

A two-year comparison of β -lactam resistance phenotypes at the disk diffusion assay of *Escherichia coli* from young calves in Wallonia, Belgium

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The most frequent β -lactam resistance mechanism is the production of β -lactamase enzymes (BLA) that inactivate the antibiotics. Their actual classification is highly complex, but 4 classes can be summarised: classical BLA (C), extended-spectrum BLA (ESBL), cephalosporinases (AmpC) and carbapenemases (CPE). A fifth class was defined according to the results of the disk diffusion assay (DDA) performed with 8 β -lactams: C associated with a ceftioxin resistance (C_FOX) (Table I). Since 2012, a decrease of β -lactam resistance of *Escherichia (E.) coli* from calves has been observed at ARSIA [1]. This maybe a consequence of the recommendation, followed in 2016 by a regulation, of the use of human critical antibiotics in livestock, like 3rd/4th generation cephalosporins. Nevertheless, the evolution of each β -lactamase family is unknown. The aim of this study was therefore to compare the resistance phenotypes observed at the DDA of pathogenic *E. coli* isolated from young diarrheic or septicemic calves over two calving seasons between November and February 2017-2018 and 2018-2019.

Table I – Resistance phenotypes observed at the disk diffusion assay for the 8 tested β -lactams

Antibiotics	AMX	AMC	XNL	CFQ	CTX	CTC	FOX	MER
C	R	S/R	S	S	S	S	S	S
C_FOX	R	S/R	S	S	S	S	I/R	S
ESBL	R	S/I	R	R	R	S/I	S	S
AmpC	R	R	R	R	R	R	R	S
CPE	R	R	R	R	R	R	R	R

AMX: amoxicillin; AMC: amoxicillin + clavulanic acid; XNL: ceftiofur; CFQ: cefquinome; CTX: cefotaxime; CTC: cefotaxime + clavulanic acid; FOX: ceftioxin; MER: meropenem

Table II – Resistance profiles of isolates collected during two calving seasons

Resistance profiles				C	C_FOX	ESBL	ESBL + C	ESBL + C_FOX	AmpC
Calving season	Total Isolates tested	Total R	% R						
2017-2018	516	425	82,36	331	29	37	13	5	10
2018-2019	447	371	83,00	283	31	39	10	4	4

After initial growth on Gassner agar plates, 3 colonies from faeces or intestinal contents were tested by agglutination to identify the production of F5 or F17a fimbrial and of CS31A capsular-like antigens. One positive isolate per calf was tested by the DDA. When pure culture was obtained from the internal organs, one *E. coli* colony was also tested.

The comparison between these two years showed a stable rate of β -lactam resistant calf *E. coli* (Table II). Similarly the different resistance profiles within the β -lactam resistant *E. coli* do not much differ. The majority of resistance were a C profile, followed by ESBL and C_FOX profiles. Conversely, very few AmpC profile were detected and no CPE resistance profile was identified. These results will be compared with those of previous years and of the 2019-2020 calving season.

Reference:

[1] Regional Animal Health and Identification Association (2017). Sensitivity tests, activity report and results. <http://www.arsia-asbl.be/wp-content/uploads/documents-telechargeables/Rapport-AB-2017.pdf>