

Article

Extended-Spectrum Beta-Lactamase-Producing and Multidrug-Resistant *Escherichia coli* and *Klebsiella* spp. from the Human–Animal–Environment Interface on Cattle Farms in Burkina Faso

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Abstract: Extended-spectrum beta-lactamase (ESBL)-producing and multidrug-resistant Enterobacteriales pose a major threat to both human and animal health. This study assessed the prevalence of ESBL-producing *Escherichia coli* (ESBL-*Ec*) and *Klebsiella* spp. (ESBL-*K*) on cattle farms in Ouagadougou, Burkina Faso, using a One Health approach. From May 2021 to September 2022, cattle faeces, farmers' stools, their drinking water and farm soil samples were collected from semi-intensive and traditional farms. An ESBL-selective medium was used to obtain resistant isolates, which were further characterised using biochemical tests. Antimicrobial susceptibility testing was performed using the Kirby–Bauer disc diffusion method. ESBL-*Ec* and/or ESBL-*K* were detected in 188 of 322 samples (58.0%). The prevalence of ESBL-*Ec* isolates was 42.2% (136/322) and that of ESBL-*K* isolates was 24.5% (79/322). Notably, 156 of the 188 ESBL isolates (83.0%) exhibited multidrug resistance. The highest resistance rates were observed against tetracycline and cotrimoxazole. Importantly, no isolates showed resistance to meropenem, which was used to test for carbapenem resistance. This study highlights the presence of ESBL-*Ec* and ESBL-*K* among the humans, animals and environment of the cattle farms. Good hygiene and biosafety practices are essential to limit the potential spread of multidrug-resistant bacteria between different interfaces on farms.

Keywords: *Escherichia coli*; *Klebsiella* spp.; ESBL; cattle farms; One Health; Burkina Faso

1. Introduction

Antimicrobial resistance (AMR) is a serious public health problem that threatens human health and can cause large economic losses. Infections caused by multidrug-resistant bacteria challenge hospital practices since they may be associated with increased severity

of infections and high mortality rates. Recently, in 2019, approximately 4.95 million deaths were associated with AMR. Of these, 1.27 million were directly attributed to multidrug-resistant bacteria. The highest number was recorded in western Sub-Saharan Africa, with 27.3 deaths per 100,000 population [1]. Moreover, the economic cost of AMR will continually increase over the next 10 years [2]. Extended-spectrum beta-lactamase (ESBL)- and carbapenemase-producing Enterobacterales, particularly *Escherichia coli* and *Klebsiella pneumoniae*, contribute to the exacerbation of the AMR crisis in the healthcare systems and communities of low- and middle-income countries (LMICs), due to their resistance to beta-lactams, antibiotics commonly used in the treatment of bacterial infections [3–6]. Meat production in Africa has increased by 64% from 2000 to 2017, driven by a demand for protein-rich diets, consumer preferences and population growth, accelerating a transfer to both more intensive and extensive animal production [5]. Cattle production accounted for 53% of the total livestock production in Africa in 2017. Estimates of the quantity of antimicrobials used in food animals vary greatly, from over 60,000 tonnes in 2019 [6] to 131,109 tonnes in 2013 [7]. The quantity of antimicrobials used in animal production in Africa was estimated at 4279 tonnes [6]. In Burkina Faso, cattle farming significantly contributes to rural households' income, with an estimated contribution of 71 to 115 million dollars [8]. The intensification of animal production has led to an increased use of veterinary medicines including antimicrobials, accelerating the rise of AMR [4,8]. Antimicrobials are used not only to treat sick animals, but also for prophylaxis, as growth promoters and to compensate for inadequate hygiene on the farm [9]. The misuse or excessive use of antimicrobials contribute to the emergence and dissemination of resistant bacteria including resistant Enterobacterales, which can be transferred to people through the food chain [10]. ESBL production is one of the most common mechanisms of multidrug resistance in Enterobacterales, and the occurrence of ESBL-producing bacteria on farms has been documented in many parts of the world [11]. In African countries, the occurrence of ESBL-producing Enterobacterales (ESBL-E) in cattle has been reported, for example, in Egypt, Madagascar, Nigeria, South Africa and Tunisia [12–16]. In Nigeria, the horizontal transfer of ESBL genes from cattle to slaughterhouse workers was reported [17]. ESBL-producing *Escherichia coli* (ESBL-Ec) and ESBL-producing *Klebsiella* spp. (ESBL-K) have been reported to be prevalent on animal farms and in hospitals in Burkina Faso [18,19]. However, data on the occurrence of ESBL-producing bacteria at the human–animal–environment interface on Burkinabe farms remain limited. Therefore, this study assessed the occurrence of ESBL-Ec and ESBL-K on farms near the capital city Ouagadougou, among cattle, farmers, their drinking water and soil, using a One Health approach.

2. Materials and Methods

2.1. Ethics Committee Approval

Ethics committee approval was obtained from the Health Research Ethics Committee (CERS) of Burkina Faso (N°2018-15-1153). The purpose of this study and the sampling procedure were explained to the farmers orally, after which written consent to participate in the study was requested.

2.2. Study Design

Samples were collected from May 2021 to September 2022 from 39 semi-intensive and 28 traditional farms located in the peri-urban area of Ouagadougou (Figure 1). In Burkina Faso, animal production facilities are commonly located in the peri-urban areas surrounding cities. On semi-intensive farms, cattle graze during the day and receive feed supplements in the evening. They are dewormed and treated, and their health is continuously monitored. On traditional farms, cattle are constantly on the move, guided by a shepherd in search of the best pastures. Treatment is only administered in cases of illness or during vaccination campaigns.

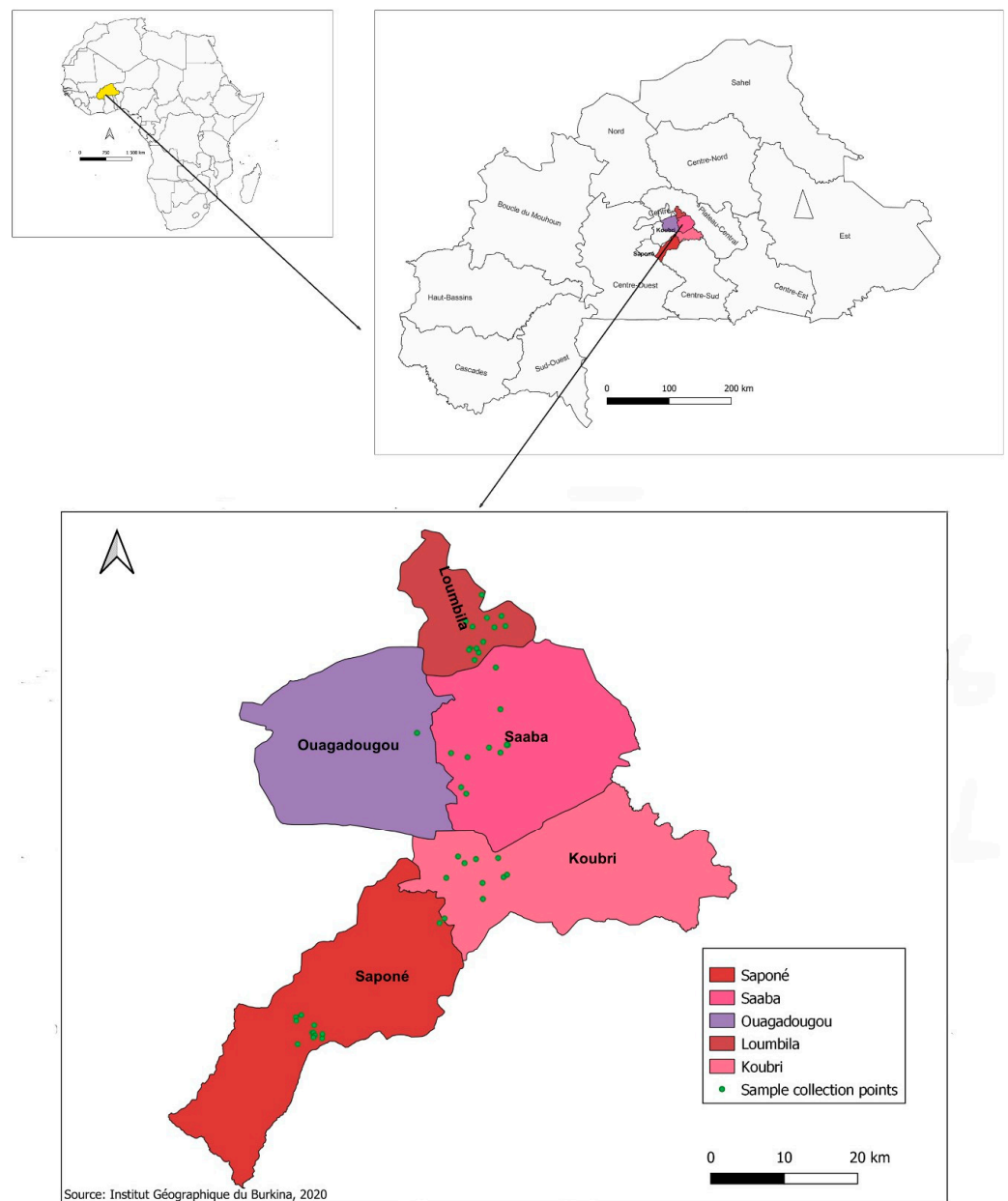


Figure 1. Map of Burkina Faso with locations of the cattle farms where samples were collected.

2.3. Sampling

From each of the 67 farms, in most cases, one sample of each type was collected (Table 1). Approximately 100 g of cattle faeces ($n = 68$) and soil samples ($n = 68$) were collected in sterile bags from cattle enclosures on both semi-intensive and traditional farms. At least five points were sampled for each sample type and pooled. Farmers' drinking water ($n = 66$), sourced from taps on the farm, was collected in sterile 500 mL bottles. Additionally, farmers provided stool samples ($n = 120$) in sterile 120 mL containers. The stools of all persons who worked on the farm and were in contact with the animals were collected. All the samples were placed in a cooler box containing ice blocks and transported to the laboratory for analysis within 24 h.

Table 1. Prevalence of ESBL-*Ec* and ESBL-*K* isolates in four different sample types and on two different farm types.

Sample type	Number of Samples/ Farms Analysed N	Samples Containing ESBL- <i>Ec</i> and/or ESBL- <i>K</i> n (%)	Samples Containing ESBL- <i>Ec</i> n (%)	Samples Containing ESBL- <i>K</i> n (%)
Cattle faeces	68	58 (85.3) ¹	52 (76.5) ²	17 (25.0)
Soil	68	41 (60.3) ¹	32 (47.0) ²	13 (19.1)
Human stools	120	64 (53.3) ¹	47 (39.2) ²	27 (22.5)
Drinking water	66	25 (37.9) ¹	5 (7.6) ²	22 (33.3)
Total	322	188 (58.4)	136 (42.2)	79 (24.5)
Farm type				
Semi-intensive	39	36 (92.3)	21 (53.8)	15 (38.5)
Traditional	28	24 (85.7)	16 (57.1)	8 (28.6)
Total	67	60 (89.5)	37 (55.2)	23 (34.3)

N = number of samples tested; n = number of positive samples. ¹ Statistically significant difference ($p < 0.05$) between the prevalence of ESBL-*Ec* and/or ESBL-*K* in the different sample types. ² Statistically significant difference ($p < 0.05$) between the prevalence of ESBL-*Ec* in the different sample types.

2.4. Bacterial Isolation and Identification

Water, soil and cattle faeces samples were enriched using buffered peptone water (BPW) (HiMedia, Mumbai, India). An amount of 10 g of soil or faeces was mixed into 90 mL of BPW. The drinking water samples were first concentrated by filtering 250 mL of water through a 0.45 µm membrane filter, after which each filter was transferred into BPW. The inoculated BPW tubes were incubated at 37 °C for 18 to 24 h. After incubation, 10 µL of each enriched sample was plated onto selective ESBL CHROMagar plates (CHROMagar™ ESBL, Paris, France). The human stool samples were directly plated without enrichment onto the ESBL CHROMagar plates, which were incubated at 37 °C for 18 to 24 h. Each sample was also inoculated on a non-selective cystine–lactose–electrolyte-deficient (CLED) agar plate to check that the sample contained bacteria. After incubation, the ESBL CHROMagar plates were inspected, and, following the manufacturer's instructions, the red or pink colonies were identified as *E. coli* and the green, blue-green or blue as part of the KESC group (*Klebsiella*, *Enterobacter*, *Citrobacter*, *Serratia*). One colony of each morphotype of *E. coli* or the KESC group was picked and purified using eosin-methylene blue agar (EMB) (Liofilchem, Roseto degli Abruzzi, Italy). The purified colonies were transferred to Mueller–Hinton agar (Liofilchem, Italy) and subsequently identified using six biochemical tests: the indole test, citrate utilisation test, lactose utilisation test, glucose fermentation test, motility test and gas production test. The verified isolates were stored in 30% glycerol at −40 °C for further analysis.

2.5. Antibiotic Sensitivity Testing

Antibiotic susceptibility testing was performed using the disk diffusion method on Mueller–Hinton agar (HiMedia, India). The isolates were tested against 13 antibiotics: amoxicillin+ clavulanic acid (30 µg), cefoxitin (30 µg), cefotaxime (30 µg), cefepime (30 µg), meropenem (10 µg), gentamycin (10 µg), amikacin (30 µg), ciprofloxacin (5 µg), ofloxacin (5 µg), nalidixic acid (30 µg), tetracycline (30 µg), sulfametoxazole + trimethoprim (25 µg) and chloramphenicol (30 µg) (Liofilchem, Italy). *Escherichia coli* ATCC 25922 was used for quality control of the antibiotic discs. The results were interpreted according to the American Clinical and Laboratory Standards Institute guidelines [20].

2.6. Phenotypic Detection of ESBL Production

ESBL production was detected using a double-disk synergy test (DDST) between cefotaxime, cefepime and amoxicillin + clavulanic acid. An isolate was considered ESBL-producing when there was a visible synergy inhibition zone between the three antibiotic disks.

2.7. Data Analysis

Data were analysed using R software version 4.2.2. Data were subjected to the Chi-square test, and a probability value of $p \leq 0.05$ was considered statistically significant. GraphPad Prism Version 10.0.3 (275) was used to produce a heat map visualising the antibiotic resistance profiles.

3. Results

3.1. Prevalence of ESBL-Producing *E. coli* and *Klebsiella* spp. Isolates by Sample and Farm Type

A total of 322 samples including cattle faeces ($n = 68$), soil ($n = 68$), farmers' stools ($n = 120$) and their drinking water ($n = 66$) were collected. Of these, 188 contained at least one ESBL-producing *E. coli* (ESBL-*Ec*) and/or ESBL-producing *Klebsiella* spp. (ESBL-*K*), with the overall prevalence being 58.4%. The highest prevalence was observed in cattle faeces (58/68, 85.3%), and the lowest was observed in farmers' drinking water (25/66, 37.9%) (Table 1). Of the two enterobacteria, ESBL-*Ec* was more prevalent than ESBL-*K* in all sample types. The highest prevalence of ESBL-*Ec* (76.5%) was detected in cattle faeces.

Regarding farm types, the prevalence of samples containing ESBL-*Ec* and/or ESBL-*K* isolates was quite similar on both semi-intensive and traditional farms (no significant difference). The overall prevalence of ESBL-*Ec* (55.2%) was higher than that of ESBL-*K* (34.3%) on the two types of farms.

3.2. Antibiotic Resistance in ESBL-Producing *E. coli* and *Klebsiella* spp. Isolates

A total of 136 ESBL-*Ec* and 79 ESBL-*K* isolates were tested for their susceptibility to 13 antibiotics belonging to seven different classes of antibiotics. Apart from beta-lactams, resistance levels were highest against tetracycline and cotrimoxazole (Figure 2, Tables 2 and 3). The lowest resistance rates among both ESBL-*Ec* and ESBL-*K* were observed against amikacin, gentamicin and ciprofloxacin (Tables 2 and 3). All the isolates were susceptible to meropenem.

Table 2. Resistance to various antibiotics among 136 ESBL-producing *E. coli* isolates from cattle faeces, soil, human stools and drinking water.

Antibiotic Class	Antibiotic (μ g)	Cattle N = 52 (%)	Soil N = 32 (%)	Human N = 47 (%)	Water N = 5 (%)
Beta-lactams	Cefoxitin (30)	1 (1.9)	2 (6.3)	1 (2.1)	0 (0.0)
	Cefotaxime (30)	52 (100)	30 (93.8)	46 (97.9)	5 (100)
	Cefepime (30)	39 (75.0)	27 (84.4)	40 (85.1)	3 (60.0)
	Meropenem (10)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Penicillin and inhibitors	Amoxicillin+ clavulanic acid (30)	24 (46.2)	20 (62.5)	12 (25.5)	4 (80.0)
Sulphonamides	Cotrimoxazole (25)	30 (57.7)	21 (65.6)	32 (68.1)	4 (80)
Quinolones, fluoroquinolones	Ciprofloxacin (5)	5 (9.6)	2 (6.3)	5 (10.6)	1 (20.0)
	Ofloxacin (5)	4 (7.7)	5 (15.6)	5 (10.6)	0 (0.0)
	Nalidixic acid (30)	13 (25.0)	11 (34.4)	12 (25.5)	1 (20.0)
Aminoglycosides	Amikacin (30)	1 (1.9)	3 (9.4)	2 (4.3)	0 (0.0)
	Gentamicin (10)	3 (5.8)	3 (9.4)	6 (12.8)	0 (0.0)
Phenicol	Chloramphenicol (30)	6 (11.5)	3 (9.4)	6 (12.8)	1 (20.0)
Cyclins	Tetracycline (30)	42 (80.8)	26 (81.3)	41 (87.2)	4 (80.0)
Multidrug resistance		36 (69.2)	19 (59.4)	33 (70.2)	4 (80.0)

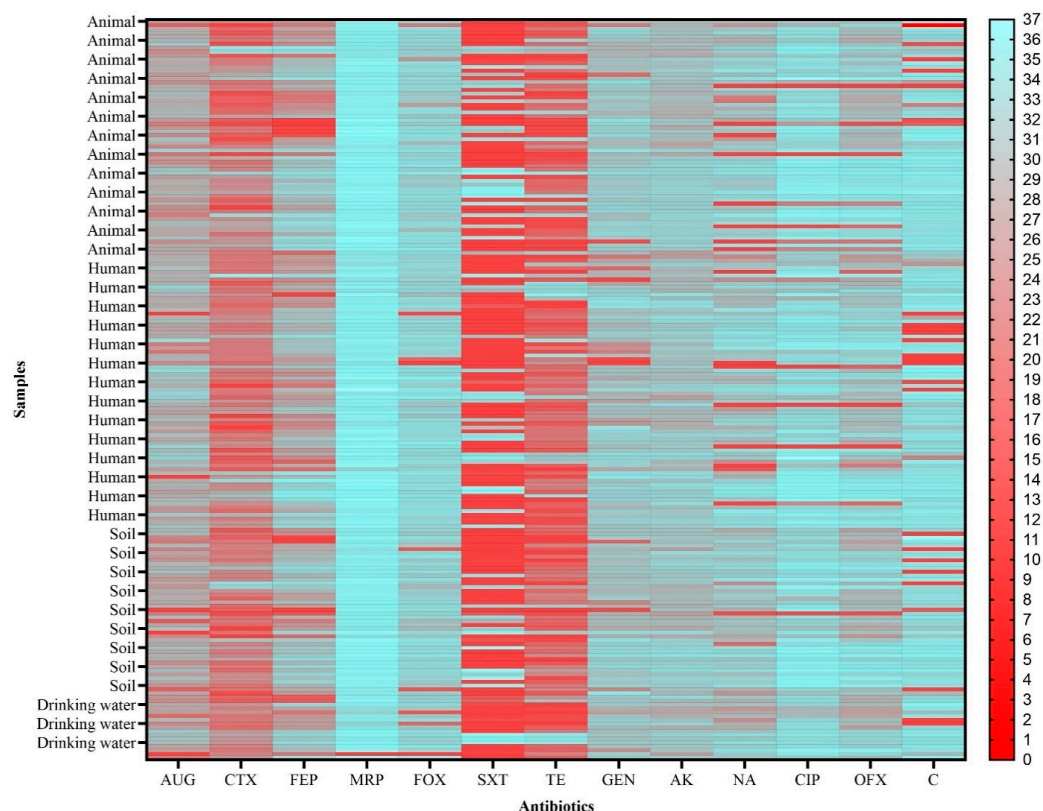


Figure 2. A heat map showing the distribution of antibiotic resistance among the ESBL-producing *E. coli* and *Klebsiella* spp. isolates from cattle, humans, soil and drinking water. Amoxicillin + clavulanic acid (AUG), cefotaxime (CTX), cefepime (FEP), meropenem (MRP), ceftiofur (FOX), cotrimoxazole (SXT), tetracycline (TE), gentamicin (GEN), amikacin (AK), nalidixic acid (NA), ciprofloxacin (CIP), ofloxacin (OFX), chloramphenicol (C). Red colour indicates resistance, blue colour indicates no resistance.

Table 3. Resistance to various antibiotics among 79 ESBL-producing *Klebsiella* spp. isolated from cattle faeces, soil, human stools and drinking water.

Antibiotic Class	Antibiotic (µg)	Cattle	Soil	Human	Water
		N = 17 (%)	N = 13 (%)	N = 27(%)	N = 22 (%)
Beta-lactams	Ceftiofur (30)	4 (23.5)	0 (0.00)	2 (7.4)	2 (9.1)
	Cefotaxime (30)	14 (82.4)	13 (100)	24 (88.9)	19 (86.4)
	Cefepime (30)	14 (80.4)	13 (100)	23 (85.2)	21 (95.5)
	Meropenem (10)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Penicillin and inhibitors	Amoxicillin+ clavulanic acid (30)	9 (52.9)	9 (69.2)	16 (59.3)	14 (63.6)
Sulphonamides	Cotrimoxazole (25)	12 (70.6)	11 (84.6)	22 (81.5)	17 (77.3)
Quinolones, fluoroquinolones	Ciprofloxacin (5)	0 (0.0)	2 (15.4)	1 (3.7)	0 (0.0)
	Ofloxacin (5)	0 (0.0)	0 (0.0)	1 (3.7)	3 (13.6)
	Nalidixic acid (30)	1 (5.9)	2 (15.4)	4 (14.8)	5 (22.7)
Aminoglycosides	Amikacin (30)	0 (0.0)	0 (0.0)	1 (3.7)	0 (0.0)
	Gentamicin (10)	2 (11.8)	2 (15.4)	4 (14.8)	1 (4.6)
Phenicol	Chloramphenicol (30)	6 (35.3)	3 (28.1)	10 (37.0)	1 (4.5)
Cyclins	Tetracycline (30)	12 (70.6)	13 (100)	16 (59.3)	16 (72.7)
	Multidrug resistance	14 (82.4)	11 (84.6)	21 (77.8)	18 (81.8)

The multidrug resistance rates of ESBL-*Ec* and ESBL-*K* were high, between 59.4 and 84.6% (Tables 2 and 3). As many as 3.1% of the ESBL-*Ec* and 1.4% of the ESBL-*K* isolates were resistant to all the antibiotic classes tested, except carbapenems (Figure 3).



Figure 3. Multidrug resistance of ESBL-producing *E. coli* and *Klebsiella* spp. to one or more antibiotic classes in cattle faeces, soil, farmers' stools and their drinking water.

4. Discussion

Antimicrobial resistance poses a serious threat to health globally, and the World Health Organisation (WHO) classifies ESBL-*Ec* and ESBL-*K* among the highest priority pathogens [21]. Multidrug-resistant *E. coli* can be considered an indicator of antibiotic-resistant bacteria in general, as *E. coli* is a ubiquitous and commensal species in animals and can provide relevant indication of the spread of antibiotic resistance [22]. Our study assessed the presence of ESBL-*Ec* and ESBL-*K* in animals, soil, humans and drinking water on two types of farms located in a semi-urban area in Burkina Faso. This study revealed that 58% of all the samples from farms yielded at least one ESBL-*Ec* or ESBL-*K* isolate. Researchers from other parts of Africa have reported lower rates, with a 25% occurrence of ESBL-*Ec* and ESBL-*K* on average in animals, the environment and humans in Egypt [23], Nigeria [17], Ghana [24] and Uganda [25]. Likewise, a study conducted in Rwanda among livestock, the environment, community members and farm products showed a relatively low prevalence of 14.8% [26]. In Burkina Faso and other LMICs, the occurrence of resistant bacteria correlates with poor sanitation and close interactions with livestock, as well as easy access to and irrational use of antibiotics [27]. The misuse of antibiotics in humans and animals has been documented in the literature to promote a selective increase in some bacterial populations as well as the dissemination of resistant strains [28].

In the cattle faeces, a prevalence of 85.3% was detected for ESBL-*Ec* and/or ESBL-*K*, which is higher than that which was previously reported in Burkina Faso [18] and Cote d'Ivoire [29]. A study on cattle faeces reported a 45.4% prevalence of ESBL-*Ec* among animals in Nigerian slaughterhouses [17]. The prevalence of ESBL-*Ec* in cattle faeces was 31% in Ghana [30] and 42.8% in Egypt [12], while ESBL-*Ec* and ESBL-*K* prevalence on cattle farms was reported to be 76.4% in South Africa [15]. In Burkina Faso, antibiotics are used by farmers to treat animals, for prophylactic purposes, and more critically, as growth promoters [8], and, consequently, the selection pressure on commensal and pathogenic microorganisms has led to the proliferation of antibiotic-resistant bacteria. These bacteria

can be transferred to humans through direct contact with animals or indirectly via the food chain or environmental pollution from agricultural effluents [31].

In the farmers' stools, the prevalence of ESBL-*Ec* and ESBL-*K* was 76.5% and 25.0%, respectively. Two previous studies carried out in Burkina Faso reported prevalences of ESBL-*Ec* and ESBL-*K* of 22% and 53% in healthy volunteers, and 42% and 56% among inpatients, respectively [32,33]. Among slaughterhouse workers in Nigeria, a 50% prevalence of ESBL-*Ec* was detected [34]. A study conducted among poultry workers in Nigeria reported a prevalence of ESBL-*Ec* as low as 2.7% [35]. Over the last 20 years, the prevalence of community-acquired ESBL carriage has increased tenfold worldwide, reaching 26% in 2016–2020 [36]. Cumulative prevalence was highest in Southeast Asia (35.1%, 95% CI, 10.3–60.0%) and lowest in Europe (6.0%, 95% CI, 4.6–7.5%), whereas it was 21.4% (95% CI, 12.7–30.1%) in Africa [36]. Compared to these figures, the prevalence we detected in farmers' stools is high. This may be due to the common use of antibiotics on the studied farms and by the studied farmers, who are in contact with livestock and share the same environment as them. Resistant bacteria can be transmitted between humans, cattle and their environment through contact with faeces or via the food chain, including through raw milk and contaminated meat [37]. Several studies have highlighted the potential contribution of poor hygienic practices, a lack of personal protective equipment and an abundance of bacterial pathogens in the environment to contamination, especially with ESBL-*Ec* [19,36–38].

In drinking water collected from farmers' taps, our study found a prevalence of 37.9% of ESBL-producing bacteria. The prevalence of ESBL-*Ec* was 7.6% and that of ESBL-*K* was 33.3%. A study conducted in Kenya found an association between domestic animal presence and ownership and household drinking water contamination, reporting approximately 70% of water samples to be contaminated by enterococci in different peri-urban areas [39]. The prevalence of ESBL-*K* and ESBL-*Ec* in the current study aligns with results from Ethiopia [40], whereas a study in Nigeria reported a prevalence of ESBL-*E* of 7.14% in drinking water sources [41]. The general poor quality of drinking water in Ouagadougou was reported in a study on borehole water in the city, with 59% of water samples being contaminated by coliforms, including *E. coli*, indicating faecal contamination [42]. ESBL-producing *Proteus*, *Klebsiella* spp. and *Bacillus* were isolated from treated water, municipal water and raw water in a study in Nigeria [43,44]. Indeed, the spread of ESBL-*E* via drinking water poses a serious health risk to consumers and can compromise the empirical treatment of invasive infections such as urinary tract and bloodstream infections [43].

ESBL-*Ec* and ESBL-*K* were also found in farm soil, with a prevalence of 47% and 19%, respectively. A recent study in Burkina Faso reported prevalences of ESBL-*Ec* and ESBL-*K* of 28.0% and 36.0% in manure from cattle markets and from two livestock markets [45]. A study from Nigeria on ESBL-*Ec* in drainage and washing water in slaughterhouses showed prevalences of 40% and 22%, respectively [46]. The presence of ESBL-*Ec* and/or ESBL-*K* in slaughterhouses can lead to the contamination of meat, which is a risk for consumers if good hygiene and proper cooking conditions are not respected. Livestock production wastewater, soil and manure from dairy and beef production can also add AMR genes and bacteria into the environment [47]. Wastewater, humans, pets, domestic animals and industry have all been identified as potential sources of resistant bacteria in the African environment [48].

The present study also compared the prevalence of ESBL-*Ec* and ESBL-*K* on semi-intensive and traditional farms. The prevalence of ESBL-*Ec* and/or ESBL-*K* was 92% on semi-intensive farms and 85% on traditional farms, and there was not a significant difference between these two types. This is possibly because cattle on semi-intensive farms also graze in the surroundings of the farm during the day. Our figures from the traditional farms are much higher than that reported from Tanzanian traditional cattle farms, where the prevalence was 10% [49]. At the global level, in 2022, the prevalence of AMR varied between 18% and 28%, depending on the farming system [50]. In comparison to these figures, the prevalence of ESBL-*E* on cattle farms in Burkina Faso seems very high. We can

speculate that the animals that roam free in the environment are exposed to various AMR sources as a result of deficient sanitation and waste management, exposing free-roaming animals to human and abattoir solid waste and wastewaters that contain resistant bacteria and antibiotic residues.

The multidrug resistance rates we detected were high; close to 70% of the ESBL-*Ec* and ESBL-*K* isolates were multidrug-resistant, with the highest resistance rates being against tetracycline and cotrimoxazole. These two antibiotics are relatively cheap and readily available over the counter in LMICs. Tetracycline belongs to one of the most commonly used classes of antimicrobial agents in veterinary medicine, due to its broad spectrum of activity [29]. It contributed 63% of the quantity of antibiotics used in 2016, 11.6% in 2017, 31.7% in 2018 and 28.7% in 2020 [6]. Our results showed that 3.1% of the animal faeces and 1.4% of the human stools contained ESBL-*Ec* and ESBL-*K* which were resistant to all classes of antibiotics tested, except carbapenems. Carbapenems are used to treat serious human infections, and their use is not licensed in livestock or veterinary fields [51,52]. However, the One Health approach is needed to prevent the dissemination of carbapenem resistance from humans to animals and the environment.

5. Conclusions

This study demonstrated the high prevalence of ESBL-*Ec* and ESBL-*K* in cattle faeces, the farm soil environment, farmers' stools and their drinking water in the surroundings of Ouagadougou in Burkina Faso. The isolates were resistant to many commonly used antibiotics, and a high rate of multidrug resistance was observed. The faecal and environmental carriage of ESBL-producing Enterobacterales among humans, animals and the environment underscores the need for increased AMR surveillance in veterinary and human medicine to discover the potential sources and dynamics of transmission. It is also necessary to raise farmers' awareness of the appropriate use of antibiotics, hygienic measures (e.g., disinfection, water quality control, detergent use) and biosafety on farms. The One Health approach is a comprehensive strategy to combat antibiotic resistance and limit the spread of multidrug-resistant bacteria across ecosystems, by sharing information between the human, animal, and environmental health sectors.

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