

Results of the survey on antiparasitic agents and resistance in terrestrial and aquatic animals in the Middle East region

Antiparasitic resistance (APR) is an important challenge globally and one of the topics the OIE is currently working to address. After conducting a questionnaire on antiparasitic agents and resistance in terrestrial and aquatic animals in Africa, for which the [results](#) were published in the September issue of the OIE News, the OIE's Antimicrobial Resistance and Veterinary Products (AMR&VP) Department, in coordination with the Regional Representation for the Middle East, continued and extended the work in the Middle East region (Fig. 1). The questionnaire was sent to Middle Eastern countries during June and July 2020. The information was collected with the objective of better understanding the global situation regarding APR, and ultimately, to provide information to the OIE and the OIE's Electronic Expert Group on Antiparasitic Resistance (EEG APR) in responding to the challenge of APR at the global level.

Figure 1: Map of countries in the Middle East region



The results of the questionnaire were analysed by Professor Christo Hilan (University of Saint Esprit USEK, Lebanon) and presented at a meeting of the EEG APR on 21 September 2020. These results will be used to provide input from the Middle East region for a document by the EEG APR on responsible and prudent use of antiparasitics. The synthesis of the results which follows below provides a current overview of APR in the Middle East region based on the responses of the OIE Focal Points for Veterinary Products.

Study approach

The questionnaire was developed by the OIE's EEG APR with a focus on anthelmintic resistance (AHR). The final format of the questionnaire was a Microsoft Word document, with multiple-choice questions and one open question to capture data on: the most economically important animal species resources, AHR status, use of diagnostics, availability of information on AHR, rating of the country's regulatory environment for

anthelmintics, quality of anthelmintics for sale, as well as the nature of information needed to assist control of resistance and the biggest knowledge gaps concerning AHR in the region.

The questionnaire was sent by the OIE AMR and VP Department to the OIE's Regional Representation for the Middle East, and in early June 2020, it was disseminated to the Focal Points for Veterinary Products and the Delegates of each country.

The OIE's Focal Points for Veterinary Products provided the responses to the questionnaire via e-mail to the OIE AMR&VP Department directly and/or through the OIE's Regional Representation for the Middle East. Responses were received from nine Members (Afghanistan, Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Saudi Arabia and the United Arab Emirates) out of 13 countries.

The data collected from the nine Middle Eastern countries which responded to the questionnaire were entered into a Microsoft Excel spreadsheet, analysed, and presented as a frequency table and graphs.

Results

Focal Points were asked to rank the five most economically important animal species in their country. The list of species to choose from included cattle, small ruminants (goats and sheep), poultry, pigs, buffaloes, camels, horses and fish. A summary of the results for this question is presented in Table I.

	Cattle	Pigs (commercial)	Pigs (backyard)	Sheep	goats	Layers for egg production	Broilers (meat production)	Other commercial avian	Poultry (backyard)	Buffaloes	Camelidae	Equidae	Fish Aquaculture production
Rank 1	4	0	0	2	1	1	2	0	0	0	0	1	0
Rank 2	2	0	0	4	2	2	1	0	0	0	0	0	0
Rank 3	2	0	0	1	1	2	0	0	0	0	2	1	0
Rank 4	0	0	0	0	2	2	2	0	1	2	1	0	2
Rank 5	0	0	0	1	1	0	1	1	1	1	0	3	2
Total	8	0	0	8	7	7	6	1	2	3	3	5	4

Table 1: The frequency of different rankings of animal species by economic importance ('1' being the most important, '5' being the least important) according to the Focal Points for Veterinary Products in the Middle East who responded to the questionnaire. NB: In this Table, the numbers represent the frequency of responses (not the rank number).

Nine Focal Points responded to all questions in the questionnaire. For some questions, multiple responses could be selected.

Current status of knowledge concerning anthelmintic resistance

The responses of Focal Points concerning the status of knowledge on AHR at national and local levels in their country are shown in Table II, demonstrating that the majority of respondents felt that the status of AHR in their country was mostly unknown.

Table II: Responses from Focal Points for Veterinary Products in the Middle East regarding the status of anthelmintic resistance in their country

Status of anthelmintic resistance	At national level (frequency of total responses, n = 9)	At local level (frequency of total responses, n = 9)
Mostly unknown	7	8
Known for some species	1	1
Well described	1	0

Diagnosis (egg count reduction)

Responses from Focal Points regarding the diagnosis of AHR by applying the most common technique, the faecal egg count reduction test (FECRT), are presented in Table III.

Table III: Responses from Focal Points for Veterinary Products in the Middle East regarding the diagnosis of antiparasitic via the faecal egg count reduction test (FECRT) in their country

Use of FECRT for diagnosis of APR	Do not know	Very low use	Only used on research facilities	Routine on advanced farms
Result (frequency of total responses, n = 9)	3	4	1	1

The responses from Focal Points about the **availability of information** on anthelmintic resistance were as follows:

- Very little awareness or information (7 of 9 responses)
- Assume that resistance is similar to other countries in the region (0 response)
- Some scientific expertise is available (2 of 9 responses).

Regarding the **regulatory environment** for anthelmintics, the responses were mostly positive, with the majority of Focal Points indicating that registration practices do exist and are comprehensive (7 of 9 responses) and that labels on anthelmintics are comprehensive (7 of 9 responses) in their country. Although the results indicate that in the majority of countries, anthelmintics are sold directly to farmers (7 of 9 responses), the respondents indicated that in many countries, farmers had access to advice on anthelmintic use by veterinarians or veterinary shops/pharmacies (6 of 9 responses). Registration was reported not to exist in one country of the nine that responded.

Considering the **quality of anthelmintics** provided to farmers, most Focal Points estimated that the majority are of good quality (5 of 9 responses), or of good quality if purchased from known providers (6 of 9 responses), while 2 of 9 respondents reported the quality as being highly reliable. Three countries responded that the quality of anthelmintics was unknown.

Of five proposals for information that could assist in **improving the control** of AHR (selection of multiple responses was possible), the 'List of available anthelmintics and their indications for use' and 'Methods of prudent and responsible use of anthelmintics' were the most frequently selected. The methods for grazing management adapted to local conditions were only considered useful by a minority of Focal Points (1 of 9 responses). The four most frequently selected responses are shown in Table IV.

Table IV: Selected responses of Focal Points for Veterinary Products in the Middle East on information they believe would assist in improving the control of anthelmintic resistance in their country

Information that would assist in improving the control of anthelmintic resistance	Frequency of responders (n = 9) that selected this option
List of available anthelmintics and their indications for use	7
Methods for prudent and responsible use of anthelmintics	8
Non-chemical parasite control methods	4
Methods for breaking parasites life cycles	7

The most frequently selected option for **knowledge gaps** with respect to parasite control were 'diagnosis of resistance' (7 of 9 responses), followed by 'extension service based on advisors, vets, and veterinary paraprofessionals' (3 of 9 responses). 'Knowledge of parasite epidemiology' and 'demonstrated control methods' were infrequently selected (2 and 1 of 9 responses, respectively).

Finally, the Focal Points were asked if in their countries they encounter resistance to products other than anthelmintics. Only three responded, indicating the presence of resistance to trypanocides, anticoccidials, antiprotozoals and drugs against external parasites.

Discussion

Important context about the Middle East region should be considered when interpreting the results of the questionnaire. The climate and the livestock production systems in the Middle East are important factors to consider as they could have an impact on the presence and the spread of internal and external parasites.

Considering the diversity of climate in the region, 90% of the region is classified as an arid and semi-arid zone, while the remaining 10% of the region consists of humid zones with a temperate or mild climate. Arid and semi-arid zones experience low and variable rainfall, while the humid areas are characterised by long, dry summers and mild, wet winters.

Sheep and goats are considered important livestock in the Middle East, and the breeds raised are usually local breeds. They are reared in an extensive pastoral system and the main feed source for these animals is rangeland pastures for grazing. Semi-intensive systems do exist in some special production flocks, especially for milk production. In general, sheep and goats can walk for miles and miles searching for pasture to graze, as they are not fed in one specific location. Cattle breeds raised in the Middle East are mainly local and imported milking breeds. They are mostly reared in intensive systems and fed with concentrates and crop residues due to very limited access to grazing lands. Poultry production is an exclusively intensive system.

With regard to the different rearing systems (intensive, semi-intensive and extensive), infestation by helminths differs in occurrence and intensity. It is rather difficult to manage helminths in extensive systems because grazing does not occur consistently in the same place. A faecal egg count is difficult to perform in sheep and goats. In intensive systems, livestock face mostly external parasites and related diseases.

The results of the questionnaire are interpreted as follows:

The results for the **ranking of animal species by economic importance** show that pigs were not considered economically important by the respondents. This is undoubtedly because pig meat is prohibited on religious grounds in Islamic countries, and most of the Middle Eastern countries are Islamic countries, with the exception of part of Lebanon. The results of the questionnaire indicate that sheep and cattle are important for meat and milk consumption, followed by goat and poultry for eggs and meat. Camels, buffaloes and horses are considered economically important in some countries such as Afghanistan, Iraq, Kuwait, Saudi Arabia and the United Arab Emirates; while fish are considered economically important in countries bordered by seas such as Iran, Yemen, Kuwait and Oman.

Knowledge of antiparasitic resistance

The results of the questionnaire suggest that resistance to anthelmintics is not a subject that is well known in most Middle Eastern countries. Information is not widely available and the level of awareness of the subject is very limited. This situation could be due to a lack of communication on the topic, as compared to antibacterial resistance, for which many studies and much research have been conducted and for which information is widely spread in the media.

Currently, there may not be harmonised withdrawal/withholding periods across some Middle Eastern countries, and there may not be official control of veterinary drug residues in slaughtered animals in either meat or milk.

Diagnosis of antiparasitic resistance

The causes of anthelmintic resistance in the Middle East could be linked to how these products are used. According to the survey, diagnosis of resistance is available and utilised only for research purpose. This suggests that in general treatments with anthelmintics are made without confirmation of a laboratory diagnosis of parasitic infection.

Legislation/regulation related to antiparasitics

According to the respondents, the importation, sale and use of anthelmintics are subject to regulation in most countries. However, even if the products sold are correctly labelled with the necessary information, their distribution is often not regulated, with these products available 'over the counter and sold directly to farmers', and/or their use on farms is not restricted or recorded. This situation could increase the chances of misuse and emergence of AHR. Monitoring the use of anthelmintic drugs is difficult, although an example could be taken from the OIE's approach to monitoring use of antimicrobial agents intended for use in animals, which makes use of sales or importation data in many countries.

Quality of anthelmintics

The anthelmintics sold on the market are generally considered to be of good quality when the suppliers are officially licensed/authorised and subject to regulatory supervision. However, on the market there are some anthelmintics which could be illegally provided and for which the quality is unknown, being possibly substandard or falsified. Although it is assumed that the majority of imported drugs and their declared

certificates can be relied on, laboratory testing for verification is not available in most countries.

Information that would assist with controlling antiparasitic resistance

Based on the results of the questionnaire, the information that would assist in the control of resistance, to be considered according to the special way of grazing or pasture applied in the region, include a list of available anthelmintics and their indications for use, methods for prudent and responsible use of anthelmintics, and methods for breaking parasite life cycles.

Biggest knowledge gaps

The biggest knowledge gaps identified by Focal Points responding to the questionnaire included the diagnosis of resistance to anthelmintics by FECRT. Another of the knowledge gaps highlighted were the identification of resistance and the lack of extension service based on advisors, vets and veterinary paraprofessionals.

Other resistances

Some countries in the Middle East are facing resistance to drugs other than anthelmintics. Ticks, fleas, protozoa and scabies do exist in high frequency, potentially due to the climate in the region, and resistance to products used to control these pathogens such as trypanocides, anticoccidials (ionophores in chicken feed), antiprotozoals, and drugs against external parasites, may exist. The administration of these products may not be well regulated and they may not always be of good quality. Consequently, resistance to these products could develop.

Potential future solutions

The results of this survey highlight the lack of awareness and the knowledge gaps existing regarding the diagnosis of APR, the spread and the life cycle of parasites, and the prudent use of anthelmintics.

In order to better control APR, the following potential solutions could be envisaged:

- awareness and training sessions to assist actors in animal health (veterinarians, veterinary paraprofessionals and farmers) to better understand the life cycle of helminths and the appropriate use of anthelmintics
- information should be disseminated more widely and training sessions held on the application of methods for diagnosis of APR such as FECRT
- efforts should be made to ensure that antiparasitics of good quality are sold and administered with appropriate access to advice from animal health professionals
- provision of a list of available quality-assured, registered anthelmintics and their indications
- dissemination of information on methods for breaking parasite life cycles
- The OIE's EEG APR could publish a document (currently in preparation) on methods of prudent and responsible use of anthelmintics.

Conclusion

Antiparasitic resistance is an important problem in Middle Eastern countries, with the potential to cause economic losses, to impact animal and human health and to pose risks to the environment. The

questionnaire prepared by the OIE's EEG-APR provides some information on the current situation concerning APR in the region. It is hoped that this information will contribute to efforts to take appropriate management actions to tackle APR with the ultimate aim of ensuring the availability of quality-assured, safe and efficient antiparasitics (including anthelmintics).

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