































Young Male	19	13	68.42
Young Female	18	15	83.33
Adult Male	22	19	86.36
Adult Female	21	16	76.19
<b>Total</b>	<b>80</b>	<b>63</b>	<b>78.58</b>

not Significant P>0.05

#### 4.2 Biochemical Tests

For indole test, all the 63 positive isolates shows the formation of a pink layer at the surface of the broth when 2-3 drops of Kovac’ s reagent was added to the medium and it indicates a positive result .For the citrate utilization test, the 63 positive isolates gives a negative result due to the absence of a bright blue colour within the medium. The methyl red test, 63 positive isolates shows the formation of a pink-red product within 5-15 minutes after 5-7 drops of methyl-red solution were added to the broth and this indicates a positive result. For catalase test, all the 63 positive isolates shows negative for catalase since there were no production of a gas bubbles. For urease test, all the 63 positive isolates were urease negative due to red-pink colour change within the media. For triple sugar ion test, all 63 positive isolates produced a gas at the butt of the test tubes and yellow colouration at the surface of the slant, these indicates a positive result.

**Table 4.2. Biochemical reactions of presumptive *E. coli* isolates from slaughtered cattle.**

Biochemical tests	Number sampled	No. of +ve	No. of - ve	% of +ve

Catalase	80	17	63	21.3%
Indole	80	63	17	78.8%
Urease	80	17	63	21.3%
Methyl-red	80	63	17	78.8%
Citrate utilization	80	17	63	21.3%
Triple sugar ion	80	63	17	78.8%

### 4.3 Antimicrobial Susceptibility Testing of the *E. coli* Isolates

The isolated *E. coli* from cattle (young male, young female, adult male and adult female) were subjected to in vitro antimicrobial susceptibility testing by the modified Bauer-Kirby method.

The result showed that the isolates from young male cattle were susceptible to Ciprofloxacin (38.7%), Ofloxacin (23%), Gentamicin (15.4%), and Nitrofurantion (7.7%), also they are intermediate to Ceftazidime (15.4%) and Cefuroxime (7.7%) but were resistant to Cefixime (7.7%) and Augmentin (7.7%). Ciprofloxacin and Ofloxacin had the widest zone of inhibition (23mm). Isolates from young female cattle were susceptible to Ciprofloxacin (26.7%), Ofloxacin (20%), Gentamicin (40%), Nitrofurantion (20%), and Ceftazidime (6.7%) and were intermediate to Augmentin (6.7%) but were resistance to Cefixime (13.3%) and Cefuroxime (6.7%). Gentamicin had the widest zone of inhibition of (17mm). Isolates from adult male cattle were susceptible to Ciprofloxacin (31.6%), Ofloxacin (21.0%), Gentamicin (26.3%), and Nitrofurantion (10.5%) but were intermediate to Cefuroxime (5.3%) and Cefixime (5.3%), and were resistant to Ceftazidime (10.5%). Ciprofloxacin had the widest zone of inhibition of (21mm).



Equally, isolates from adult female cattle were susceptible to Ciprofloxacin (25%), Ofloxacin (18.8%), Gentamicin (12.5%), Nitrofurantion (6.3%), and those isolates were Intermediate to Ceftazidime (6.3%) and Cefuroxime (12.5%) but were resistant to Cefixime (6.3%). But Ciprofloxacin had the widest zone of inhibition of (21mm).

**Table 4.3: Antimicrobial Susceptibility Studies of E. coli Isolates from Cattle to Commonly Used Antimicrobial Agents.**

Antimicrobials	Drug Conc.(ug)	No. of Susceptible %	No. of Intermediate %	No. of Resistance %
CAZ	30	0 (0.0)	3 (12.5)	2 (8.3)
CRX	30	0 (0.0)	4 (16.7)	1 (4.2)
GEN	10	15 (62.5)	0 (0.0)	0 (0.0)
CXM	5	0 (0.0)	1 (4.2)	5 (20.8)
OFL	5	13 (54.2)	0 (0.0)	0 (0.0)
AUG	30	0 (0.0)	3 (12.5)	1 (4.2)
NIT	300	7 (29.2)	0 (0.0)	0 (0.0)
CRP	5	19 (79.2)	0 (0.0)	0 (0.0)

**CAZ- Ceftazidime, CRX- Cefuroxime, GEN- Gentamicin, CXM- Cefixime, OFL-Ofloxacin, AUG- Augmentin, NIT- Nitrofurantion, CPR- Ciprofloxacin.**

Among all the sex and age of cattle tested for antimicrobial sensitivity, adult male showed the highest resistance level of (77.2%) to commonly used antibiotics and as well 19 (79.2%) of the positive isolates were susceptible to Ciprofloxacin, 7 (29.2%) were susceptible to Nitrofurantion, 13 (54.2%) were susceptible to Ofloxacin, 15 (62.5%) were susceptible to Gentamicin, while 3 (12.5%) were intermediate to Ceftazidime, 4 (16.7%) were intermediate to Cefuroxime, 1 (4.2%)

were intermediate to Cefixime, 3 (12.5%) were intermediate to Augmentin, and 2 (8.3%) were resistance to Ceftazidime, 1 (4.2%) were resistance to Cefuroxime, 5 (20.8%) were resistance to Cefixime and 1 (4.2%) were resistance to Augmentin.

## **Discussion**

The study was carried out to isolates and carried out antimicrobial susceptibility studies from gastro intestinal content sample from cattle in Maiduguri abattoir, Nigeria. A total of 80 rectal swab samples were collected from cattle based on age and sex and 63 were positive for *E. coli* organisms. The isolation rate of *E. coli* in this study area was 78.58%. *Escherichia coli* occur aberrantly in most tissues or organs of the body (e.g. gastro intestinal tract, respiratory tract, urogenital tract) in man and animals (Adetosoye, 1980). *Escherichia coli* has been isolated in large numbers from faeces of ruminants and even humans (Moses, 2005, Ameh *et al.*, 2003). The organism is implicated in causing several diseases in animals and man, with ruminant playing an important aspect in the epidemiology of the infections. Zoonotic *E. coli* (O157:H7) has been implicated in human outbreaks of haemorrhagic colitis, neonatal diarrhea and haemorrhagic uraemic syndrome (Griffin and Tauxe, 1991). Meat and meat product from animals can be contaminated by *E. coli* and transmitted to man via consumption of undercooked meat and poor hygienic practice.

Over the past 60 years, antimicrobial have been used in a variety of setting including human medicine, veterinary medicine, plant agriculture and even cosmetics and antibacterial household products (DeVincent and Viola, 2006). All of these uses of antimicrobials potentially contribute to the emergence and spread of antimicrobial resistance but antimicrobial use in animals, particularly in food animals has recently come under particular scrutiny. In large part, concern stems from evidence for direct transfer of resistant pathogens from animals to humans through the food supply (Spika *et al.*, 1987).

The result of the in vitro antimicrobial susceptibility study show that the *Escherichia coli* from cattle were susceptible to Ciprofloxacin, Ofloxacin and Gentamicin but were intermediate to Nitrofurantion and as well resistance to Augmentin, Cefixime, Ceftazidime and Cefuroxime. Generally, the organism were susceptible to the flouroquinolones and this is in agreement with the report by Umolu *et al.*, (2006), Moses (2005), (Ahmed and Ahmed (2020) and Ameh *et al.*, (2003). Flouroquinolones are newer drugs with mode of action central on inhibition of DNA replication which stops the multiplication of the bacterial cells and are relatively expensive and therefore, are less available for abuse. The flouroquinolones (Ciprofloxacin, Ofloxacin and Gentamicin) had the widest zone of inhibition and are inversely related to minimum inhibitory concentration (MIC) values and this is in agreement with earlier report by Ameh *et al.*, (2003). Resistance to Augmentin, Cefixime, Ceftazidime and Cefuroxime is in agreement with those of other workers (Ameh *et al.*, 2003, Adetosoye, 1980 and Ahmed & Ahmed 2020). The high incidence of drug resistance of *Escherichia coli* isolates as observed in this study may suggest that there was a wide spread transfer of resistance plasmid in the past (Adekele *et al.*, 2011) because resistance transfer in *E. coli* and other enterobacteriaceae is often embolic and plasmid mediated (Ahmed and Ahmed 2020).

To generate baseline data to be used in future risk assessment of antimicrobial resistance, a number of surveillance systems on the local, continental and global scale is needed. Among the species proposed for surveillance of *E. coli*. The distribution of resistance in commensal *E. coli* is a good indicator for the selective pressure by antibiotic use and resistance problems to be expected in pathogenic bacteria. In food animals, a low distribution and degree of antibiotic resistance in the intestinal flora should be considered as a distinguishing quality and safety mark (Ahmed and Ahmed 2020).

## **Conclusion**

From the result of this study, it can be concluded that there is a high distribution of the bacteria (*E. coli*) among cattle slaughtered for meat in Maiduguri abattoir which may serve as a reservoirs of *E. coli* for transmission through their meat and by-products especially when slaughter conditions are not hygienic enough. This study has also shown the presence of antibiotic-resistant bacteria in cattle slaughtered in Maiduguri abattoir which could be as a result of acquisition of these antibiotic resistant bacteria by contact with carriers or ingestion of food (meat) and water contaminated by faecal droppings of other animals with previous exposure to antibiotic. The study has established the presence of antibiotic-resistant bacteria. The level of antimicrobial drug resistance is high which can enter into the food chain. From the study, Ciprofloxacin, Ofloxacin, and Gentamicin had well activity against *Escherichia coli* and may be drugs of choice for the treatment of infections caused by *E. coli* but high resistance were observed to Cefixime, Cefuroxime, Ceftazidime and Augmentin.

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