Presence of Veterinary Drugs in Livestock samples

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Abstract

The use of veterinary drugs in animal husbandry worldwide is of great concern nowadays within the One Health Approach [1]. The presence of residues of veterinary drugs and certain substances in live animals and animal products may pose a risk factor for public health, animal health and welfare, and the environment. The aim of this poster is to review the existing situation in Cyprus and to identify the existing compounds present in live animals and animal products originating from the National Residue Control Plans under the European Legislation. The review outcome indicated the major veterinary drug classes to be investigated are: Antibiotics, Coccidiostats, Hormones, Non-steroidal Anti-inflammatory drugs, Hormones, Resorcyclic Acid Lactones and Thyreostastics which are encountered from samples originating from the pork, bovine, goat, sheep, chicken, and rabbit farms.

Introduction

Within the European Union, the Member states are requested to implement National Residue Control Plans (NRCPs) in order to protect the public health from the presence of residues of veterinary medicinal products (VMPs) (or pharmacologically active substances) in live animals and animal products such as Antibiotics, Coccidiostats, Non-Steroidal Anti-inflammatory Drugs (NSAIDs), Hormones, Resorcyclic Acid Lactones (RALs), and Thyreostats. The control plans follow the European Union legislation namely Regulations 2022/1644/EU [2] and 2022/1646/EU [3]. As it is indicated in the NRCPs, the official control laboratories routinely analyze these substances in animal products to verify that the residue levels are below Maximum Residue Limits (MRLs) set by the Regulation 37/2010 [4]. In Europe, Cyprus, Italy, and Spain have the greatest use of Veterinary drugs on a regular basis for treatment and prevention of diseases in animals in commercial livestock farming. Cyprus state report summarizes the monitoring data from 2019 till 2023 on the presence of residues of veterinary medicinal products in live animals and animal products in Cyprus [5].

Aim: The presence of these residues will serve as guide to identify the existing compounds present in farming waste such as manure, wastewater and soil samples originating from livestock farms.

Method

A comprehensive review on Veterinary Drug Residues was conducted to evaluate the existing situation in Cyprus. The monitoring data from 2019-2023 were studied [5]. The last year's 2023 sample categories are selected and represented based on the new Reg's. (EU) 2022/1644 and 2022/1646 where the official controls are performed on a risk basis and with an appropriate frequency, Art. 9, Reg. (EU) 2017/625 [6] (Figure 1). The Reg. (EU) 2022/1644 ensures that the controls are effectively targeted in all Member States by setting out the rules on the combinations of substance groups and criteria on the content of the national monitoring plans and Reg. (EU) 2022/1646 refers to the practical arrangements for the performance of official controls and specifies the content and the arrangements. The presence of non-compliant samples for antibiotics was also extracted from the national monitoring control plans, 2010-2023 (Figure 2), and evaluated. Additionally, the presence of sulfonamides is shown in Figure 3 as continuous control from the beginning of the implementation of the NRCPs in 1991 and the method of detection applied.

Results – Discussion

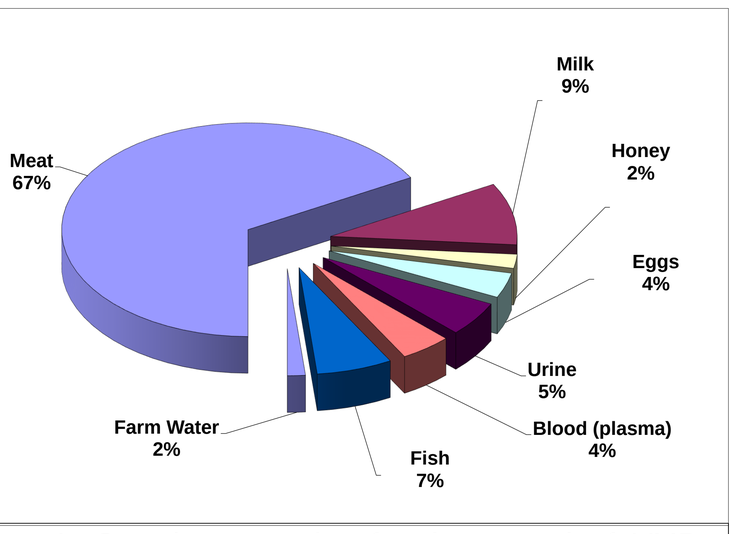

Figure 1: Sample categories for the control of VMPs, 2023 [5].

Percentage distribution of 901 in total number of samples tested for 32322 parameters (for 2023).

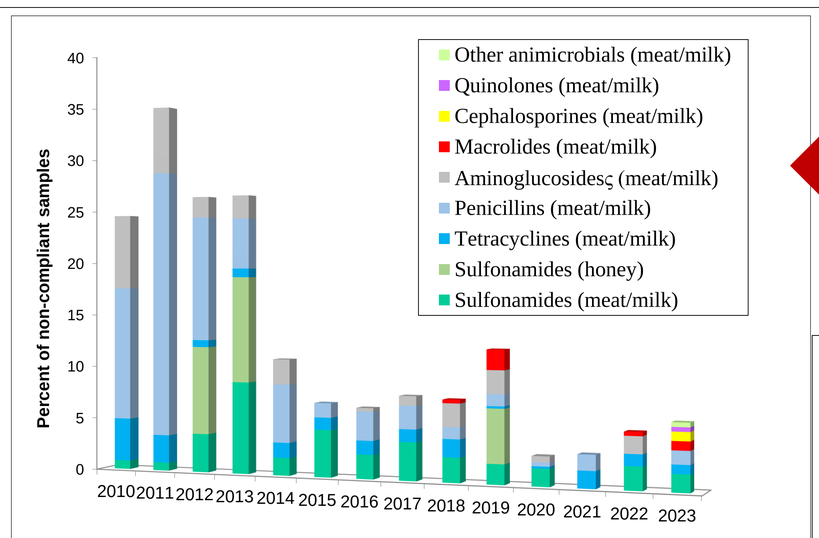

Figure 2: Comparative Distribution of non-compliant samples in animal products for antibiotics [5]

The sulfonamide residue control, 1991-2023; note the detection method the decrease in total number of positive samples and the NRCP for piglets [5].

For 2023, there was a decrease in the presence of sulfonamides in meat, no non-compliant milk sample for ATB was reported or detected for aminoglucosides [5]

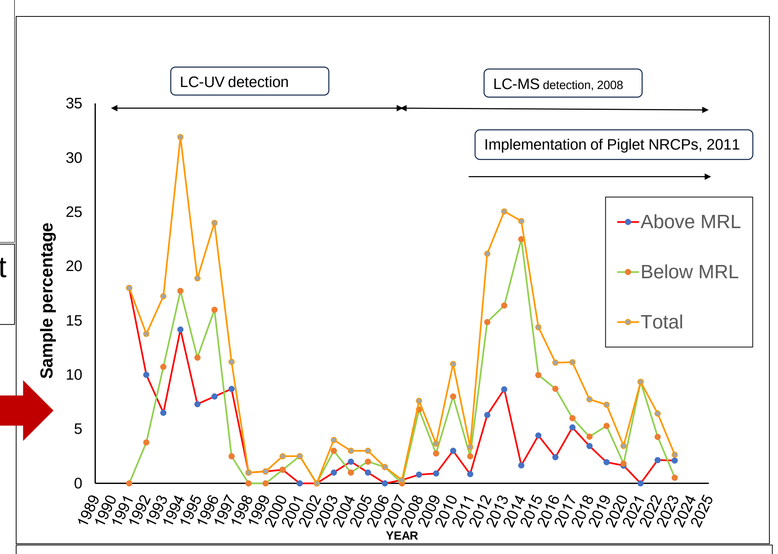

Figure 3: Comparative Sulfonamide Residue control in Pig meat 1991 – 2023.

It is noteworthy to observe the monitoring of sulfonamides throughout the years of the implementation of the NRCPs, the use of the UV detection versus the mass spectrometry detection along with the inclusion of a National program to test antibiotics in piglets.

The farm investigation on the presence of hormones indicated an endogenous origin and the NSAIDs were administered to animals having mobility problems mainly due to their age.

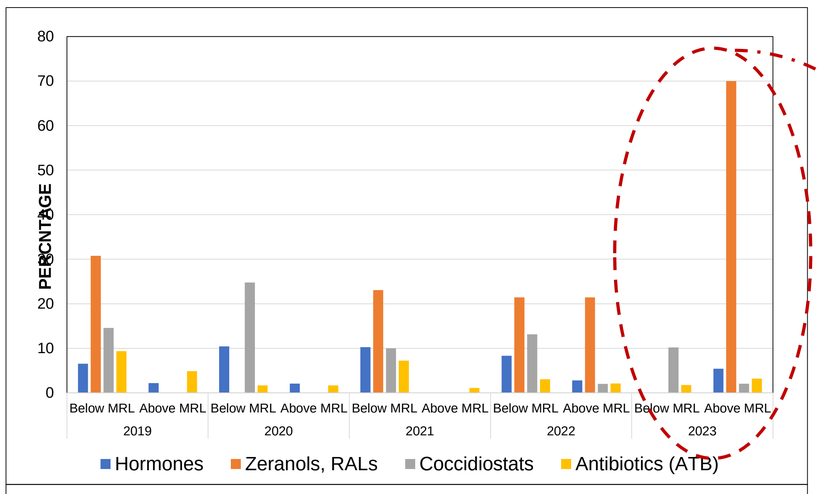

Figure 4(a): Percentage of samples above or below the MRL.

Percentage of samples above or below the MRL in terms of the total number of samples analyzed for each of the substance groups shown

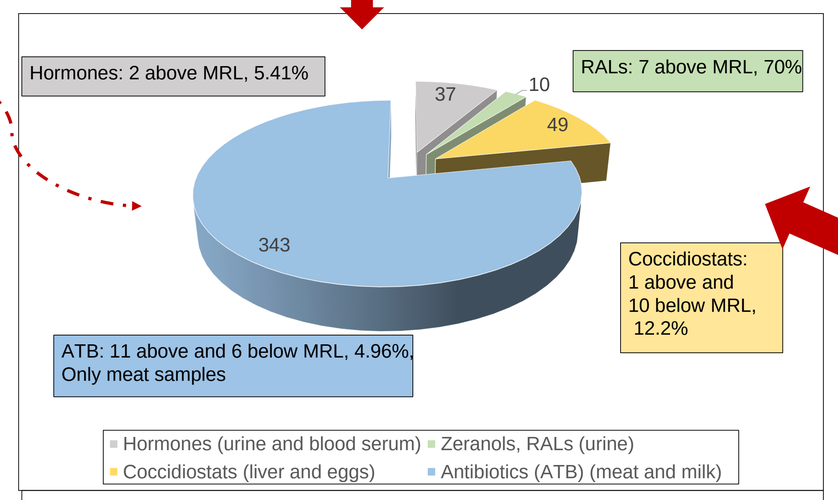

Figure 4 (b): Substance group numerical representation for the number of samples tested, 2023.

The number of samples tested for four substance groups during 2023 and the number and percentage of positive samples is also indicated [5]

The presence of RALs in animal urine is originating from the contaminated feed and the presence of thiouracil attributed to the animal diet from cruciferous plants.

Conclusions:

- The new regulations intensify the control of VMPs in live animal and animal products based on the risk-based approach.
- Cyprus as Member States has adopted a strategy according to certain criteria to implement the NRCPs in such way to control combinations of substance groups and commodity groups leading to the monitoring of more than thirty-two thousand parameters (2023)
- The most widely used VMPs are antibiotics and coccidiostats.
- In recent years, the use of macrolides, cephalosporines, quinolones, and other antimicrobials as derived from Figure 2 and their use did not contribute to a higher percentage number in the positive sample for antibiotics.
- The EFSA 2022 report states that the results on the levels of residues from veterinary drugs and other substances found in animals and animal products remain low in the European Union [7].

References:

[1] WHO (2024) World Health Organization, One Health Approach: https://www.who.int/health-topics/one-health#tab=tab_1
[2] CDR (EU) 2022/1644, (2022) Commission Delegated Regulation https://eur-lex.europa.eu/eli/reg_del/2022/1644/oj
[3] CIR (EU) 2022/1646, (2022) Commission Implementing Regulation, https://eur-lex.europa.eu/eli/reg_impl/2022/1646/oj
[4] Commission Reg. (EU) 37/2010, (2009) Commission Regulation (EU), https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32010R0037
[5] State General Laboratory Cyprus, Annual Report, Greek Version
[6] Commission Reg. (EU) 2017/625
[7] EFSA, Report for 2022 on the results from the monitoring of veterinary medicinal product residues and other substances in live animals and animal products, 26 February 2024

11th International Conference on Sustainable Solid Waste Management
Rhodes, Greece, 19 - 22 JUNE 2024