



Susceptibility of commensally available *Escherichia coli* isolates of neonatal calves on commonly used on-farm antimicrobials

S RAI¹✉, T K DUTTA¹, R BEHERA¹, D K MANDAL¹, C BHAKAT¹, A CHATTERJEE¹, M K GHOSH¹ and M KARUNAKARAN¹

ICAR-National Dairy Research Institute, ERS, Kalyani, West Bengal 741 235 India

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Scientific management of calf rearing plays a crucial role in calf survival. Diarrhoea being the most common problem occurring predominantly during the first 4 wks of life (Azizzadeh *et al.* 2012) were significantly associated with young age and low colostrum feeding (Ashenafi and Tesfaye 2016). Antimicrobials used to prevent or treat infections are known to develop resistant bacteria that persisted even after discontinuing its use (Phillips *et al.* 2004). Lack of stringent guidelines and policies have led to the reckless use of antibiotics in food animals thereby,

and 88° 26' 4" E, respectively. The calves were separated immediately after birth and housed in well-ventilated calf sheds. Colostrum and milk was bottle fed @ 1/10th of the bodyweight till 3 months of age. *Ad lib.* supply of concentrates and green fodder was offered to the calves as per the routine practices of the farm.

Clinical cases (84) of disease in calves from 1 day to 3 months of age were recorded for the study. During prevalence of any disease, antimicrobials were used by full dose in single or in combination. The faecal sample was

Table 1. Health problems with repeated antibiotic usage in young calves

Health problems in calves	Number affected	Number of repeated case after antibiotic use	Antibiotic repeated interval (days)	Average days suffered (Range)
Pneumonia	4	1	28	6.64 (2–21)
Bloody diarrhoea	9	2	2, 4	4.14 (1–8)
Bloody diarrhoea + Pneumonia	3	0	0	6.66 (2–14)
Diarrhoea/Loose stool	46	23	3, 5, 7, 10, 21, 25, 38, 56	3.59 (1–9)
Joint ill	3	2	10, 30	16.5 (2–56)
Weakness/debility	3	2	6, 55	3.18 (1–8)
Scour	9	8	3, 5, 5, 11, 10, 21, 30, 45	3.81 (1–8)
Alopecia	9	5	4, 19, 19, 42, 61	9.66 (2–30)
Eye infection	2	1	6	12

decreasing the efficacy and development of resistant strains (Fahey 1957). Therefore, *E. coli* being commensally available in the gut are easy to collect and culture from the faeces (Gekenids *et al.* 2018) is taken as an indicator organism to find out the resistance of commonly used on-farm antimicrobials. This is the first study on susceptibility of common on-farm antimicrobials used against *E. coli* in neonatal Jersey crossbred calves of NDRI, Eastern regional Station, Kalyani, West Bengal, India. Kalyani is located at the lower Gangetic basin of West Bengal in Nadia district. The altitude of the place is 9.75 metres above mean sea level, latitude and longitude position being 22° 58' 30" N

collected aseptically by massage method from Nov 2018 to March 2019. The sample was then further processed for isolation of *E. coli* in Mac Conkey and Eosin Methylene Blue Agar media subjecting to common biochemical test (Sena *et al.* 2006). The colonies further gram stained for morphological confirmation. A total of 141 *E. coli* isolates were tested for antibacterial susceptibility test by the disc diffusion method (Rada *et al.* 2012). The most common antibiotics used in the farm were oxytetracycline (30 mcg), ceftriaxone/tazobactam (30/10 mcg), enrofloxacin (5 mcg), cefotaxim (30 mcg) and suphadiazine (100 mcg) (Himedia Lab. Pvt. Ltd). Results of antimicrobial sensitivity were recorded and compared with the interpretation of zone of inhibition in agar diffusion method according to CLSI, 2017. Overall health problems encountered in the farm during the study period is mentioned in Table 1. The most

Present address: ¹ICAR-National Dairy Research Institute, Eastern Regional Station, Kalyani, West Bengal. ✉Corresponding author email: drsaroj.ra@gmail.com

Table 2. Antibigram of *E. coli* in neonatal calves

Commonly used on-farm antibiotics for treatment of calves	Sensitive resistant	Moderately	Resistant
Enrofloxacin	39	8	8
Cefotaxime	27	11	16
Ofloxacin	35	1	19
Sulphadiazine	32	0	23
Ceftriaxone/Tazobactam	51	1	3

common problem was diarrhoea occurring as a single illness or in association with pneumonia. Although antibiotics were used initially to control the disease, a common problem of reoccurrence was encountered where another dose of antibiotics was resorted.

Antibiotics were used for diarrhoea, scour and bloody diarrhoea at least 18 times ranging from a minimum of 2 days to 56 days. All the three calves suffering from Pneumonia with diarrhoea died within an average period of seven days. However other repeated cases have also been seen in alopecia, joint ill and debility.

In vitro antibiotic sensitivity test of *E. coli* by disc diffusion method (Table 2) showed that out of 141 isolates of *E. Coli*, 8 (5.67%) were resistant to enrofloxacin, 16 (11.23%) to cefotaxime, 19 (13.47%) to ofloxacin, 23 (16.31%) to sulphadiazine and 3 (2.12%) to ceftriaxone/taxobactum, respectively.

The highest number of isolates sensitive to *E. Coli* was ceftriaxone/tazobactam (36.17%) which might be an indication of its use for treatment of calves in case of illness caused by *E. coli*. Antibigram studies are relatively helpful in knowing the status of antibiotic use and sensitivity to particular organisms. Since, antimicrobial resistance is a global concern the sensitivity pattern of the isolates between regions will be helpful in selection of the most sensitive or elimination of the resistant ones for treatment purpose in animals. Further one need to assess the minimum inhibitory concentration (MIC) of the antibiotics in use though, in the present work, only preliminary work on antibiotic use and resistance have been carried on.

SUMMARY

The present study was carried out to find out the

resistance of commonly used on-farm antimicrobials on commensally available *E.coli* isolates from faeces of young calves by the most simplified antibiogram study. Highest number of *E coli* isolates were sensitive to ceftriaxone/tazobactam (36.17%) followed by the resistant sulphadiazine (16.31%) and ofloxacin (13.47%), respectively. Around 11.23% isolates were also found to be resistant to cefotaxime. Therefore, even the most common antibiotics used to tackle common infections in calves are slowly becoming resistant. Such problems of disease occurrence and routine antibiotic use should be addressed by suitable managemental practices followed by appropriate vaccination schedules hence, reducing the dependence of farm animals on antibiotics.

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