Co-Space Stevenage, 25 Town Square, Stevenage, SG1 1BP, United Kingdom
Email: noah@noah.co.uk
Website: www.noah.co.uk www.noahcompendium.co.uk

Registered in England No: 2145809

Ionophores Q&A

Introduction

This document is designed to support the use of ionophores by the UK broiler industry. It is to be used as a resource for the industry to align messaging and provide detailed responses to some of the most challenging and commonly-asked questions. These range from questions relating to the basic understanding of the role of ionophores and the issues around coccidiosis in poultry to more technical questions and questions which draw on the global picture to address issues such as resistance and antibiotic usage in the US.

Positioning statement

Ionophores are used to prevent and control coccidiosis, a ubiquitous disease that can occur at any stage in a bird's life cycle. Coccidiosis has the potential to cause enteritis leading to intestinal inflammation, reduced absorptive capacity, increased podo-dermatitis due to wet litter and increased mortality.

There are various methods available for the control of coccidiosis in poultry, including biosecurity and vaccination. Ionophores are a sustainable and economical solution to prevent and control coccidiosis acting directly on the coccidia parasite when it is in the intestines of the bird. They are an option to help maintain bird health and welfare and they have no impact on human health as confirmed by the World Health Organisation, the World Animal Health Organisation and the European Surveillance Programme of Veterinary Antibiotics[i].

Ionophores are unique as they are animal-only antimicrobials that are not used in human medicine and are unrelated to and do not contribute to shared-class antibiotic resistance. They are therefore not considered important to human health by leading public health and regulatory agencies.

The use of ionophores, along with other measures such as use of synthetic anticoccidial products, vaccination, and biosecurity, will enable the UK poultry industry to continue to produce high quality, safe, and nutritious chicken.

General Questions and Answers

1. What is coccidiosis?

Coccidiosis is a severe parasitic disease that can affect poultry, cattle, sheep and pigs.

2. Why is it a problem for poultry in particular?

Coccidia (Eimeria species) oocysts are highly resistant and are always present in the birds' environment. Coccidiosis can affect all growing poultry, including outdoor flocks. Immunity can develop, but in some cases can be short lived, and concurrent diseases may make birds more susceptible again.

3. How do birds become infected?

Coccidiosis is caused by infections with microscopic parasites called coccidia – ubiquitous organisms which are able to rapidly multiply in the digestive tract of poultry. The parasite can destroy the cells of the chicken intestine causing enteritis, and potentially leading to other intestinal diseases[ii] as well as negatively impacting optimal growth of the animal. Coccidia have an oocyst life cycle stage which exists in the environment and, as they are highly resistant to cleaning and disinfection, it is virtually impossible to destroy and remove them. This means coccidia are constantly present in poultry environments with birds being continuously re-infected and potentially diseased until birds develops their own immunity.

4. How does the disease manifest itself?

Chicken with coccidiosis can suffer from severe diarrhoea and other related diseases, affecting their health and well-being. In heavy burdens with the most pathogenic species, coccidiosis can be fatal[iii].

5. How can farmers protect poultry from coccidiosis?

Since coccidiosis is naturally occurring, best management practices and hygiene may not be sufficient to prevent the disease. Management practices, hygiene and vaccination may help to reduce the risk of disease. However, as coccidia have huge replicative potential and cannot be eliminated from the environment, coccidiosis remains a constant risk for poultry. For the health and welfare of infected birds, anticoccidials are a suitable option to prevent coccidiosis and to limit the build-up and further spread of coccidia in the environment.

Farmers and veterinarians need access to appropriate products to treat the animals and limit the build-up and spread of the coccidia.

Licensed doses of anticoccidials can be supplemented in feed for the preventative control of coccidiosis[iv].

Vaccination is also an option to be used to reduce clinical signs and intestinal lesions caused by coccidiosis.

6. Why are anticoccidials so important in this context?

Poultry production without anticoccidials or vaccination can cause bird suffering by compromising health and welfare.

7. Why is coccidiosis harmful?

Coccidiosis damages intestinal epithelial cells resulting in inflammatory changes, reducing the normal digestive processes and causing increased mucus production, which can in turn allow bacteria to proliferate leading to enteritis. Effects of enteritis can include:

- Reduced absorptive capacity –reduced performance
- Diarrhoea leading to wet litter – can lead to poor environment with increased podo-dermatitis and negative welfare outcomes for birds
- Mortality

8. When is coccidiosis a threat to the birds?

Coccidiosis is now a threat all the way through the life of a growing chicken as it takes time for immunity to develop. Even when immunity has developed, in some cases it can be short lived.

9. What constitutes good intestinal integrity?

Intestinal integrity is the optimal functionality of the intestinal tract and the primary driver of bird health and performance. Coccidiosis can significantly compromise intestinal integrity often leading to enteritis. Preventing inflammation of the intestinal tract (enteritis) is essential for maintaining intestinal integrity.

10. How does intestinal integrity link to sustainability?

Good intestinal integrity is a key component of sustainable chicken production. By dealing with the most important component of health, farmers can address some of the important contributors to sustainability:

1. Economic – performance is not lost through disease
2. Social – bird health and welfare standards are maintained
3. Environment – in the absence of disease, better use of feed etc and thus a lower environmental footprint

11. What are the main causes for loss of intestinal integrity?

Intestinal integrity is balanced by the microbial flora and can be influenced by various infectious and non-infectious factors:

- Enteritis caused by coccidia, bacteria and viruses
- Diet high in salt
- Biogenic amines
- Non-starch polysaccharides such as xylans, glucans or mannans
- Poor fat quality
- Mycotoxins
- Poor farm management
- Lack of hygiene
- Lack of biosecurity measures
- All immuno suppressive diseases (e.g. Gumboro or Marek´s disease) create a favourable environment for the loss of intestinal integrity.

12. What are ionophores?

- Ionophores in use in the UK poultry industry are classed as specified feed additives not veterinary medicinal products.
- They cannot be used in human medicine and are unrelated to and **do not contribute** to shared class antibiotic resistance. They are therefore not considered important to human health by leading public health and regulatory agencies[iii].
- Ionophores are not classified as veterinary medicinal products

- Ionophores are used to control and prevent coccidiosis and maintain intestinal integrity

Ionophores are used to control and prevent coccidiosis and maintain intestinal integrity and at this stage are considered a sustainable and economical solution to control coccidiosis and maintain bird health and welfare.

13. How are ionophores for poultry controlled?

Ionophores fall under the Food Standards Agency (FSA) jurisdiction with the retained EU Regulation 1831/2003. This regulation enables the FSA to monitor and control the use of anticoccidials. Under the current regulations, any variation to the recommended dosage is strictly prohibited. Although a veterinary prescription is not required, anticoccidials are always administered and controlled by qualified animal health personnel. All major poultry integrations contract and use expert poultry veterinarians to ensure that the best health and safety control measures are observed.

14. What are Maximum Residue Limits (MRLs)?

The maximum residue limit (MRL) is the maximum allowed concentration of a residue in a food product obtained from an animal that has received a veterinary medicine or that has been exposed to a biocidal product for use in animal husbandry[v]. In the process of establishing an MRL, firstly a No Observed (Adverse) Effect Level (**NO(A)EL**) is identified through scientific studies with the active substance. The NO(A)EL is the highest dose that does not cause adverse effects. This figure is then divided by an 'uncertainty' or 'safety factor' e.g. by 100-1000 to determine the Acceptable Daily Intake (**ADI**). The ADI is the amount of the residue that is considered safe for an individual to eat every day for their lifetime taking into account a number of safety factors. The MRLs are such that consumers can ingest generous amounts of animal foodstuffs every day without exceeding the ADI. A number of factors are taken into consideration here including the amounts of each food eaten per day and how the substance is metabolised and distributed in the various tissues.
For all registered ionophore coccidiostats, a MRL is set for each edible tissue and product to ensure the ADI is not exceeded.

15. How much chicken would a human have to eat to exceed the Maximum Residue Levels (MRLs) for ionophores?

All ionophores are licensed with established Maximum Residue Levels (MRLs) linked to the Average Daily Intake of meat by consumers, (ADI). Ionophore MRLs are such that consumers would have to consume 600kg or 300 whole chickens per day to reach a level where there remains no adverse effect.

16. Is there a withdrawal period?

Some ionophores have a withdrawal period, and some do not. Check the label for the product that is used.

17. Why do we need ionophores?

Prevention of coccidiosis is essential in order to maintain intestinal integrity, health and welfare and the efficient absorption of nutrients in the chicken[vi].

Ionophore based anticoccidials have been the mainstay of protection against coccidiosis since 1970s.

18. Is there an environmental benefit to using coccidiostats?

A: Yes, in a recently published paper it was calculated that if coccidiostats were removed from the UK broiler industry, and the demand for chicken stayed the same, there would be a need for 3% more land and the carbon emission would increase by 3.96%. This would be an increase 84,000 tons of CO2 equivalent per year. Additionally, the amount of food required to feed the chickens would increase by 4.2%. Sustainability of our food chain is an important factor in addressing climate change and ionophores can help by helping manage coccidiosis which causes health and welfare issues[vii].

19. How do ionophores in poultry work?

Ionophores act directly on the coccidial parasite when it is in the intestines of the bird resulting in the death of the parasite and preventing the intestinal damage that it causes. Ionophores are unique in their action as instead of trying to eliminate coccidiosis entirely, they allow a small number of cocci to replicate in the intestine and enable birds to develop their own immune response.

20. Are ionophores considered medically important for humans?

No. The World Animal Health Organisations (OIE) did not include ionophores in their global survey on antibiotic use[viii].
The World Health Organisation (WHO) has defined medically important antimicrobials. Ionophores are not included as medically or critically important[ix].

The European Surveillance programme of veterinary antibiotics (ESVAC) has not included ionophores in their data collection programme[x].

21. Is there likely to be any future use of ionophores in human medicine?

Salinomycin was at one time investigated for cancer therapy in humans. However, the levels needed for any beneficial outcome would have resulted in human toxicity. For this same reason, they ionophores are unlikely to be considered for any other therapeutic properties[xi].

22. What are the differences between the US production system and the UK production system?

The methods of poultry production and processing in the US are quite different to the UK.
Animal health products are classified by the FDA which is different to the European classification. Due to the US classification system some companies removed ionophores from their diets as part of specific marketing campaigns. Some producers who removed them from their diets are now reintroducing ionophores.

23. What alternatives are there to ionophores?

Live vaccines can be used to stimulate immunity against coccidiosis in poultry. While this can be a successful approach in layers and breeders, the growing cycle of broilers means that immunity development from vaccination may take too long for this to be the most sustainable option. It can also be used in broilers, either on its own or in combination with ionophores and other in feed anticoccidials.

Synthetic coccidiostats can be used to control coccidiosis, however resistance to these products can build up relatively quickly, necessitating close monitoring and rotation practices.
Finally there are several 'alternative' products which claim to be effective at helping managing coccidiosis. While some of these products have been shown to help reduce the impact of coccidiosis, these alternatives are generally offer a supplementary support in addition to an existing coccidiosis program (ionophore, chemical or vaccine).

In broilers, pullets and turkeys immunity development after field challenge alone may not develop fast enough and be strong enough to protect against coccidiosis. The broiler industry also needs continued access to synthetic coccidiostats as well as ionophores to control coccidiosis.

Summary
Removing ionophores would decrease the health and welfare of the birds, increase the cost to consumers and have a detrimental impact on the sustainability of the poultry industry which provides high quality protein for all consumers.

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