

## **Title: Veterinary Antimicrobial Monitoring Systems (VAMS): IT-Based Monitoring System**

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### **Abstract**

Monitoring and surveillance data on importation, distribution and usage of antimicrobials in livestock farming systems in Uganda is limited and not well represented. We designed a project aimed at establishing the quantities of antimicrobials imported in the country using retrospective data from 2018 to 2020 and developing an information technology system for capturing data in real-time. We found that antibacterials (antibiotics) were the most imported (84%, 84% and 55%) for the three years respectively followed by antiprotozoal agents. Tetracyclines and a combination of Aminoglycoside + Penicillin pharmacological classes were the most imported antibiotics for the three-year study period. We developed an interactive information technology web-based dashboard to capturing import, distribution, sales and usage antimicrobial data and display it in different graphical formats for timely visualization, monitoring and reporting. The developed interactive web-based application to be integrated with mobile application will enable timely access and monitoring antimicrobial data imported and distributed for use, a critical step for monitoring of antimicrobial usage in livestock farming systems for the control and management of antimicrobial resistance.

### **Background**

The consumption of antimicrobials is one of the leading causes of antimicrobial resistance (AMR) in both humans and animals. At global level, there is continued unabated rise in antimicrobial consumption predicted to increase to 200% by 2030 leading to widespread antimicrobial resistance. Antimicrobial resistance is one of the leading causes of death (700,000 per day) in humans and projected to rise to 10 million death in 10 years if concerted efforts are not taken to address the current challenges posed by antimicrobial resistance. Likewise, antimicrobial resistance in livestock systems poses serious challenges for disease management affecting animal health, welfare and

productivity. Uncontrolled and widespread usage of antimicrobials in livestock has raised public health concerns because of the associated risks of transferring resistant bacteria to humans through food and environmental contamination and direct contact with animals. However, there is limited or no data on consumption of antimicrobials in livestock in most Low- and Middle-Income Countries (LMICs) especially here in Uganda to measure the extent and magnitude of AMR. Understanding what antimicrobials are consumed, in what quantities and by what livestock production system is critical to designing appropriate interventions to curb the AMR in animals and spread to humans.

## Methods

We accessed electronic database of antimicrobial importations for animals for the period from 2018 to 2020 from National Drug Authority (NDA). The data was extracted into excel, sorted according into two broad categories of antibacterials and antiprotozoals, active ingredient and pharmacological classes. The data was then analysed and summarized into quantities (kgs) per month/ per year for 3 years according to recommended units of measurement by OIE and WHO universal standards. Using the assorted datasets, we then developed an interactive information technology web-based dashboard for monitoring importations in real-time.

## Results

### 1. Quantities (Kgs) per year for imported antibacterials and antiprotozoals

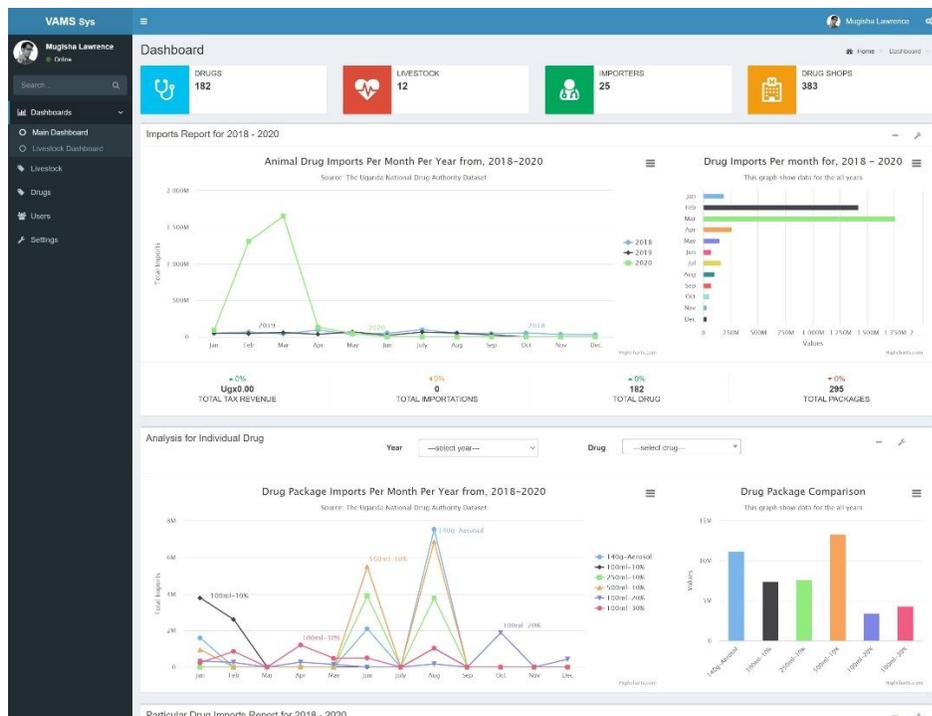
	2018		2019		2020	
Broad Class	Qty (Kg)	%	Qty (Kg)	%	Qty (Kg)	%
Antibacterials	210,418.58	84	150,032.48	84	142,069.12	55
Antiprotozoal	39,183.35	16	27,644.47	16	116,504.10	45
<b>Total</b>	<b>249,601.94</b>	<b>100</b>	<b>177,676.95</b>	<b>100</b>	<b>258,573.21</b>	<b>100</b>

### 2. Pharmacological classes of antibiotics imported in the country, 2018-2020

		2018		2019		2020	
	Pharmacological Class	Qty	%	Qty	%	Qty	%
1	Tetracyclines	93551.219	44.5	72765.785	48.5	58605.980	41.3
2	Aminoglycoside + Penicillin	75642.040	35.9	34826.000	23.2	42568.675	30.0

3	Sulfonamides and trimethoprim	24074.013	11.4	14452.316	9.6	22863.199	16.1
4	Macrolides	5825.000	2.8	8087.030	5.4	4896.700	3.4
5	Fluoroquinolones	4236.510	2.0	6380.470	4.3	6142.840	4.3
6	Aminoglycoside + Sulfonamides	3999.600	1.9	3299.670	2.2	1237.376	.9

### 3. Interactive Web-based Dashboard ([VAMS | Dashboard \(demo-vams.herokuapp.com\)](https://vams.herokuapp.com))



## Conclusion

We established quantities in kilograms (kgs) of broad antimicrobials, specific antibiotics and pharmacological classes imported into the country to be used in livestock for 2018-2020. We then developed an interactive information technology web-based dashboard to capture import, distribution, sales and usage antimicrobial data displayed in different graphical formats for timely visualization, monitoring and reporting. Routine, electronic data collection, quantification and presentation of antimicrobials imported and used in livestock farming systems is needed to guide surveillance systems and inform policies for AMR action plans. For more information on the project:

<https://www.youtube.com/watch?v=daaVNrDec7k&list=UUOvowEvrh3IH6Em07k0UdkQ&index=13>

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## Collaborators



**NATIONAL DRUG AUTHORITY**

*Safe Drugs Save Lives*



