Reduction of Antimicrobial use on layer site

Name of the initiative: Reduction of Antimicrobial Use on Layer Site
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Background

In this case example, Alex Royden has demonstrated the value of Plan Prevent Protect.

Plan – Working with clients to plan ahead. Considering individual patients as well as cohorts and groups. Considering their diet and condition. Are they fit and healthy? What is their breed and how might this affect the risks? Thinking of the unexpected and creating a dynamic and responsive contingency plan.

Prevent – Considering patient's environment. Is it clean, dry and ventilated? How well is their husbandry managed? Considering if hygiene can be improved? Aiming to prevent unnecessary disease.

Protect - Protecting patients through good colostrum and comprehensive vaccination. Protecting resources through responsible use and proactive culture and sensitivity testing.

Plan Prevent Protect is a holistic approach to responsible antimicrobial use that is promoted through RCVS Knowledge's Farm Vet Champions Scheme. This collaborative project champions responsible antimicrobial use. To find out more, sign up to take part, and to access the free, evidence-based CPD and the free SMART goals tool, visit rcvsknowledge.org/FVC.

Introduction

A client contacted the practice for help with his 36-week-old 16,000 hen laying flock which had been suffering from high mortality (approx. 0.5-1% daily mortality) and a drop in egg production for a few days. I conducted post-mortem examinations on submitted carcases and diagnosed *E. coli*-associated egg peritonitis. Culture and sensitivity testing of swabs of heart, liver and peritoneum collected from carcases cultured *E. coli* sensitive to oxytetracycline. The flock were treated with oxytetracycline in the drinking water for 5 days. The mortality resolved in a matter of days and egg production returned to normal.

A few months later, the client re-contacted us as mortality in the (now 56-weeks old) flock had again increased to 1% daily mortality and egg production had decreased. Post-mortem examinations again revealed *E. coli*-associated egg peritonitis, however, the culture and sensitivity testing of *E. coli* from the carcases did not demonstrate sensitivity to any of the antimicrobial panel tested against.

E. coli-associated egg peritonitis in laying hens is often secondary to other underlying, primary challenges, such as viral, bacterial, or protozoal pathogens, high parasite burdens, and management issues (e.g., poor water quality, lack of environmental enrichment, and issues with feed quality).

Given that antimicrobial therapy was very unlikely to be successful in this case, I decided to undertake more extensive investigations to identify any primary challenges and to tackle these directly to reduce the morbidity and mortality from the *E. coli*-associated egg peritonitis. I also hoped that these interventions would prevent recurrences of *E. coli*-associated egg peritonitis in future flocks.

Aims

I aimed to investigate underlying disease challenges, identify management failings, and propose solutions to tackle the morbidity and mortality resulting from the *E. coli*-associated egg peritonitis in this layer flock. Through these interventions, I also hoped to prevent recurrences and to reduce the need for and use of antimicrobials in future flocks.

Actions for Current Flock

PLAN

- **Veterinary Investigations**
  - Analysis of farm data and records
  - Diagnostic plan: post-mortem investigations, culture and sensitivity testing, serology testing (including testing for Mycoplasma gallisepticum and synoviae, avian rhinotracheitis (ART), infectious bronchitis (IB), Ornithobacterium rhinotracheale (ORT)), PCR testing (including for Mycoplasma spp. and IB), *E. coli* typing, red mite trapping, and water testing.
  - Site biosecurity audit

- **Findings**
  - These investigations revealed a series of health, welfare, and management problems, including biosecurity failings, poor water quality, high red mite levels and an ongoing uncontrolled infectious bronchitis outbreak. All of these factors were likely contributing to the secondary E. coli-associated egg peritonitis and subsequent high morbidity and mortality.

- **Treatment Plan**
  - Due to the poor sensitivity testing results, none of the antimicrobials licensed for use in laying flocks were likely to be effective in treating the *E. coli*-associated egg peritonitis.
  - As an IB challenge had been identified and IB vaccines can be used in the face of an outbreak to reduce disease, the flock was vaccinated in lay against IB.
  - The *E. coli* was typed as O78. A few weeks after IB vaccination in lay, a commercially available *E. coli* vaccine (against serotype O78) was also used in lay.

- **Result**
  - The combined use of the vaccines reduced mortality to an acceptable level and increased egg production so that the flock did not have to be depleted early. The flock's health and welfare dramatically improved along with the farm's immediate financial profitability.

Interventions for Future Flocks:

Once the morbidity and mortality of the current flock was under control, I designed a plan with the input of the farm, to introduce interventions that would maintain the health of the current flock and prevent a recurrence of the same issues in subsequent flocks.

PREVENT

- **Improvement in Water Hygiene** with continuous dosing of a stabilized hydrogen peroxide water sanitizer (at the correct concentration) through drinking water at all times (or at least 3-4 days per week) when not vaccinating, dosing or supplementing the drinking water with another product or medication.

- **Red Mite Control**
  - Regular red mite trapping every 8 weeks from 24 weeks of age to monitor red mite levels.
  - Treatment with Exzolt (fluralaner) when appropriate based on trapping data, to control red mite levels and improve health and welfare.
  - Use of diatomaceous earth in nest boxes and dust baths. Children's paddling pools turned into dust baths are also a great form of environmental enrichment for layers.
  - Control of red mite with appropriate products used topically in the environment or through supplementation in the drinking water.

- **Improved Range Management**
  - Fence-off and fill-in holes on range to reduce standing water for birds to drink from. This aimed to prevent the birds drinking dirty water which may be contaminated and be contributing to the bacterial and parasite burden of the flock.
  - Improve availability of cover on the range through the provision of shelters and trees. This increases ranging, provides environmental enrichment, and reduces stress when ranging.
  - Reduce wild bird access to range. Issues had been noted with crows attacking hens on the range. Reduce attraction of range to crows and provide cover for hens. This is also important to reduce risk of disease incursion, such as avian influenza risk.

- **Routine Worm Egg Counts**
  - Monitor worm burden and efficacy of treatment with regular faecal worm egg and cocci counts every 10-12 weeks, starting at 32-weeks of age.
  - This aimed to prevent the development of anthelminthic resistance through the overuse of 'routine' worming treatments (flubendazole and fenbendazole) in the feed.

- **Improve General On-Site Biosecurity**
  - As for many layer sites, this site is also a working dairy farm, with the milking parlour and cattle sheds in close proximity to the entrance of the laying shed. A roped-off area was created around the laying house to prevent cattle-related traffic in the proximity of the laying shed and to create a clear barrier between the two farm operations. Footdips (changed regularly) and house-specific footwear and clothing was also introduced to prevent any introduction of pathogens from the wider farm environment.

PROTECT

- **Enhanced In-Rear Vaccination Program (vaccination for birds at rearing stage)**
  - Introduction of vaccines in rear against *E. coli*.
  - Ensuring continued vaccination against Erysipelas, Coccidiosis, and Mycoplasma, in rear or on-transfer (when pullets are transferred to laying site). Often when introducing new costs, farmers will, understandably, wish to cut costs in other areas. However, introducing one vaccination and removing another is often a false economy and will be regretted down the line when the disease not vaccinated against appears.

- **Enhanced In-Lay Vaccination Program (vaccination for birds at laying stage)**
  - Introduction of vaccines in lay against infectious bronchitis (IB) and *E. coli*.
  - Vaccination audit (FOC) provided by MSD (manufacturers of IB vaccines) for farm staff to ensure correct administration of vaccine to flock.

- **Provide Environmental Enrichment**
  - As described above, improve environmental enrichment on range and in house, through use of dust baths, range cover etc. Also provide more toys in the house, such as cones and coloured, plastic objects on the scratch area, and hanging objects such as old plastic bottles filled with stones (to make a rattling noise), old CDs, rope, etc. Lucerne bales and pecking blocks are also fantastic sources of environmental enrichment and additional nutrition and have been demonstrated to reduce pecking behaviour. Rotation of toys is also important to prevent boredom.

Results and Impact of interventions

For the affected flock, post-mortems and culture and sensitivity testing demonstrated the presence of a multidrug-resistant *E. coli* infection. It was beneficial that culture and sensitivity testing was undertaken in a timely fashion at the outset of the case to prevent treatment with antimicrobials that would not be effective.

Through further investigations, other interventions were identified, and the use of vaccines and improvements in flock management reduced mortality to an acceptable level so that the flock did not have to be depleted early. This improved flock health and welfare and the farm's financial profitability.

The farm was impressed that the infection was controlled without the use of antimicrobials and was committed to maintaining these interventions for the rest of the flock and for future flocks.

In the next flock cycle, following the introduction of the new vaccination programmes and management protocols, the farm saw an >50% increase in net profit compared to the previous flock. The flock's egg production and other production parameters remained above target for the entirety of the flock's production cycle, demonstrating the improvement in health and welfare that had been achieved through the interventions.

This was also a valuable case for me as it demonstrated the value of other interventions and their utility and effectiveness above and beyond the use of antimicrobials to ensure sustainable, long-term, and meaningful change for farms.

Conclusion

Alex Royden demonstrated the value of Plan Prevent Protect. This example has shown that using Plan Provent Protect on a layer site, there was a reduction of antimicrobial use, a dramatic improvement in the flock's health and welfare, above target egg production and other production parameters, and >50% increase in net profit for the site.