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Addressing antiparasitic drug resistance through One Health

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I. Introduction

1. Parasitism is one of the challenges that exist to achieve profitable livestock production. Parasitic diseases negatively affect health and welfare of livestock as well as influence the economy and trade of animals and animal products.¹

2. Worms, ticks and trypanosomes are the top disease agents globally ranked according to their impact, especially on small-scale producers.² Approximately 70 percent of production animals, especially in developing countries, are estimated to experience severe parasite transmission. The impact of these diseases in different geographical regions of the world varies greatly depending on many factors, but both livestock producers from developed and developing countries allocate a considerable budget to control

¹ FAO. 2004. Module 1. Ticks: Acaricide resistance: Diagnosis, management and prevention. In: Guidelines resistance management and integrated parasite control in ruminants. Rome: FAO Animal Production and Health Division. pp. 25-77. <https://openknowledge.fao.org/handle/20.500.14283/ag014e>

² Rist C.L., Garchitorena, A., Ngonghala, C.N., Gillespie, T.R. & Bonds, M.H. 2015. The burden of livestock parasites on the poor. *Trends in Parasitology*, 31(11), 527-530. <https://doi.org/10.1016/j.pt.2015.09.005>

Documents can be consulted at www.fao.org

these parasitic diseases.³ It was estimated that USD 51 are lost for each head of cattle every year worldwide due to control, treatment and mortality costs caused by protozoans and helminths.⁴

3. Most livestock production is supported by antiparasitic drugs, representing the second largest global market segment in the animal health industry, after vaccines.⁵ However, the rapid emergence and spread of drug-resistant parasite strains, such as ticks and worms, are alarming. Chemical control of ticks and worms remains heavily dependent on a limited number of classes of compounds. Overuse and misuse of parasiticides as well as use of substandard medicinal products are main factors which contribute to antiparasitic drug resistance, with an impact not only on animal health, but also on public health and the environment.^{6,7}

4. FAO's involvement in the issue of resistance to antiparasitic agents dates back to 1984.⁸ In 1997, a permanent FAO working group of experts was established to advise on resistance management and integrated parasite control. In 2004, FAO published guidelines on resistance management and integrated parasite control in ruminants.⁹ Since 2004, the number of scientific papers on antiparasitic drug resistance, especially in ticks and worms, sharply increased, indicating enhanced interest and importance of the issue. In 2021, FAO organized a virtual expert consultation on the "sustainable management of parasites in livestock challenged by the global emergence of resistance", focusing on acaricides and trypanocides. The consultation highlighted the worrying situation and the need to consider this issue as a priority area of work.^{10,11}

II. Current activities

5. Following the recommendations from the virtual expert consultation in 2021, FAO established the Community of Practice on Acaricide Resistance Management of Livestock Ticks in 2023.¹² This is an inclusive international community, with 547 members as of March 2024 from 83 countries. Knowledge is shared among the community, supported by a core group of experts, which is developing updated guidelines on sustainable tick and acaricide resistance management in livestock (due to be published in 2025).

³ Charlier, J., Rinaldi, L., Musella, V., Ploeger, H.W., Chartier, C., Vineer, H.R., Hinney, B. *et al.* 2020. Initial assessment of the economic burden of major parasitic helminth infections to the ruminant livestock industry in Europe. *Preventive Veterinary Medicine*. 182:105103. <https://doi.org/10.1016/j.prevetmed.2020.105103>

⁴ Rashid, M., Rashid, M.I., Akbar, H., Ahmad, L., Hassan, M.A., Ashraf, K., Saeed, K. & Gharbi, M.A. 2019. A systematic review on modelling approaches for economic losses studies caused by parasites and their associated diseases in cattle. *Parasitology*. 146(2):129-141. <https://doi.org/10.1017/S0031182018001282>

⁵ Selzer, P.M. & Epe, C. 2020. Antiparasitics in animal health: Quo vadis? *Trends in Parasitology*. 37(1):77-89. <https://doi.org/10.1016/j.pt.2020.09.004>

⁶ Fissiha, W. & Kinde, M.Z. 2021. Anthelmintic resistance and its mechanism: A review. *Infection and Drug Resistance*. 14:5403-5410. <https://doi.org/10.2147/IDR.S332378>

⁷ Dzemo, W.D., Thekiso, O. & Vudriko, P. 2022. Development of acaricide resistance in tick populations of cattle: A systematic review and meta-analysis. *Heliyon*, 8(1-2):e08718. <https://doi.org/10.1016/j.heliyon.2022.e08718>

⁸ FAO. 1984. *Tick and tick-borne disease control: A practical field manual*. Volumes 1 and 2. Rome.

⁹ FAO. 2004. *Guidelines resistance management and integrated parasite control in ruminants*. Rome. <https://openknowledge.fao.org/handle/20.500.14283/ag014e>

¹⁰ FAO. 2022. *Expert consultation on the sustainable management of parasites in livestock challenged by the global emergence of resistance – Part 1: Current status and management of acaricide resistance in livestock ticks. Report of the FAO Expert Consultation – 9–10 November 2021*. FAO Animal Production and Health Report No. 17. Rome. <https://openknowledge.fao.org/handle/20.500.14283/cc2981en>

¹¹ FAO. 2022. *Expert consultation on the sustainable management of parasites in livestock challenged by the global emergence of resistance - Part 2: African animal trypanosomosis and drug resistance – a challenge to progressive, sustainable disease control, 9–10 November 2021*. FAO Animal Production and Health Report No. 18. Rome. <https://openknowledge.fao.org/handle/20.500.14283/cc2988en>

¹² <https://www.fao.org/animal-health/areas-of-work/livestock-tick-control/en>

6. In the framework of the Programme Against African Trypanosomosis,¹³ FAO initiated the development of guidelines for animal trypanosomosis treatment and the management of trypanocidal drug resistance. FAO is also participating in the Controlling and progressively minimizing the burden of animal trypanosomosis (COMBAT) project, a four-year research and innovation project funded by the European Commission with the goal of reducing the burden of animal trypanosomosis in Africa.¹⁴

7. The Emergency Management Centre¹⁵ periodically organizes missions at the request of countries in urgent situations involving parasites and vector-borne diseases control.

III. Perspectives and the way forward

8. The vision of a world where parasitism and antiparasitic drug resistance no longer pose a threat to food safety, food security and global health needs to be envisaged with reduction of the prevalence of parasitic diseases and stopping the spread of resistance to antiparasitic drugs.

9. While methods for successful parasite control change over time, parasite susceptibility to chemotherapeutics shifts, new management strategies are introduced and parasite epidemiology fluctuates, in particular under the effects of climate change and animal movements. Global access to integrated and diversified parasite control methods should be ensured at regional, national and local levels.

10. Future priorities might be:

- Strengthening diagnostic and integrated surveillance, which is critical for decision-making and implementation support;
- Enabling best practices, including preventive measures and biosecurity, responsible use of antiparasitic drugs and diversification of control methods. They are key elements of control strategies, guaranteeing health and safety of animals, humans and the environment. This should also be supported by research and innovation; and
- Empowering professionals and strengthening the regulatory framework for veterinary medicinal products.

11. Considering the global challenge of parasites and antiparasitic drug resistance management as an alarming issue, addressing antiparasitic drug resistance through One Health would contribute to the FAO One Health Programme Priority Area and be supported by the engagement of all stakeholders.

¹³ www.fao.org/paat

¹⁴ Boulangé, A., Lejon, V., Berthier, D., Thévenon, S., Gimonneau, G., Desquesnes, M., Abah, S. et al. 2022. The COMBAT project: controlling and progressively minimizing the burden of vector-borne animal trypanosomosis in Africa. *Open Research Europe*, 2(67). <https://doi.org/10.12688/openreseurope.14759.2>

¹⁵ [https://www.fao.org/animal-health/our-programmes/emergency-management-centre-\(emc\)](https://www.fao.org/animal-health/our-programmes/emergency-management-centre-(emc))