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SHORT COMMUNICATION

Current anthelmintic and antibiotic use in UK organic farming systems

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Abstract

Introduction: The use of anthelmintic and antibiotic medicines is imperative to prevent the suffering of diseased stock in organic farming. However, their use must be minimised to comply with low input ideals and prevent the spread of resistance. Reducing such inputs first requires determining their current use, but information is lacking. The objective of this study was to benchmark the current use of anthelmintics and antibiotics in UK organic livestock farming.

Methods: Data were gathered by conducting a national survey of organic livestock farmers in the UK and by analysing records of requests for allopathic medicines.

Results: Key findings include (i) anthelmintics used in sheep constitute the greatest input of veterinary medicines in organic systems, (ii) farmers are incorporating alternative/support tools in helminth control to reduce anthelmintic requirements, (iii) the use of antibiotics is targeting individual animals, whereas the use of anthelmintics is targeting groups of animals.

Conclusion: This study provides the first benchmark on the use of anthelmintics and antibiotics in UK organic livestock.

1 | INTRODUCTION

Infectious diseases are a significant threat to the health, welfare and production of organic livestock. In the absence of effective natural treatments, the EU organic regulations[1] authorise the use of synthetic allopathic medicines to prevent suffering of diseased stock, such as anthelmintics to treat parasitic helminth infections (e.g., nematodes, trematodes, cestodes) and antibiotics to treat bacterial infections. Minimising their input is fundamental to complying with the low input ideals of organic farming and to combat the global spread of drug resistance. Information on the current use of allopathic medicines in organic farming is currently lacking. A recent EU wide survey of organic inspectors identified distinct country-specific patterns in the use of anthelmintic and antibiotic drugs,[2] although the actual frequency of use was not recorded. While the overall sales of antibiotics for use in food producing animals in the EU were 7860 tonnes of active ingredients, the proportion used specifically in the organic systems was not recorded.[3] On the other hand, the frequency of anthelmintic drenches has been found to depend on farm characteristics, helminth monitoring and control strategies,[4] but information on inputs into the organic systems as a whole is still unknown. The objective of this study was to set the benchmark on the frequency of use of these veterinary medicines as part of wider disease management practices, in UK organic livestock farming. To address this objective, we (i) conducted a national survey of UK organic farmers and (ii) analysed records for allopathic medicine requests made to the UK organic certification body the Soil Association Certification. The descriptive data were considered in the context of current recommendations and best practice in the application of these medicines, and potential options to improve disease control are discussed.

2 | METHODS

2.1 | Survey of organic livestock farmers

All livestock farmers with a subscription to the Organic Farming magazine (approximately 4000) were invited to participate in an online survey on their disease management practices and use of medicines over a 1-year period (2017–2018). The survey consisted of

16 main questions, split into three categories: (i) general information on the farm size and current use of anthelmintics (against all helminth infections, including nematode, trematode or cestode) and antibiotics (against all bacterial infection) (ii) tools used to monitor infection and (iii) current use or openness to use alternative/support tools for disease control and/or the input of veterinary medicines (Supporting Information).

2.2 | Individual requests for allopathic medicine

In the UK, organic farmers are required to justify their need to use allopathic medicines. The justification is reviewed by organic certification bodies either via the health plan, a tool used to detail their wider disease management strategy over the course of the year, or in individual requests throughout the year. General Data Protection Regulations prevented access to the health plans; however anonymised data of the individual requests made to Soil Association Certification were made available to us, to extract data on the specific medicines requested, the species and number of livestock treated.

The results are presented as descriptive summaries. The percentages reported throughout are reflecting the percentage of farmers which responded to each specific question.

3 | RESULTS AND DISCUSSION

3.1 | Survey responses

Approximately 9% of the farmers with access to the survey responded. Of the total 343 survey responses received, 81% (278) of the farmers farmed cattle, 60% (207) sheep, 35% (119) poultry, 23% (78) pigs and 16% (55) deer. Collectively, these farmers were responsible for approximately 162,550 organic livestock, of which, 40% were sheep, 38% cattle, 16% poultry, 4% pig and 2% deer. Of the total organic livestock registered in the UK,[5] this response rate represents approximately 7% of sheep, 21% of cattle, 0.8% of poultry, and 16% of pigs. No data are currently available on the total heads of organic deer in the UK.

3.2 | Monitoring and control of parasitic helminth infections

Over a 12-month period, 61% of the farmers responded that they had used anthelmintics. This finding is in agreement with the outcome of a recent EU-wide survey of organic inspectors, where it was suggested that 69% of UK farmers used anthelmintics over the same time period.[2] The frequency of anthelmintic use was largely restricted to between one and two treatments per year in both young (72%) and adult (85%) stock, with 3–5 treatments more common in young (18%) than adult (5%) stock. When anthelmintics were applied, the proportion of total stock treated varied, with only 38% of farmers reporting to have mass drenched 100% of their stock, whereas the majority (62%) incorporated a more selective approach to administering anthelmintics: that is, 6% drenched 80%–90%, 20% drenched 50%–70%, 13% drenched 20%–40% and 23% drenched less than 10% of stock. Targeting anthelmintic treatments to animals at risk, most heavily infected and symptomatic animals have, for example, proven to be a particularly effective means to reduce anthelmintic inputs against widespread GIN infections in sheep and to a lesser extent cattle, while slowing the spread of anthelmintic resistance and delivering epidemiological and production benefits.[6–9] However, data to support this approach in other livestock species, and/or against other helminth infections, are lacking. To monitor and inform drenching decisions, faecal egg counts (FEC 82%), loss of condition and/or production (67%), and previous experience (61%) were the most common reported methods, whereas diarrhoea (55%), slaughterhouse feedback (31%), anaemia (10%) and milk antibodies (9%) were used less frequently. Anthelmintic resistance was confirmed by 18% of the surveyed farmers, 40% of which specified against Benzimidazole. There are currently no requirements for organic farmers to monitor anthelmintic resistance on farm, and the prevalence reported in the present study may be underestimated.

The implementation of alternative/support tools in helminth control varied considerably. Most commonly used were pasture management (90%), and drenching individuals (65%), or part of the stock (53%) to reduce anthelmintic use (Figure 1). The farmers were generally open to trying alternative/support tools, although they were uncertain about the use of nematophagous fungi (49% do not know if they would try) and homeopathy (45% do not know or would never try). Interestingly, although 19% of the farmers use homeopathy, there is no scientific evidence to support that it serves as an effective alternative/support tool in helminth control, and it is not currently recommended by experts. Although farmers appear largely open to trying other alternative/support tools such as phytotherapy and bioactive forages, current uptake is limited, possibly due to greater labour or financial constraints; previous evidence has shown that organic farmers have exhibited some resistance to accepting such costs.[4,10]

Based on the percentage of stock treated and the frequency of anthelmintic treatments reported over the 1 year period, we estimated the quantity of anthelmintics potentially entering the UK organic system. Our survey showed that most farmers treated 50%–100% of their livestock with anthelmintics (when they drenched) and used one-two drenches per year. As the total heads of UK organic stock registered in 2018 was 4,575,000,[5] we estimated that anywhere between 2.2 and 9 million doses of anthelmintics may be entering the UK organic system. This figure

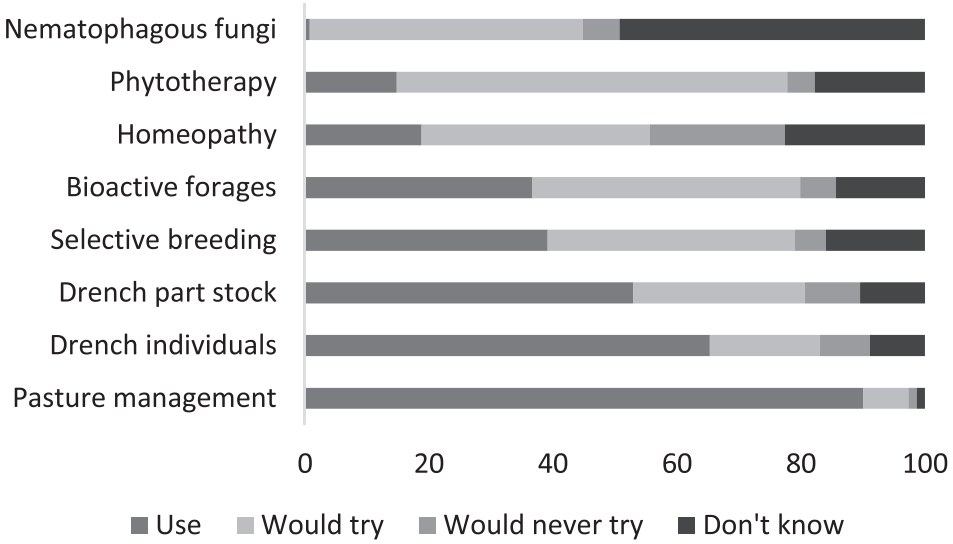

FIGURE 1 UK organic farmer use and openness to alternative/support tools to control helminth infections and/or lower anthelmintic inputs

equates to 0.5–2 anthelmintic drenches per animal per year in the UK. There are no available data to contrast the input of anthelmintics into the UK conventional livestock system, although there are data from certain livestock species. For example, in a study of 600 UK conventional sheep farms, 93% of surveyed farmers routinely treated their sheep against GIN with lambs, on average, being treated 3.6 times annually.[11] Our data show that although anthelmintic use is required to ensure health and welfare of organic livestock, the extrapolated calculations indicate that the anthelmintic input is likely substantially lower than that reported in UK conventional sheep farms.

3.3 | Monitoring and control of bacterial infections

Antibiotics were used by 43% of the farmers over a 12-month period, a figure consistent with that stated in a recent EU-wide survey, where organic inspectors reported that 41% of organic farmers have used antibiotics during the same period.[2] The frequency of treatments was limited to 1–10 treatments for most farmers (70%), although some treated with greater frequency, that is, 11–20 treatments (12%), 21–30 treatments (7%), 31–40 treatments (4%), 41–50 treatments (2%) and ≥51 treatments (4%). The five most common health problems in which antibiotics were used included foot conditions, mastitis, respiratory problems, parturition problems and eye infections. The proportion of the stock treated with antibiotics was ≤10% for 84% of the farmers. The most used indicators to monitor bacterial infections included sickness behaviour (37%), loss of condition and/or production (25%), blood or pus in milk (15%) and diarrhoea (15%). As per organic guidelines, antibiotic use is targeted to individual stock to reduce the frequency of treatments and the spread of resistance, and our data support this. This appears to be effective as only 2% of the organic farmers surveyed recorded antibiotic resistance on their farms. Surveillance programmes which monitor antibiotic resistance in UK food producing animals documented that only 23% of key bacterial pathogens were susceptible to the main available antibiotics.[12]

Studies looking at the farm-level use of antibiotics in UK conventional sheep flocks reported that 24.4% of farmers were treating for footrot,[13] 26.8% administered prophylactic antibiotics to newborn lambs[14] and 73.3% of farms for joint ill.[15] Our data showed that 43% of the surveyed farmers required antibiotics to treat all bacterial diseases. Less than 16% of farmers used alternatives to control bacterial infection on farm, less than 4% of farmers stated they would never try the tools suggested in the survey (Figure 2). It appears that farmers are not convinced about their efficacy as they were divided between being open to trying them (ranging from 39% to 57% depending on the alternative/support tool) and being uncertain about trying them (ranging from 29% to 46% depending on the tool). Reliable alternative/support tools to control bacterial disease would be required to further reduce antibiotic use and ensure high animal welfare in organic systems of production. While the benefits of organic acids, prebiotics and probiotics have been documented as contributing to gastrointestinal health in livestock, especially for monogastrics,[16] very few phytotherapeutic options are currently registered as alternatives to antibiotics for bacterial diseases.[17]

Based on the percentage of flock/herd treated and the frequency of antibiotics used over the 1-year period, we estimated the amount of antibiotics potentially entering the organic systems. Our survey showed that most farmers treated less than 10% of their livestock with antibiotics (when required) and used 1–10 treatments per year. As the total heads of UK organic stock registered in 2018 was 4,575,000,[5] we estimated that anywhere between 457,000 and 4.5 million doses of antibiotics may be entering the organic systems in the UK.

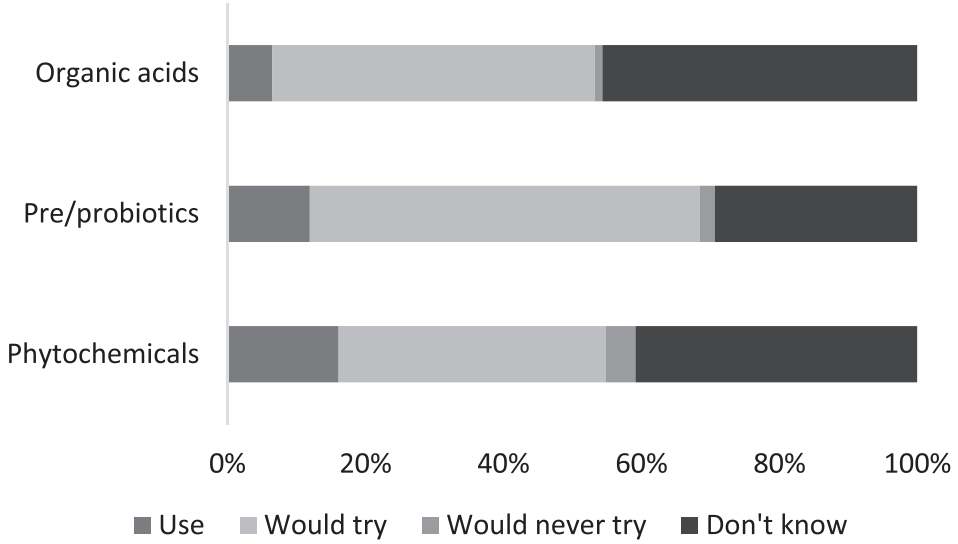

FIGURE 2 UK organic farmer use and openness to alternative/support tools to control bacterial infections and/or lower antibiotic inputs

3.4 | Individual requests for allopathic medicines

Between 2017 and 2018, a total of 533 individual requests to use medicines were made by 229 farmers certified to Soil Association Certification encompassing anthelmintics, antibiotics, insecticides and coccidiostats. Of these, 72% were for anthelmintics and 3% were for antibiotics. The requested anthelmintics were applied to approximately 80,826 livestock, including 67,838 sheep, 6693 poultry, 5643 cattle, 168 pigs, 69 goats and 42 deer. For 15 of the anthelmintic requests, the number of stock to be treated was detailed elsewhere in the farmer records that we did not have access to: one of these was to treat deer, the other 14 were for sheep, 12 of which detailed treating the 'whole flock'. Thus, although the number of requests is accurate, the number of sheep and deer treated with anthelmintics represents conservative numbers. Antibiotics were applied to 1797 livestock, including 1030 sheep, 700 poultry, 66 cattle and one pig. It was evident from our data that more than half of all individual requests for medicines were for anthelmintic drugs to treat parasitic helminth infections in sheep. This confirms that helminth control is a considerable health and welfare concern in organic livestock farming, particularly for sheep.

4 | CONCLUSIONS

Infectious diseases pose a significant risk for organic livestock, and existing flexibility in the regulated use of allopathic medicines is necessary to prevent animal suffering. Our study has shown that organic farmers in the UK are incorporating helminth monitoring and alternative/support tools into their parasite management programme, to reduce anthelmintic input in their animals. The antibiotic use is targeted towards treating individual animals, but the lack of reliable alternatives to antibiotics is a constraint in further reduction in their use, without penalties in the health and welfare. Although organic farmers tend to farm more than one livestock species to promote biodiversity, maintain ecosystem stability and mitigate disease, most farmers that responded to the survey were farming sheep and cattle (79%) so the results are primarily representative of these production systems. Gathering livestock species-specific information on the use of anthelmintics and antibiotics relative to different parasitic and bacterial infections would be the next step, to identify opportunities for further drug use reduction in organic livestock systems. Our result showed that increasing farmer uptake of the available helminth control alternative/support tools could facilitate further reductions of anthelmintic inputs into the UK organic system. Further limiting antibiotic use, however, would depend upon the scientific community developing more effective and/or targeted alternative/support tools to tackle the wide range of bacterial disease found across livestock species.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest that could be perceived as prejudicing the impartiality of the research reported.

ETHICS STATEMENT

All farmers gave their consent to the survey prior to completion. The de-identified participant details are available from the Soil Association.

DATA AVAILABILITY STATEMENT

The data are not in a repository. The deidentified participant data used are available from the Soil Association.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

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