH for all livestock species and poultry. The biomass of each relevant livestock species is aggregated into a single figure. Both terrestrial and aquatic biomass are combined to produce a total biomass value. Finally, the total quantity of antimicrobials, measured in kilograms, is divided by the total livestock biomass to yield a final figure expressed in mili grams per kilogram.

II. Context

A. Animal Population, Production and Biomass

In Sri Lanka, broiler meat and eggs are the most popular livestock commodities. For example, total broiler meat consumption typically ranges between 220,000 and 230,000 tons annually. However, production reached 269,000 tons of broiler meat in 2024. The average daily consumption of chicken eggs in Sri Lanka is 7 million, although it was 8 million in 2024. Total chicken egg production amounted to 2,960.59 million in 2024. Private sector entrepreneurs primarily dominate the commercial broiler industry, and intensive management systems in closed houses are quite common.

In addition, cattle and buffalo are primarily raised for milk and beef production. The country is described dividing into nine provinces, with the highest milk production reported in the Central Province, followed by the North Western Province, which employs both intensive and semi-intensive management practices. Although animals are raised in the dry zone using an extensive management system, daily milk production there is minimal. Cattle are mainly raised in the northern part of the country, as well as in certain areas of the Eastern and North Central provinces, primarily for meat production. A zero-input management system is predominantly practiced in the Northern Province. Total beef production in Sri Lanka was 22,000 tons in 2022, a decrease from 25,000 tons in 2021. Additionally, buffalo curd remains a popular dessert among Sri Lankans, with traditional buffalo curd production occurring in specific geographical locations throughout the country.

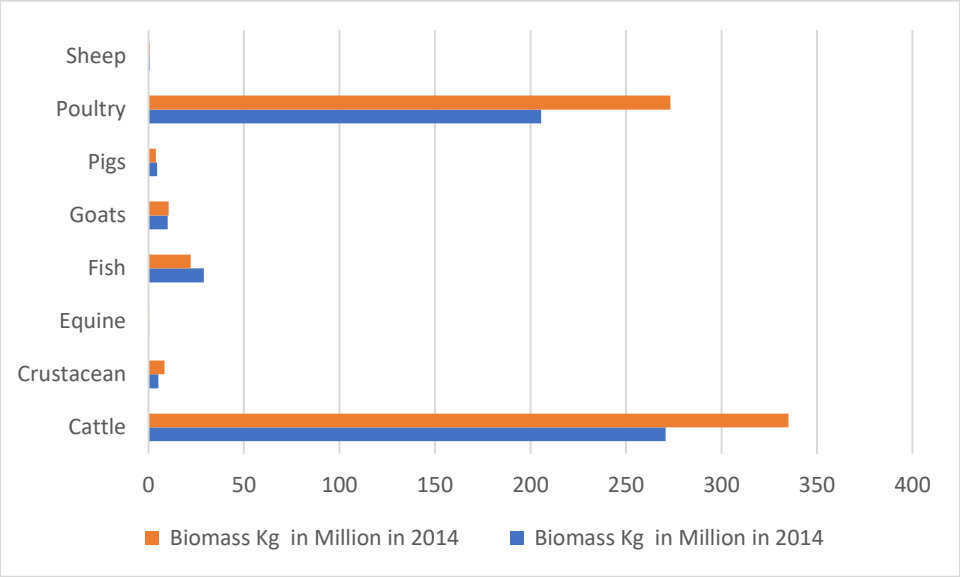
Goats are raised for both milk and meat. The majority of goats are found in the dry zone, although they are also present in the wet zone and mid-country regions. Mutton is considered an expensive meat among Sri Lankans, and there is significant demand for goat milk, particularly within the Muslim community. In 2022, mutton production reached 3,200 metric tons. In some areas, such as Madawala, Akurana, Gampola, and Negombo, goats are raised in close proximity to human settlements. The swine industry is primarily concentrated in the coastal regions, especially in the Western and North Western Provinces. Both intensive and semi-intensive management systems are commonly practiced. Total annual pig production amounts to 14,000 metric tons.

Aquaculture is a rapidly expanding industry in Sri Lanka. In 2019, the country exported 2,115 metric tons of aquaculture products, valued at 352 million Sri Lankan Rupees (SLR). Total aquaculture production in Sri Lanka reached 28,000 metric tons in 2017. The shrimp industry primarily employs intensive farming systems, either in artificially created environments or in lagoons. Additionally, captive management practices are implemented in the natural lagoons along the country's coastal areas. The ornamental fish industry is currently experiencing growth, with a significant portion of its products being exported. As per **Figure:1**, 93% of total biomass of livestock is represented by bovine (51%) and poultry (42%) in Sri Lanka. In addition, fish also represented 3% of total biomass in the country.

Table 1. Animal Biomass Data Sources in Sri Lanka, 2022 and 2023

Year	Animal category	Live animals or production data	Data source	Calculated weight per animal	Biomass (kg)
2023	Bovine	2 064 287	DAPH, WAHIS	163.3320	335099994
2023	Equidae		FAO		373459
2023	Fish		FAO		22091270
2023	Goats	750 987	DAPH, WAHIS	14.0074	10519398
2023	Molluscs		FAO		27200
2023	Poultry	31 460 000	DAPH, WAHIS	8.6869	273290000
2023	Swine	170 409	DAPH, WAHIS	22.79146	3883871
2023	Crustacean		FAO		8285010
2022	Bovine	2 088 764	DAPH, WAHIS	160.4298	335099994
2022	Equidae		DAPH, WAHIS		373559
2022	Fish		DAPH, WAHIS		22091270
2022	Goats	773080	DAPH, WAHIS	13.60712	10519398
2022	Molluscs		DAPH, WAHIS		27200
2022	Poultry	31350000	DAPH, WAHIS	8.71738	273290000
2022	Swine	169267	DAPH, WAHIS	22.94523	3883871
2022	Crustacean		FAO		8285010

Figure 1. Species composition of animal biomass in Sri Lanka 2014 and 2022 (Kg million).



B. Animal Health Situation in Sri Lanka

Vaccination has been identified as one of the primary preventive strategy in livestock and companion animals. In poultry, birds are vaccinated against a number of viral and bacterial pathogens. Both killed and live attenuated vaccines have been registered at VDCA and those vaccines are used widely in livestock. Newcastle Disease (NCD) is the major disease affecting poultry, while Infectious Bursal Disease (IBD), Infectious Bronchitis (IB), and mycoplasmosis are also shown common. Chickens are vaccinated against Marek's disease, NCD, IBD, IB, Reovirus, Infectious Laryngotrachitis, Egg drop syndrome, Mycoplasma, Fowl Cholera, and several other diseases. Type of vaccine and vaccination programme may be varied farm to farm mostly depend endemic disease reported and expected antibody titers in the flock or farm. The efficacy of vaccination in animals is based on several factors, such as host associated factors, pathogen associated and environment associated factors. In addition, cover of vaccination in a given population, type of vaccines, management system, the endemic nature of the diseases and biosecurity measures.

Both grandparent and parent birds follow a similar vaccination program, whereas commercial birds (broilers or layers) may have different vaccination protocols, based on risk of pathogen at the given locations. Furthermore, more than ten types of vaccines are utilized in poultry breeder operations, while only a few types are used in commercial broiler operations.

In the dairy sector, mass vaccination is conducted for Foot and Mouth Disease (FMD), Hemorrhagic Septicemia (HS), and Black Quarter (BQ), depending on geographical location. Vaccination against Lumpy Skin Disease (LSD), Bovine Viral Diarrhea (BVD), and *Brucella abortus* S19 is also carried out in certain areas of the country. Goats are vaccinated only for FMD, while swine are vaccinated for FMD, Porcine Reproductive and Respiratory Syndrome (PRRS), and Classical Swine Fever.

Vaccination is not a common practice in the aquaculture sector in Sri Lanka. Most poultry vaccines are imported, and vaccination titers are frequently monitored in breeder operations, whereas they are monitored less frequently in commercial broiler and layer sectors.

The animal health sector plays a crucial role in maintaining the health of livestock in the country, particularly against certain diseases remain endemic and cause significant economic losses. Fortunately, no severe outbreaks have been reported recently except African swine fever in swine. Foot-and-mouth disease (FMD), babesiosis, mastitis are the primary concern affecting cattle and buffaloes, followed by Lumpy skin disease (LSD), metabolic (Milk fever) and nutritional disorders. Brucellosis and Leptospirosis have also been reported in cattle and buffaloes, especially in cases with a history of abortions. In goats, bacterial pneumonia, nutritional disorders, worm infestations, cerebros spinal nemotodiasis and Mastitis are commonly observed, while the swine industry has reported cases of Porcine reproductive and respiratory syndrome (PRRS), classical swine fever, FMD,African swine fever (ASF) and mycoplasmosis.

Certain diseases, such as White Spot Syndrome Virus (WSSV), Monodon Baculovirus (MBV), and Yellow Head Disease(YHD), are endemic to shrimp farming in Sri Lanka (FAO). Although WSSV is regarded as the primary threat to the shrimp industry, luminescent vibriosis has been identified as a serious issue in monodon hatcheries. Vaccination is not a common practice in aquaculture in Sri Lanka.

Additionally, exotic diseases are considered critically important. To minimize such risks in livestock, animal quarantine procedures, strict biosecurity measures, and standard hygienic practices are implemented.

C. Regulatory Framework in animal health sector in Sri Lanka.

Veterinary medicinal products are primarily imported into the country, with only a few manufactured (however, local manufacturing has shown a rapid increase over the last few years). The importation and manufacturing of these products are regulated by the Veterinary Drug Control Authority (VDCA) under the Department of Animal Production and Health (DAPH). The VDCA was established in accordance with the Animal Disease Act No. 59 of 1992. A Veterinary Drug Registrar has been appointed to oversee regulations pertaining to veterinary medicinal products. Although the marketing of these products is regulated by the VDCA, there are currently no regulations governing the distribution of veterinary antimicrobials in the field. The distribution of antimicrobials at farm shops and field levels is not adequately monitored in the animal health sector in Sri Lanka. In 1996, growth promoters such as avoparcin, carbadox, and flavomycin were allowed in animal feed as per the given regulation of the Animal Feed Act No. 15 of 1986. As mentioned previously, it is important to note that antimicrobials have not

been used as growth promoters since 2018, as per the decision of the Animal Feed Advisory Committee on 30th June 2018.

Surveillance of veterinary medicinal products is based on confirmation through importers and distributors through written evidence and as a result of telephone communication from livestock farmers. Although a prescription is required to obtain antimicrobials from pharmacies, no such requirement exists for purchasing antimicrobials from farm shops currently. Antimicrobials are sold without a prescription by veterinarians in these shops as a practice, which is not monitored or regulated by DAPH. The working staff in farm shops have not been identified as having compulsory or required qualifications and training on the relevant subjects, such as basic pharmacology or chemistry. On some occasions, farmers themselves decide to use antimicrobials when they observe unusual mortality or a risk of disease. Farmers may consult their friends who do farming or the farm shop network. Although veterinary consultation is required, trained and experienced farmers may decide the antimicrobial that is given to the animal by themselves. In addition, the majority of livestock farmers get veterinary consultation through their private or government veterinary surgeon. Some farmers get the service of regional Veterinary Investigation Centers (VIC) or private labs for the isolation and identification of pathogens, followed by antimicrobial susceptibility testing (AST), before deciding on the antimicrobial for therapeutic purposes.

It has been identified that a registration mechanism is required for distribution points or farm shops in the country. The Department of Animal Production and Health (DAPH) is working to introduce the registration of all farm shops, along with establishing the basic qualifications required to operate a farm or feed shop. Priority areas for implementation include the registration of farm shops, National Vocational Qualification (NVQ) level training for farm shop workers, a reporting system to the Veterinary Drug Control Authority (VDCA), and national guidelines for farm shops. However, relevant legislation has not yet been developed or implemented. The World Organization highlighted these gaps in the Joint External Evaluation (JEE) conducted by the World Health Organization (WHO) and the Performance of Veterinary Services (PVS) assessment for Animal Health (WOAH). Additionally, the enforcement of the recommended withdrawal period for antimicrobials has not been established as a regulation in the field. These legislative deficiencies are also noted in the National Strategic Plan for Antimicrobial Resistance (AMR) 2023–2028. The importance of such legislation is further emphasized in the draft AMR policy of the Ministry of Health, Sri Lanka. Veterinary intervention is common in large-scale poultry, dairy, and intensive livestock management systems. Exporters of livestock products comply with all quality standards to remain competitive in the international market. However, an antimicrobial residue monitoring mechanism has yet to be introduced for terrestrial animals. DAPH has adopted Codex standards as the accepted maximum residue limits (MRLs) for animal products (milk, meat, eggs, fish), animal feed, and feed raw materials. All export consignments are screened for antimicrobial residues according to the requirements of the importing countries. The Sri Lanka Standards Institute (SLSI) has adopted ISO standards and Codex MRL values for antimicrobials in food of animal origin and in feed.

The Veterinary Drug Control Authority (VDCA) at the Department of Animal Production and Health (DAPH) regulates antimicrobial use in aquaculture. Antimicrobials are not permitted in aquaculture practices within the food production system. However, the Ministry of Fisheries

monitors antimicrobial residues under the regulation of aquaculture (monitoring of residues) 2002. Although it has not been conclusively proven, antimicrobials may be used very rarely in aquaculture hatcheries and ornamental fish farming, with minimal use observed in the food production system. Nonetheless, it appears that water sources have been contaminated with resistant bacterial species due to environmental pollution.

As previously mentioned, the importation and manufacturing of antimicrobials in the veterinary field are monitored and regulated by the Veterinary Drug Control Authority (VDCA) at the Department of Animal Production and Health (DAPH). Furthermore, the falsified use of antimicrobials is reported monthly to the World Organization for Animal Health (WOAH). Although a standardized monitoring system has not yet been established in the field, the Veterinary Drug Control Authority (VDCA) addresses written complaints received from clients, veterinarians, and farmers. Additionally, the VDCA conducts inspections of production facilities or factories prior to the registration and renewal of products. While reports in this area are scarce, the VDCA is actively investigating potential malpractices or misuse of antimicrobials and veterinary medicinal products in the field. Moreover, the quality of antimicrobials, whether imported or locally manufactured, is not monitored in the field. The country lacks laboratory facilities for testing the purity and quality of antimicrobials, and evaluations rely solely on the information provided in the submitted dossiers.

D. Social behaviours on antibiotic use in the field

Although the therapeutic use of antimicrobials is common in livestock within the system, their use for preventive purposes is also practiced for certain diseases, such as mycoplasmosis and colibacillosis, in poultry breeding operations in Sri Lanka. Since very few antimicrobial are used in aquaculture, antimicrobials use in terrestrial animals constitutes the majority of total antimicrobial consumption. According to the Veterinary Surgeons and Practitioners Act No. 46 of 1956, antimicrobials may only be prescribed by registered veterinary surgeons. Although this regulation has been effectively enforced in the field, no monitoring mechanism has been implemented. As farm shops sell antimicrobials without requiring a prescription, access to these substances is high among farming communities. In addition, online purchasing has become popular in the country, with antimicrobials even being delivered to doorsteps through courier networks. These products may not be regulated, as it is practically very difficult to implement such regulatory mechanisms.

Farmers use antimicrobials to treat clinical or subclinical diseases and to prevent bacterial infections within farming systems. Only veterinarians may prescribe antimicrobials in accordance with the Veterinary Surgeons and Practitioners Act No. 46 of 1956. The delivery of antimicrobials is managed by importing and distributing companies. As a result, farmers have access to antimicrobials without any oversight at the farm level. Conversely, the current farming community is well aware of technical knowledge since they have been working in this field for a long time. However, continued awareness programs on antimicrobials are required in the industry.

Local livestock farmers have a strong bond with social media and online networks, where they share their experiences. However, inaccurate information may be disseminated through online platforms, including the names of antimicrobials and medication modes. Since prescriptions are not required to obtain antimicrobials from farm shops, farmers can purchase these substances without having any difficulty, often influenced by the information shared on social media. As farmers exchange their experiences through these networks, the information spreads among their communities. On the other hand, the pharmaceutical industry conducts robust promotional programs directly targeting farmers. Most of them are provided overseas technical tours (Thailand and Malaysia) and attractive entertainment packages as a part of the promotion campaign for antimicrobials and other veterinary medicine. As a result of the intense competition and existing intense promotional activities, farmers may be encouraged to use antimicrobials, often without a prescription. Therefore, awareness programs on the prudent use of antimicrobials are necessary to promote responsible practices in the country continuously and simultaneously.

III. AMU Data Collection System

A. Monitoring System on AMU data collection

AMU (Antimicrobial Use) data collection occurs at the point of import, either at ports or airports on the island. As per the customs regulations in Sri Lanka, preclearance of antimicrobials and veterinary medicine is required from VDCA and DAPH. Therefore, information on importing antimicrobials is collected from Sri Lanka Customs and certificate clearance through Animal Quarantine Stations in Colombo, Sri Lanka. Currently, there is no sentinel site surveillance or census-level information regarding antimicrobials. Almost 100% of antimicrobials are imported, only repacking is being done locally. As a code of practice, importers are required to submit information on the delivery of quantity antimicrobials at the farmer level before applying for the next consignments of antimicrobials.If they do not supply that information, VDCA asks for the information at the registration process. In addition, the quality of this data is confirmed through random telephone conversations. Validation of data and information on antimicrobials is conducted by the Veterinary Drug Registrar and the Veterinary Drug Control Authority (VDCA) within the Department of Animal Production and Health (DAPH). The data is stored confidentially at the VDCA, and there is no agreement on data sharing or storage with manufacturing or importing entities.

Data on antimicrobial imports are analyzed and interpreted based on the calendar year. VDCA submits this information to WOAH every year. A monitoring system for antimicrobial usage must be implemented, and regulations governing antimicrobial use in the veterinary sector of Sri Lanka need to be strengthened. Some gaps in regulations have previously been identified by the IHR and PVS evaluations. In addition, DAPH has appointed veterinary surgeons as authorized officers at the district level for regulation of veterinary drugs and animal feed. However, implementation of these regulations needs to be strengthened.

B. Data Sources

Antimicrobials are administered in the field based on the livestock population within the country. The livestock industry is primarily concentrated in the North Western Province, Western Province, Central Province, and North Central Province, where a higher volume of antimicrobials is utilized. Additionally, poultry farming is popular in the North Western, Western, and Central Provinces, while the swine industry is also commonly found in the North Western and Western Provinces. The distribution of antimicrobials in the veterinary sector is not monitored, and no such data is available at the Department of Animal Production and Health (DAPH).

Data on antimicrobials are solely based on import, customs, or pre-clearance data related to the importation of antimicrobials in the animal health sector. Since no local production, import data covers the total antimicrobial consumption. Antimicrobials import data are collected, analyzed at the central facility, provincial and regional level collection of data is challenging due to practical difficulty.

IV. Veterinary antimicrobial consumption

A. Antimicrobial Quantities

Total antimicrobial consumption in animal health sector, Sri Lanka reached 32598.20 Kg (without coverage adjustment 32 598.20 Kg and 34 352. 42 Kg with adjustment in 2023) in 2023, which has validated and published in ANIMUSE database in WOAH (Figure 2). It was 34640.50Kg in 2022 and 66342 Kg in 2021. Although it has not been submitted and not validated yet, based on DAPH information, total antimicrobial consumption in animal health sector was 45 452 Kg in 2024 in Sri Lanka.

Antimicrobial consumption has been reduced by 60.7% for five years in the country from 2019 to 2023(87 417.89 Kg 34 352.42in 2019 and 2023). In Sri Lanka, policies and strategic plans are prepared for 5 years, only reason considered 5 years for this calculation. Over 30% contribution represented from top 10 used antimicrobials, poultry (over 50%) was identified as the highest contributor for antimicrobial consumption. Antimicrobial consumption from terrestrial food producing animals and contribution from aquatic animals and nonfood producing animals were observed minimum. Based on non-validated data in DAPH, 11 099.58 Kg increment has been shown from 2023 to 2024 period (considering both terrestrial and aquatic animals).

In 2024, the common classes of antimicrobials used in the animal health sector include beta-lactams (9722 Kg), macrolides (6368 Kg), sulfonamides (7614 Kg), quinolones (6297 Kg), tetracycline (6978 Kg), cyclic polypeptides (3744 Kg), Aminoglycoside (2518 Kg), and pleuromutilin (1518Kg)(**Table: 3 and Table: 4**). The majority of these antimicrobials are utilized in the poultry sector. All these classes of antimicrobials are primarily used for therapeutic purposes, with very limited use for preventive measures. In poultry, oral administration of antimicrobials is the most common route, while injectable forms are less frequently used in this sector. The geographical distribution of antimicrobial usage is difficult to find, it has been assumed that usage is based on distribution of livestock in the country. Hence, antimicrobial usage may be high in provinces such as North Western Province (NWP), Western Province (WP) than rest of the

provinces in the country. The oral route if administration has been recognized as the major route of antimicrobials in these products used in the country. However, injectable antimicrobials are more commonly found in other livestock species, such as bovines, swine, and caprine. There have been no reports of antimicrobial use in the aquaculture industry in the country. Fluoroquinolone is the only last line antimicrobials contributed heavily on total antimicrobial consumption in the country, 2nd generation, 3rd generation and 4th generation cephalosporin were used very limited extent in food producing and non-producing animals in Sri Lanka.

The class of antimicrobials that was registered for animal health has been listed in **Table** 2. A number of antimicrobials have been registered in the same class of antimicrobial. Compared to the human health sector, a limited number of critically important antimicrobials are being used in the animal health sector in Sri Lanka. In addition, none of the antimicrobials have been registered for aquatic animals in the country. However, off-label use of antimicrobials is quite common in companion animals' health, and it is not that significant in other livestock practices in the country. As per Table 4b, macrolides, beta lactams, tetracycline, sulfamethoxazole were the most use antimicrobials in animal health sector. As an example, macrolide are use common in poultry industry for the treatment of mycoplasmosis, which is an endemic disease in the country (**Figure: 4b and Figure 4a**).

Livestock population including poultry were increased in 2024 at the recovery phase after the economic crisis in Sri Lanka. It was 52.44387mg/Kg per biomass of livestock in 2023 (**Figure: 2 and Figure: 6, Table: 4 and Table: 5**). Based on biomass calculation, antimicrobial consumption was 143.8mg/kg of biomass in 2019 in Sri Lanka and it has reduced to 52.4 mg/Kg in 2023 again it increased to 69.47mg/Kg in 2024 (however, data in 2024 has not been validated by WOAH, Hence, conclusion based on 2024 data may not be 100% right). In the global context, antimicrobial consumption in the animal health sector was 166.72 mg/kg biomass in Asia and Oceania and 99.48 mg/kg in America in 2019. However, the antimicrobial consumption was 53.35 in Europe in 2019 **(Figure 7**).

As mentioned previously, no more growth promoters have been used in the livestock industry in Sri Lanka since 2018. In addition, colistin, chloramphenicol, streptomycin, and gentamicin have been banned in livestock. In addition, carbapenem and 3rd- and 4th-generation cephalosporin are not used in the livestock industry. **Furthermore, antimicrobial consumption based on sale data is highly recommended to be implemented.** However, a small quantity of colistin (74 kg) has been imported in 2022, not for livestock and poultry, only for external application in companion animals. Although no 3rd- and 4th-generation cephalosporin have been imported and are not used in livestock, a quantity of 1st- and 2nd-generation cephalosporin are used in certain preparations such as intramammary infusion production. However, quinolone was the significant type of antimicrobial used in 2024; 6287 kg of quinolone had been used in the animal health sector in 2024. Since antimicrobials are critically important, the percentage of such antimicrobials used has been increased in the animal health sector in 2024.

These findings reflect the requirement of continued progress in antimicrobial stewardship in Sri Lanka's animal health sector while highlighting areas that require ongoing monitoring, particularly the use of critically important antibiotics, antibiotic sales, an off label uses. Although poultry sector has been identified as the sector for contributed significantly for total

antimicrobial usage in the country, mitigation strategic and alternatives for antimicrobials have been heavily implemented in the field comparing to dairy and other industries.

Table 2. Antimicrobial classes and active ingredients approved for use in animals in 2023 together with WHO classification as Access, Watch and Reserve and WOAH classification as veterinary critically important(VCIA), veterinary highly important(VHIA), and veterinary important(VIA) antimicrobials/in red.

Antimicrobial Classes and Active Ingredients Approved for Animals
1-2 gen. cephalosporins
Cefalexin(Access)(VHIA)
Cyclic polypeptides
Bacitracin(Access)(VHIA)
Enramycin(Access)(VHIA)
Penicillins
Penicllin G(Access) (VCIA)
Penicllin G procaine(Access) (VCIA)
Amoxicillin(Access) (VCIA)
Amoxycillin and clavulanic acid(Access) (VCIA)
Ampicillin(Access) (VCIA)
Cloxacillin benzathine (Access) (VCIA)
Sulfonamides (including trimethoprim)
Trimethoprim(Access) (VCIA)
Sulfadimidine(Access) (VCIA)
Sulfachloropyradicine(Access) (VCIA)
Sulfadoxine(Access) (VCIA)
Sulfamethoxasole(Access) (VCIA)
Sulfaquinoxacillin(Access) (VCIA)
Sulfazunixacillin(access) (VCIA)
Tetracyclines
Doxycycline (Access) (VCIA)
Oxytetracycline(Access) (VCIA)
Tetracyclines(Access) (VCIA)
Clotetracycline(Access) (VCIA)
Quinolone
Enrofloxacin(Watch) (VCIA)
Other
Halqunolone(Watch) (VCIA)
Amynoglycosides
Neomycine(Access) (VCIA)
Pleuromutilin
Tiamutin(Access) (VHIA)
Macrolids
Tilmicosin(Access) (VCIA)
Tylosin(Access) (VCIA)

Table 3. Antimicrobial classes either imported of manufactured in Sri Lanka in 2022 to 2023 (DAPH data in 2024 also included to understand the trend although those values has not validated by WOAH yet).

Antimicrobial classes	2022	2023	2024 (Not validated by WOAH)
1-2 gen. cephalosporins	2108	74	6
3-4 gen. cephalosporins			
Aggregated class data			
Aminoglycosides	913	944	2548
Amphenicols			
Arsenicals			
Cephalosporins (all generations)	0	80	6
Cyclic polypeptides	0	80	3744
Fluoroquinolones	3081	3018	6297
Glycopeptides			
Glycophospholipids			
Lincosamides			
Macrolides	9603	12592	6368
Nitrofurans			
Orthosomycins			
Other quinolones			
Others	1331	120	637
Penicillins	7476	6270	9722
Pleuromutilins	225	450	1518
Polymyxins			
Quinoxalines			
Streptogramins			
Sulfonamides (including trimethoprim)	7096	4136	7614
Tetracyclines	2762	4954	6978
Total	**34646**	**32633**	**45452**

Figure 2. Total import of kilograms of active ingredients in total animal groups in Sri Lanka 2015 to 2023

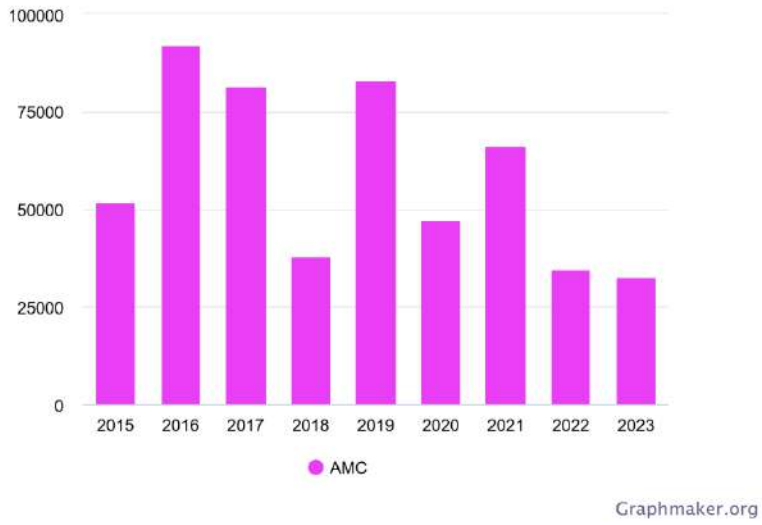


Figure 3. Total import of kilograms of active ingredients by routes of administration in Sri Lanka since 2015 to 2024.

This is diffuclt to extract from exisitng database in VDCA.

Figure 4.a The percentage of total import of kilograms of active ingredients by AWaRe classification in Sri Lanka 2023.

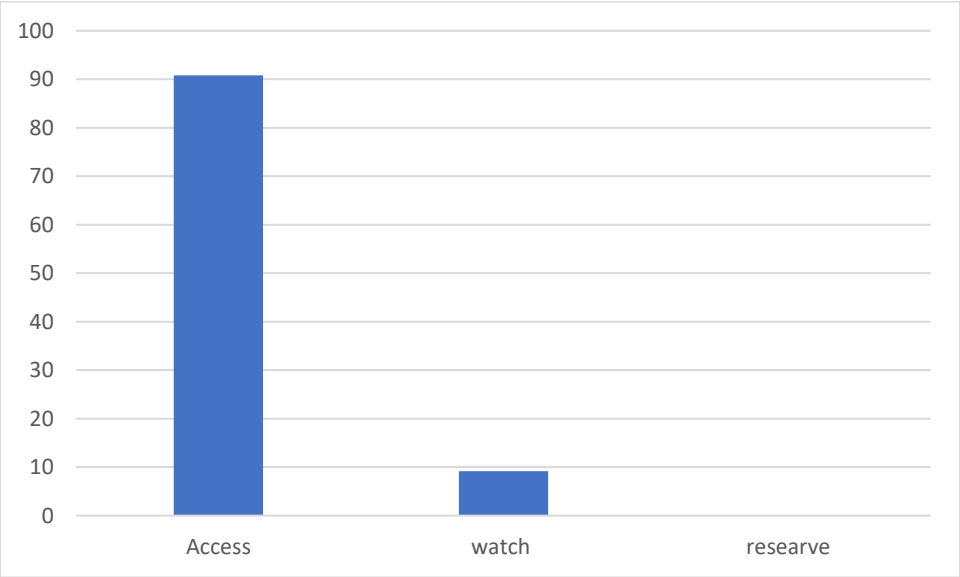


Figure 5.b Total import of kilograms of active ingredients by antimicrobial classes in Sri Lanka 2022-2023.

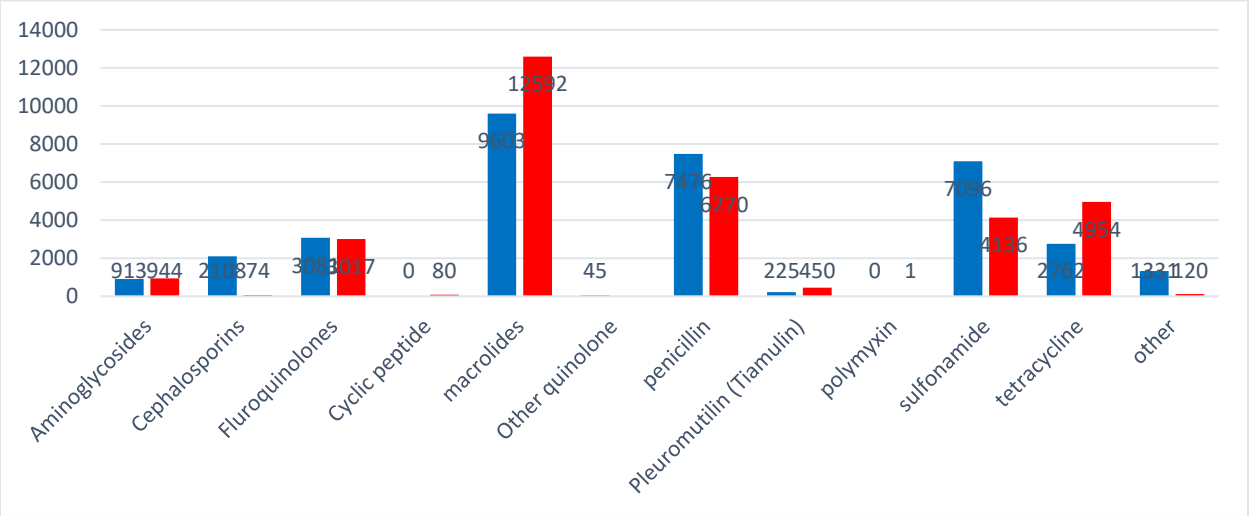
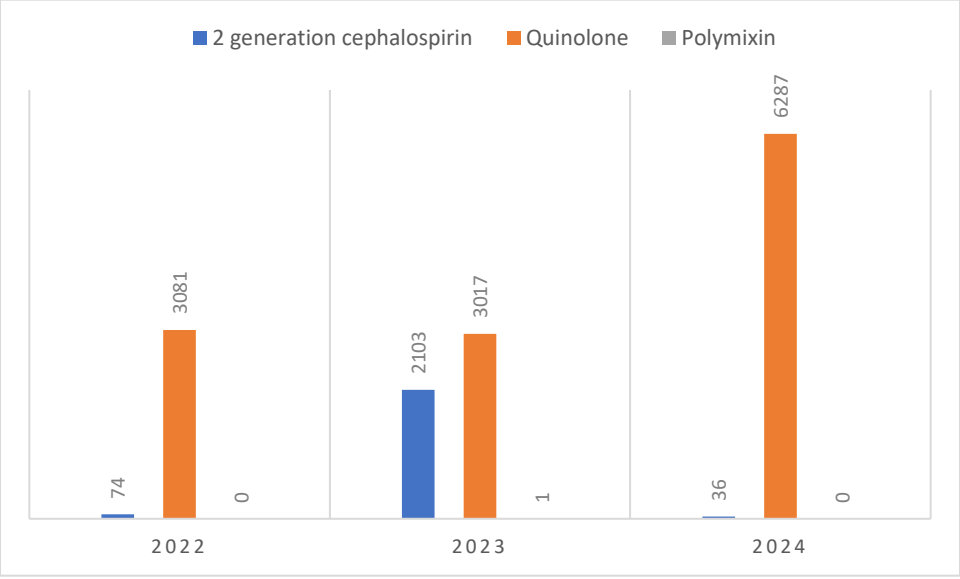


Figure 6. Total import of kilograms of active ingredients of 1st- and 2 nd generation cephalosporin, other quinolones, fluoroquinolones and polymixin in Sri Lanka from 2022 to 2023. Non Validated data in DAPH in 2024 also included.



B. Antimicrobial Quantities adjusted by Animal Biomass

Livestock population including poultry were increased in 2024 at the recovery phase after the economic crisis in Sri Lanka. It was 52.44387mg/Kg per biomass of livestock in 2023 (**Figure: 2 and Figure: 6, Table: 4 and Table: 5**). Based on biomass calculation, antimicrobial consumption was 143.8mg/kg of biomass in 2019 in Sri Lanka and it has reduced to 52.4 mg/Kg in 2023 again it increased to 69.47mg/Kg in 2024.

In the global context, antimicrobial consumption in the animal health sector was 166.72 mg/kg biomass in Asia and Oceania and 99.48 mg/kg in America in 2019. However, the antimicrobial consumption was 53.35 in Europe in 2019 **(Figure 7**).

Antimicrobial consumption showed a decreasing trend until 2023, after which it increased again in 2024. This fluctuation can be attributed to the reduction in livestock production during the COVID-19 pandemic and the subsequent economic crisis in the country, which resulted in a shortage of raw materials, fuel, and other essential services. The leading livestock industry, particularly poultry, returned to normal production levels in 2024. As production increased in poultry and dairy, importation of antimicrobials was also high due to the existing demand in the sector. Additionally, the revival of tourism and other service-related sectors also contributed to high demand and high supply in the livestock market in 2024. As previously mentioned, a sudden rise in the demand for antimicrobials was reported due to the increased need for livestock in the country. Furthermore, a high usage of macrolides has been observed over the past couple of years as a result of high disease prevalence of poultry mycoplasmosis. As a general practice, quinolone is frequently used in the poultry industry during the first week of production as an alternative to less hygienic practices, as well as to combat colibacillosis and reduce hatchery-related infections in the field.
Antimicrobials are more commonly used in the poultry industry in Sri Lanka compared to other sectors. Over 30 million birds are raised to meet the high demand for poultry, which is the most popular source of protein among the public. The non-empirical use of antimicrobials is prevalent in poultry, primarily due to the intensive management systems and the robust extension services provided by pharmaceutical companies.

Antimicrobial use per biomass has been identified as a practical parameter to compare the antimicrobial usage from country to country. This figure prevents rising antimicrobial use purely on increasing livestock population in a country. The antimicrobial use per biomass has been reducing from 2018 to 2023 in Sri Lanka. Although the livestock population of poultry has been increased over the years, antimicrobial usage per biomass has been reduced. Sri Lanka requires a further attempt to reduce the values to 52.4 mg/kg since it is just above 40 mg/kg in the EU. The finding reflects that antimicrobial use per biomass is low compared to the other countries in the region. However, further improvements are required to implement this, since developed countries have reached such a level of minimum use of antimicrobials in the industry. When special attention may be given to watching antimicrobials such as quinolone, further improvement of the system may be achieved.

Figure 7. Quantities of imported antimicrobial agents intended for use in animals in Sri Lanka for 2015 to 2023 adjusted by animal biomass (mg/kg).

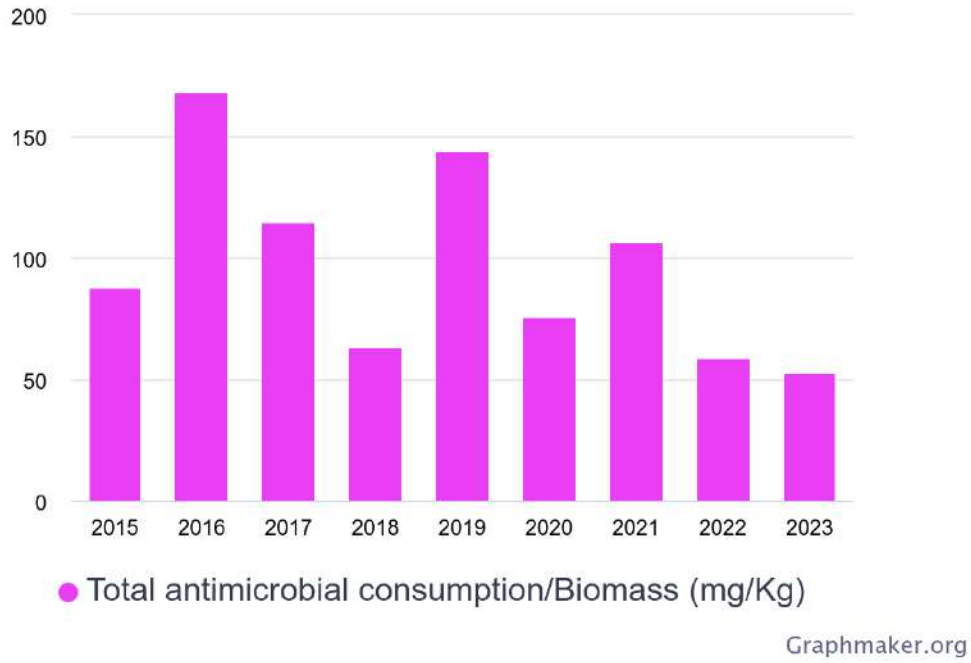


Figure 7. Quantities of antimicrobials agents use in animals per biomass in Europe and Sri Lanka, 2023.

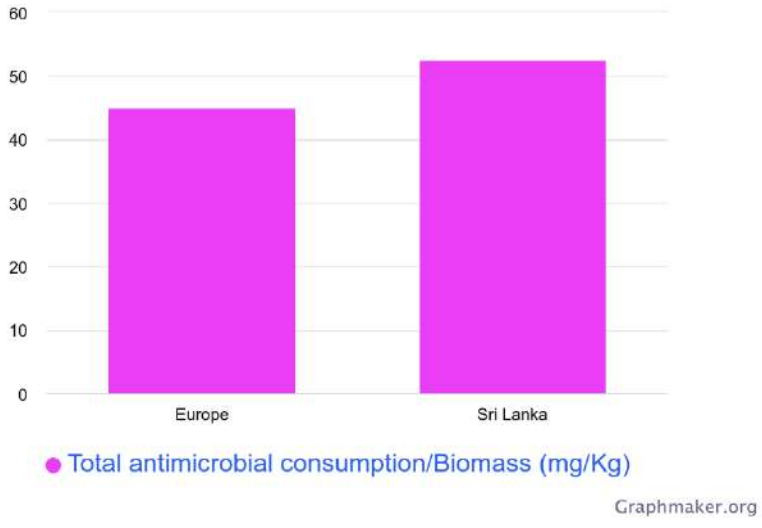


Table 4. Antimicrobial quantities imported, adjusted by animal biomass in Sri Lanka 2021, 2023 and 2024.

Year	Total kg	Data Coverage (%)	Total Kg Adjusted	Animal Biomass (Kg)	Antimicrobials Quantities Adjusted by Animal Biomass (and estimated data coverage) (mg/kg)
2021	66342	100 %	66341	654297567	106.73 (101.39)
2023	34598.20	100 %	34646	654297567	58.83 (52.94)
2024	45452	100 %	45452	654297567	Not adjusted yet or not validated (69.467)

Note: Data in 2024 is only from DAPH and those data have not been validated by WOAH.

Table 5. Antimicrobial quantities, adjusted by animal biomass, for terrestrial animals and aquatic animals in Sri Lanka 2021, 2023 and 2024.

Animal Group	2021 Total mg/kg	2023 Total mg/kg	2024 Total mg/kg
aquatic	0	0	0
terrestrial	106.73 (101.393)	58.83 (52.94)	Not Validated (69.467)

V. DISCUSSION

Total antimicrobial consumption in the animal health sector has been decreasing in trend over the last five years in the country. Since 2019, total antimicrobial consumption has been reduced by 69% in the animal health sector in Sri Lanka. Although the exact reason is not known, new regulations and auditing implemented by DAPH, awareness programmes, and global trends may be the vital reasons for such positive trends in the animal health sector in the country. In addition, consumer awareness and the emerging antimicrobial-free product concept may play a vital role in the reduction of antimicrobials in food-producing animals, including poultry and dairy.

As a species, the highest quantity of antimicrobials was used in the poultry sector compared to other livestock species. Based on 2023 data, Sri Lanka is the 37th highest antimicrobial-consuming country out of 131 countries who report country data to the ANIMUSE database in WOAH. Hence, Sri Lanka has to move forward to minimize antimicrobials in the livestock sector with new strategies and remedies. Although Sri Lanka is well ahead of South America, Asia, Africa, and the global average of antimicrobial consumption per biomass in livestock, **further improvements are required compared to the average of the Middle East and Europe.**

The use of antimicrobials critical to human health and used in animal health was 9% in 2023 in Sri Lanka. Since 2019, the use of such antimicrobials critical to human health has decreased by 32.4% in 2023. It was 7.73mg/Kg of biomass in 2019, and it was reduced to 4.85mg/Kg of biomass in 2023**. Quinolone antimicrobials such as enrofloxacin were the most common antimicrobials used in this category since 2019 in the country**. Macrolides, tetracycline, beta-lactams, sulfa-trimethoprim, and glycopeptides were the most used classes of antimicrobials in the animal health sector over the last five years.

Only import and manufacturing data on antimicrobials are found as national antimicrobial consumption data in this document. 100% of total antimicrobial usage is imported in Sri Lanka. However, quantities may be considered rather high or overestimation since actual usage data are not found for further interpretation. In addition, antimicrobials are imported and the product are not used in the animal husbandry field. However, waste or nonuse percentage has not determined.

The accuracy of the data is critical in this process, hence the reconfirmation of data is vitally important. Although importers of antimicrobials have submitted the delivery information, actual usage information is very limited. **The collection of real information at the farmer level is highly recommended,** although significant practical difficulties are encountered in the data collection process. Furthermore**, off-label use of antimicrobials is common in livestock; some human products are also used in livestock**. However, the percentage of such off-label practices is limited and not significant for the final calculation of total antimicrobials. Random surveillance of livestock farms may contribute to companion animal practices. Some of the antimicrobials used for external applications are also calculated based on biomass, which is a limitation of the report. However, such a percentage is minimal and considered negligible as per the data given in the report.

Prudent usage of antimicrobials should be encouraged in livestock farming, and veterinary prescriptions need to be identified as a requirement to distribute antimicrobials from farm shops. These legislative gaps need to be addressed in the country. In addition, antimicrobial susceptibility testing has been implemented in regional Veterinary Investigation centers to encourage the prudent use of antimicrobials in livestock practices.

Implementation of following practices have been highlighted herewith.

- Antimicrobial stewardship in livestock production systems, including prudent use of antimicrobials,
- Multi-sectoral awareness of antimicrobial consumption and antimicrobial resistance,
- regulation and necessary enforcement on antimicrobials in the veterinary sector,
- active survey of AMU every year, and antimicrobial residue surveillance in public health and food safety have been identified as necessary recommendations from state veterinary services for further reduction of antimicrobials in the animal health sector in the country.
- In addition, the AMR national committee has a role in the identification of new regulations required, multi-sector involvement in the decision-making process, international collaboration, and national surveillance of AMR, antimicrobial residues, and AMC.

Following recommendations have been suggested to encourage prudent usage of antimicrobials in livestock and companion animals.

Data-Driven Recommendations:

- The observed decrease in antibiotic use suggests that current strategies are having a positive impact, indicating that these efforts should be continued and reinforced. The strong collaboration and understanding between Department of Animal Production and Health and industry of antimicrobial importing may contribute significantly to achieve this trend. In addition, changes of marketing trends in poultry production system would be benefited for this purpose.
- Targeted strategies are recommended to further reduce the use of critically important antibiotics, including regulatory measures and awareness campaigns. Most of poultry producers have been planned to prevent usage of 10% enrofloxacin in the first week of chick production.
- The poultry sector exhibits the highest levels of antibiotic use; chicken meat is the popular meat commodity in the country. Additional investigation is warranted to understand the underlying drivers and inform effective reduction strategies.
- Although overall antibiotic use has decreased, continued usage persists; strategies should ensure that antibiotics are used appropriately, primarily for therapeutic purposes. As an example, macrolide was the highly used antimicrobial every year. Hence, further strategic approaches are required to minimize usage of macrolids in the livestock industry.
- Import and manufacturing data provide limited insight into antimicrobial use, transitioning to sales or farm-level data could offer a more comprehensive understanding.

- In addition, legal enforcement on marketing and distribution of antimicrobials are required to minimize non evidence based antimicrobial treatment. Special attention must be given to regulate farm shop to avoid sale of non-prescription antimicrobials at the farm shops.
- Registration of antimicrobials at the regulatory authority (VDCA) are required to strength up with further scientific approaches and evidences, evaluation of dossier together with other supportive documents and scientific or animal experiment are required to validate. Furthermore, existing regulations needs to be review bi annually to facilitate quality antimicrobial in the market.
- Laboratory capacity development for testing of the quality or purity of antimicrobials together with efficacy are required. Hence, usage of low quality amicrobial may be minimized in the livestock and companions animals.

Complementary Strategic Recommendations:

- Strength up the national AMR surveillance covering livestock, poultry, companion animals and food of animal origin.
- Develop, implement, monitoring and evaluation of Infection prevention and control programme (IPC) are required in animal clinics and hospitals.
- Developing guideline on prescription for practising veterinarians, implementation, monitoring and evaluation of such guideline in continuously.
- Review, implement, monitor and evaluation of Biosecurity programme in livestock, poultry and aquaculture.
- Laboratory capacity development to carry out standard antimicrobial susceptibility testing at regional labs of animal health sector in the country (both government and private labs).
- Implementation of Antimicrobial stewardship programme in companion animals, livestock, specially in veterinary/animal hospitals.
- Address off-label use of antimicrobials: VDCA may acts on the off-label use of antimicrobials in livestock, companion animals and aquaculture with the existing legal provisions.
- Antimicrobials may be stored and are sold in improper conditions or inappropriate condition. Hence, Monitoring and evaluation of farm shops, distributers, and importers are required to be implemented. In addition, introduction of certificate qualification for the farm shop are required.
- Monitoring and evaluation of standards usage of disinfectants/antiseptic in livestock and hospitals are required to monitor with provided guideline by DAPH and relevant authorities.
- Consider implications of human drug use in animals: This is a common complaint in the country, some veterinary practitioners prescribes last resort antimicrobials for treating general infections in companion animals.
- Monitor non-prescription use of antimicrobials. Monitoring of issuing of antimicrobials without prescription are required to monitor in veterinary farm shops and other shops.

- Strengthen residue monitoring programs. Antimicrobial residues are required to monitor in food of animal origin. National surveillance of antimicrobial residue monitoring has not been implemented in the country.
- Inclusion of antimicrobial resistance to curriculum of paraprofessional sin the country. Although AMR is in curriculum of veterinarian, it has not been included in the curriculum of middle level paraprofessionals.
- Enforcement of necessary regulation on falsified usage of antimicrobials is required. In addition, implementation of regulation on antimicrobials only for prescription based issuing at veterinary pharmacies and farm shops.
- Systemic awareness campaign on antimicrobials resistance under the one health stakeholders are also required. Special attention must be given to AWaRe classification by WHO and similar classification of antimicrobials by WOAH.
- Awareness on AMR among school children in the ministry of education.
- Encourage investment on alternative for antimicrobials such as vaccine, prebiotics and probiotics and other alternatives in livestock, poultry and companion practices.
- Encourage research and development of veterinary vaccine and other alternative for antimicrobials.

VI. CONCLUSIONS

Total antimicrobial consumption is decreasing in trend in the animal health sector, Sri Lanka. The contribution from the critically important antimicrobials was 9% in 2023, which needs further reduction with a strategic approach and by implementation in the livestock. However, it was over 50% reduction in last five years. Sri Lanka is the 37th highest antimicrobial-using country in the animal health sector in 2023, out of 131 countries submitted. On a quantity basis, the poultry sector uses a high amount of antimicrobials in the country, since poultry is the well-established livestock sector in Sri Lanka; recent expansion of the poultry sector may contribute to increasing antimicrobial consumption every year.

DAPH continues to monitor antimicrobial consumption in the animal health sector; necessary implementation of legislation, policies, and concepts may contribute to the trend of reduction in the animal health sector. Strong collaboration between DAPH and industry (both pharmaceutical and livestock farming) is always encouraged. Regulatory implementation may be minimal from companion animal practices since practitioners use human-targeted antimicrobials in their practices. However, legislation gaps are significant, and enforcement of regulation needs to be enforced on antimicrobials in the animal health sector. Implementation, monitoring, and evaluation of IPC, biosecurity practices, antimicrobial stewardship programs, good animal husbandry practices, vaccination, and alternatives for antimicrobials are always encouraged to minimize use of antimicrobials in the animal health sector in the country. In addition, implementation, auditing, awareness programs, and national surveillance mechanisms across the sectors may contribute to further reduction (by 20% in the next five years) of antimicrobials in livestock and animal health sectors.

VII. ANNEXES

A. Additional Data Tables

No additional data tables were included.

B. Glossary of Terms

No such term were used in the text

C. References and Acknowledgments

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