Deterministic bio-mathematical model (Anthelmintic Resistance Program) of resistance evaluation in equine strongyls

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Several methods have been described and used to detect anthelmintic resistance with differing sensitivity and reliability in horse strongyolidosis. Regardless of the employed method these have advantages as well as disadvantages, reason for which various authors tried adapting them in order to increase the precision and speed. All these inconveniences determined the creation of an original computer program Anthelmintic Resistance Program - ARP meant to eliminate errors in data interpretation. This computer program allows for egg hatch assay (EHA) and larval development assay (LDA), the calculations regarding hatching percentage of eggs in various concentrations and reference dilution of benzimidazols, tetrahydropirimidines and macrocyclic lactones; the representation of the reference curve of reduction; determination of the lethal dose 50 (DL₅₀) or lethal concentration 50 (LC₅₀); graphical analysis of the reduction curve, calculation of Resistance Factor (RF), as well as the risk of resistance to the various tested substances. For FECRT is possible to calculate the standard deviation, the reduction percentage and the 95% confidence interval.

In vivo analysis by FECRT of resistance to benzimidazole conducted between 2003-2008, on 992 horses belonging to 22 populations from Romania, revealed installation of resistance phenomenon in 66.66% of cases to Mebendazole (MBZ), Fenbendazole (FBZ) or Albendazole (ABZ).

In vitro strongyl resistance to anthelmintic drugs (for the same horse population on which in vivo tests were performed) was detected was detected by use of EHA and LDA, in 77.28% of the populations taken in to study. Our statistically analyses using ARP, established that the correlation between FECRT and EHA or LDA tests was 86.25%, quantified through bio-mathematical model.

The Anthelmintic Resistance Program - www.Pharma-Logic.ro -, created and used for the first time in Romania, allowed numerical, biostatistical and graphic analysis of data obtained at in vitro and in vivo resistance tests, making possible the risk assessment for the exposed animal or equine population with regard to the possibility of occurrence of resistant strongyl species.