

# Effect of repeated anthelmintic exposure on livestock commensal



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## faecal bacteria.

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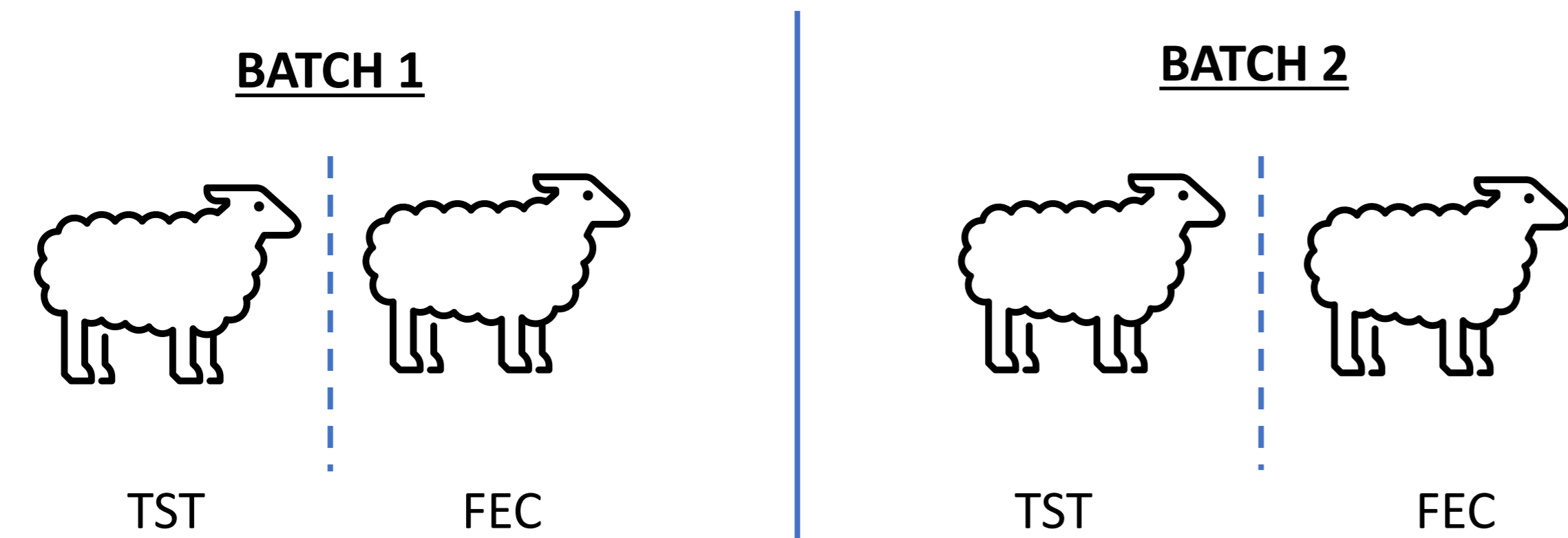


### INTRODUCTION

Controlling parasitic helminths is an integral part of ruminant farm management and is highly dependent on using effective anthelmintics. Significant resistance of ruminant gastrointestinal helminths to a broad spectrum of anthelmintics has been well established across Europe (Geurden, 2014), in a time where antimicrobial resistance (AMR) has been declared as one of the biggest challenges to One Health for this generation. Studies in mammals have suggested that anthelmintic administration has profound effects on commensal faecal bacteria (Hu, 2020), with little information on how this affects AMR. Whilst research on parasitic-microbiome interactions has increased, very little is known about how repeated use of anthelmintic treatments may affect ruminant AMR.

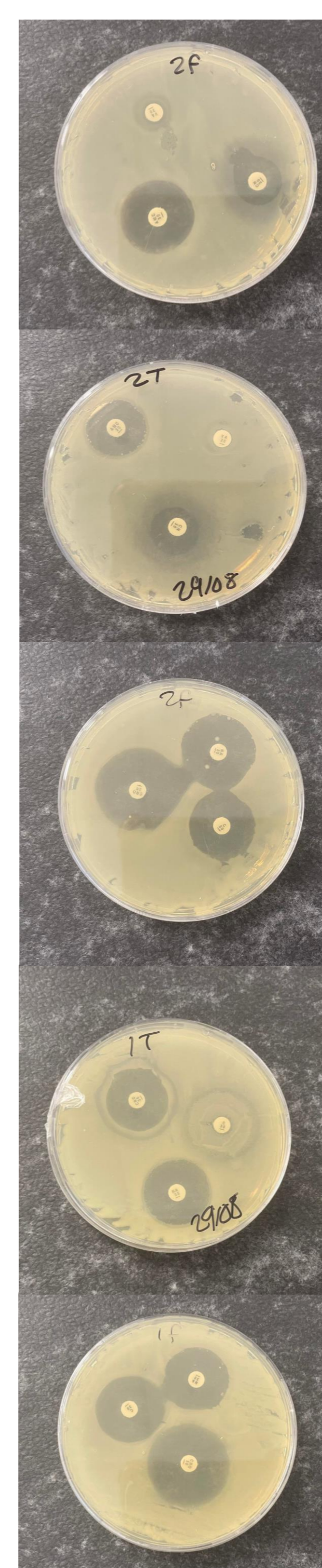
### STUDY DESIGN AND SAMPLE COLLECTION

- ❑ LOCATION: Ballymena, Northern Ireland.
- ❑ Two batches of sheep residing on two separate pastures.
- ❑ These two batches equally divided into two further subgroups.
  - ❑ Control group (FEC group - blanket treatments given based on farmers usual schedule)
  - ❑ Targeted-Selective-Treatment group (TST), where lambs treated based upon Happy Factor scoring (Greer, 2009)



- ❑ Four lamb subgroups in total.
- ❑ 15 individual lambs from each subgroup were selected at random, from identification by their ear tags.
- ❑ After faecal egg counting, individual faecal samples were then pooled into their respective groups ready for processing.

### SAMPLE PROCESSING



Pooled faeces swabbed onto selective media

Selective media incubated at 37°C for 24hrs.

Following incubation, colonies selected and vortexed in nuclease free water.

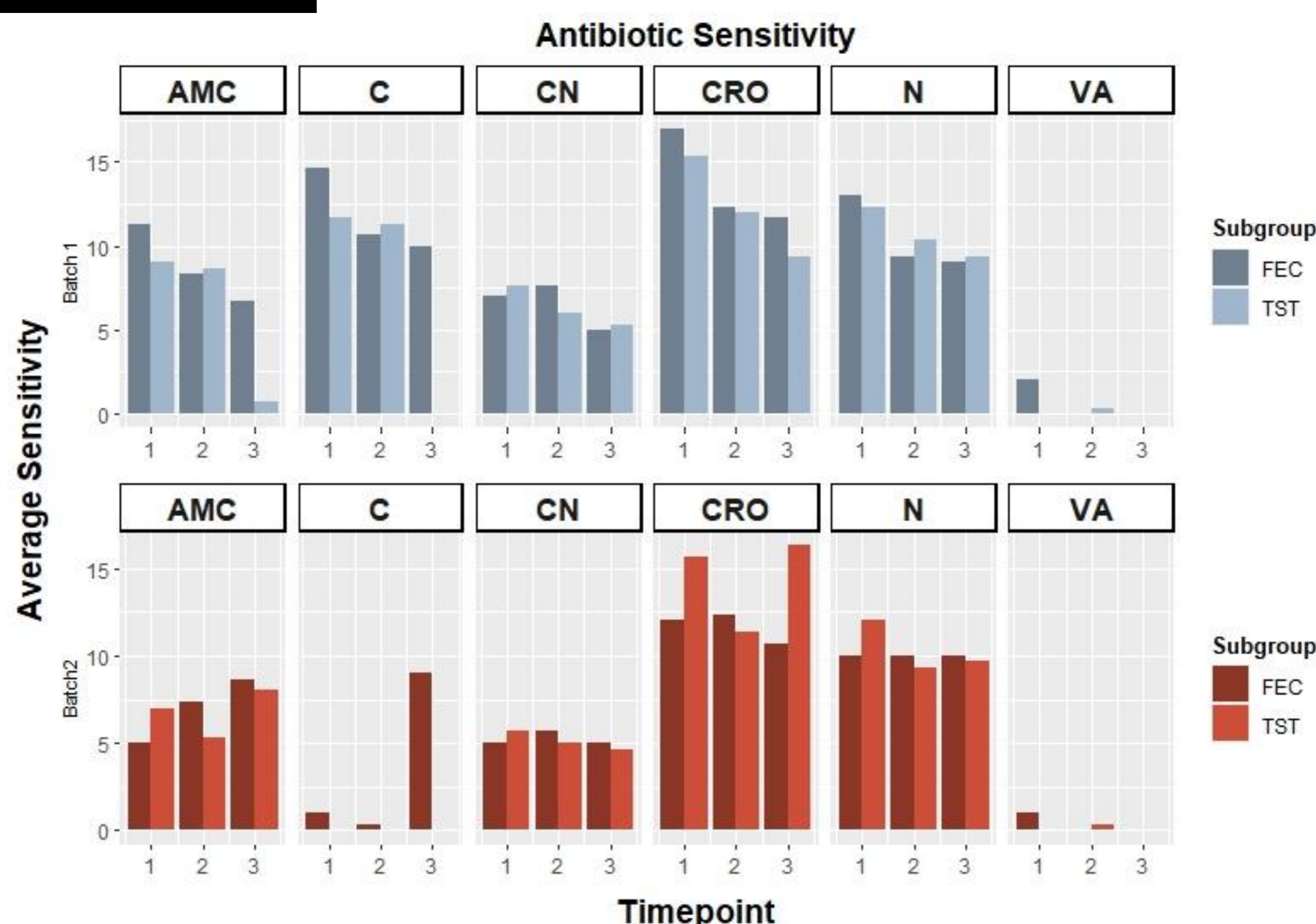
Solutions compared to a 0.5 McFarland Standard.

Solution added to Mueller-Hinton agar, before antibiotic disks added.

Once added, plate is incubated at 37°C for 24hrs before reading.

### RESULTS

- ❑ Resistance present to all antibacterial disks, aside from VA.
- ❑ Resistance significantly increased over time in batch 1 ( $p < 0.05$ ).
- ❑ Biggest differences shown were between the two batches of lambs, particularly for Chloramphenicol ( $p < 0.01$ )



- ❑ No significant differences observed between Control and TST groups sensitivity over time to any antibiotic class.

- ❑ Significant differences observed between Control and TST groups in batch 2 over time to Ceftriaxone and to Chloramphenicol ( $p < 0.05$ )

**Fig 1.** AMC = Amoxicyclin, C = Chloramphenicol, CN = Gentamicin, CRO = Ceftriaxone, N = Nalidix Acid, VA = Vancomycin. Higher sensitivity = lower resistance.

#### REFERENCES:

Greer, A.W., Kenyon, F., Bartley, D.J., Jackson, E.B., Gordon, Y., Donnan, A.A., McBean, D.W. and Jackson, F., 2009. Development and field evaluation of a decision support model for anthelmintic treatments as part of a targeted selective treatment (TST) regime in lambs. *Veterinary Parasitology*, 164(1), pp.12-20.

Geurden, T., Hoste, H., Jacquiet, P., Traversa, D., Sottraki, S., di Regalbono, A.F., Tzanidakis, N., Kostopoulou, D., Gaillac, C., Privat, S. and Giangaspero, A., 2014. Anthelmintic resistance and multidrug resistance in sheep gastro-intestinal nematodes in France, Greece and Italy. *Veterinary parasitology*, 201(1-2), pp.59-66.

Hu, X., Xu, Y., Liu, G., Hu, D., Wang, Y., Zhang, W. and Zheng, Y., 2020. The impact of anthelmintic treatment on gut bacterial and fungal communities in diagnosed parasite-free sika deer *Cervus nippon*. *Applied Microbiology and Biotechnology*, 104, pp.9239-9250.