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Isolation and Identification of *Enterohaemorrhagic Escherichia coli O157:H7* from Beef and Lambs Meat in Tree Marked (Diguel, Dembe and Gougi) in Ndjamena City-Chad

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Abstract: The *Enterohaemorrhagic Escherichia coli O157:H7* is emerging and major zoonotic foodborne pathogen. It has and increasing concerning about spread of antimicrobial- resistant strain. This study aimed to isolate and characterize Shiga toxin producing *Enterohaemorrhagic Escherichia coli O157:H7* from row beef and lamb meats and determine their and microbial susceptibility pattern from December 2025 to January 2026, and total of 306 beef and lamb meat samples were collected from different Market in Ndjamena city- Chad. The collected sample were analyzed microbiologically for the presence of *Enterohaemorrhagic Escherichia coli O157:H7* and Shiga toxin producing E.coli and determination of their antimicrobial susceptibility pattern following the standard bacteriological and total of 306 167 (54.57%) were biologically positive for E.coli and 100 (33.66%) were positive of Shiga toxin E.coli O157:H7. Respectively *E.coli* isolates showed the highest level of susceptibility to the tetracycline, Ciprofloxacin and cefepime (100%), but the highest level of resistance to Ampicillin and Amoxicillin (100%) and intermediate susceptibility to Gentamicin, ofloxacin, ceftriaxone of the tested isolate, 0(0%) of E.coli showed multidrug resistant. This study revealed the occurrence of Shiga- toxin producing *E.coli O157:H7* in beef and lambs meat. In conclusion, a nationwide phenotypic characterization, in depth-typing, and drug- resistant identification of E.coli O157:H7.

Keywords: Isolation, Enterohaemorrhagic, Escherichia, Coli, Beef and Lambs Meat, Tree Marked, Ndjamena

INTRODUCTION

Food Contamination

Food contamination is generally defined as the presence in food or associated with food of toxic chemicals elements or compounds or microorganisms present which can cause illness to the consumer (Abdolshahi,2020).

There are 4 types of contamination are physical, biological, chemical and cross contamination. Major contamination source are water, air, sewage, insects, equipment, dust, rodent (Fahad, 2021).

Cause of food contamination biological hazards (microorganism) including fungi, bacteria, viruses, mold and yeast. Physical hazard. Chemical hazards including cleaning foods, chemical, with naturally occurring toxins such as green potatoes. (Nerin, 2016)

The main criteria for contamination judgment could be potential risk and the effect it has on human health. In this regard, mycotoxins, and other microbial toxins, toxic elements, radioactive isotopes, nitroso compounds, polycyclic hydrocarbon aromatic, halogen containing organic compounds, pesticides residues, veterinary drug residues etc., are major critical food contaminants. (Abdolshahi, 2020)

Source of food contamination

Food contamination may be regarded as every substance not intentionally added to the food, but found inside the food during the production process, farming practices, treatment, packaging, transport, storage of food, or from environmental Sources. Thus food contamination can take place at different steps of the food process, from the reception of row material to the final food intake by consumers. The source involved in the food contamination process include.

1. external raw food contamination due to environmental contamination.
2. Transport of row material to the factory where they will be processes.

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3. Food containing which involves the storages of row materials, preheating, cleaning and sterilization steps.
4. Heating steps by either boiling, baking, frying, or combining with other ingredients at high temperature in an oven or in a reactor.
5. Food packing.
6. Transport of packaged food, distribution and storage of package.

Biological contamination

Food is main source of energy and nutrition for human being, biological contamination is one of most common cause of food poisoning. Contamination of food items by other living organisms knows as biological contamination, during the food contamination the harmful bacteria spread on food That you consume. They break down complex food structure into simpler components and use these for reproduction and biological function. Although the microorganism can be readily found in nature decomposing organic mate, they can quickly work their way into the food industry. When the microorganisms are unintentionally present in food, they are considered biological contamination. This type of contamination is responsible for most reported food-borne illness cases globally of the approximately 600 million cases of food borne illness all over the world; a majority of this portion is caused by biological contamination. The centre of disease control and prevention has reported that there are at least 250 identified food borne illnesses known to the food industry, the majority of these illnesses are attributed to biological contamination. (Hanson, 2022).

Many pathogenic microorganism can contaminate food during various stages of their handling, production, storage, serving and consumption (Thomas 2017).

Diseases arise from food contaminated with living organism, poorly cooked food and contaminated water. (Erkmen *etal;* 2016)

The street vending food has become an important public health issue In the developing countries food sold by street vendors are the major source of food borne disease although food item from these outlets are appreciated mostly for their unique flavor and for their conscience , their microbial safety is not always certain. (Rane, 2011)

The major source contributing to microbial contamination of such food infrastructure, preparation and storage, cooking, cleaning and serving utensils, quality of water and personal hygiene of food handlers other source of contamination, include place and surface of food preparation, flies and dust on uncovered food items, lack of facilities for drainage of waste water, dish washing clothes. Contaminating row materials, unavailability and shortage of potable water time in-adequate reheating of cooked food and improper and unsanitary food handling by vendors. (Bergen *etal*; 2020 and Islam *etal;* 2015 and Jose *etal;* 2021)

Chemical contamination

Chemical contamination of food is global food safety issue, there are many potentially toxic substances in the environment, which may contaminate foods, consumed by people Include inorganic and organic substances and may originate from wide range of source. (Thompson *etal*; 2019).

The Food contamination could be due to naturally occurring contaminants in the environment or artificially introduced by the human, the phase of food processing, packaging, transportation and storage also significant contributors to food contamination. The implication of these chemical contaminants on human, ranging from mild gastroenteritis to fatal case of hepatic, renal, and neurological syndrome. Therefore, the food production chain poses an intrinsic and extrinsic risk of contamination. (Rther *etal*; 2017 and Lebelo *etal;* 2021)

The Chemical Contamination include:

A) Heavy metal contamination

The heavy metals are responsible for causing adverse effects on human health through food chain contamination .Heavy metals are refer to individual metal or metal compounds that can impact human health, contamination of food supply is receiving more and more attention all over the world. Human are exposed to these metal by ingestion (drinking or eating), the dietary sources of heavy metals include contaminated food stuff such as fruits, vegetables and water (Sattar *etal*; 2015).

The street food are only considered as contaminated with heavy metal(Aluminium(Al), copper (Cu), lead (Pb), Cadmium (Cd), Chromium (Cr), Nickel (Ni), Zinc (Zn)) if it is greater than 5mg/cm^3 as result of exposure to the open air and other sources. The presence of heavy metals at an unacceptable level in food will contribute to negative effects to human health. Foods that are being sold near roads especially are the one easily exposed to these heavy metals. High concentration in human body will be damage several biochemical processes, leading to kidney, bone, liver, brain, nervous system and cardiovascular problem, Also stated that the major source of heavy metals contamination in food is not only from vehicle emission and atmospheric deposition but also from exposure to the Chemicals and microbes (Afida *etal*; 2019).

B) Radioactive Contamination

Most radioactive element did not exist naturally, and soil contamination with such material has only become problem since nuclear weapons and reactors have been developed. After tsunami damage affected the Fukushima nuclear plant in Japon in 2011, monitoring of food and water samples detected contamination above provisional regulation value and

restrictions were put in place. Radionucleotides have also been detected in seafood in India, various foods in the Balkans. Risk assessments are conducted to ensure that levels remain within acceptable limits. Furthermore, experimental model are undertaken to assess safety in ingestion pathways, considering several different food intakes. (Thompson *etal;* 2019)

C) Pesticides and Insecticides Contamination

Vegetables and fruits treated with pesticides during agricultural operations and management could be contaminated, as these pesticides are usually concentrated in plant tissues. This, in turn, results in severe poisoning cases for those who eat them, especially if they are not washed well before consuming fresh vegetable and fruits. The severity of poisoning resulting from these pesticides varies according to types and concentration of pesticide. Example of these contaminated pesticides include insecticides known as DDT (dichloro-diphenyl-trichloroethane), Toxaphene and dieldrin. Toxaphene is a rapidly dispersing pesticide with fatty tissue, and it produce ulcers. It may cause cancerous injuries to tissue that contain a high concentration of fat, such as liver. (Mohammed, 2020).

Dieldrin is the most dangerous food contaminants, and it is one of the famous pesticides that have been used in U.S.A for long time, due to its high efficiency in eliminating grain insects, and even its harmful effects to human have been proven and due to the seriousness of the pollution effect of pesticides on meat. Millions of chickens were destroyed in Mississippi in 1974 (Amato *etal*; 2017).

Physical Contamination

Physical contamination of occurs when there is foreign or unwanted object present. Physical contamination can occur at any time during food production and manufacture. Physical contamination can be metal, glass, plastic, and rubber, bone, wood or stone. This types of food contamination is dangerous because it can damage the teeth, gums, throat and other body parts or results choking and death.(Mathet,2021)

Cross contamination

Cross contamination is transfer of harmful bacteria to food from other foods, cutting boards, and utensils and it happens when they are not handling properly. This is especially true when handling row meat, poultry, eggs, and seafood, so keep these foods and their juices away from already cooked or ready –to-eat food and product. (Sadhana *etal*; 2010)

However this type of contamination can lead to a number of health problems. Cross contamination take pace when infective are transported from any objective that can you use in the kitchen, unclean utensils, pests, row, dry kitchen clothes can lead to cross contamination (Fahad, 2021).

Cross contamination presents a risk of unknown magnitude for food allergic consumers, cross contamination can occur in home, restaurants, food-manufacturing plants and on farms. The frequency of gross contamination as cause of accidental exposures to allergic food is unknowing. Food allergic individuals can react to ingestion of trace level of offending food, although the highly variable range of threshold doses exist among population of food allergic individual. The magnitude of the risk posed to food allergic. (Valero *etal*; 2017).

Consumer by cross- contamination is reported to and important factor strongly linked to food bone diseases outbreak and food spoilage. A limitation of existing predictive models in this regard is the lack of reproducibility in some cases to characterize variability associated to bacteria transfer from contaminated food surfaces in food-related environments. Cross contamination is characterized by the frequency of exposure to cross-contaminated foods, the dose of exposure, and the individual's threshold dose. The food service industry (and food preparers in home as well) have responsibility to provide and prepare foods that are safe food allergic consumers, but quality of life. (Carrasco *etal*; 2017)

MATERIAL AND METHOD

Material

All laboratory equipment, chemicals, kits and consumable and computer application used in this study area in indicated in table

Equipment and tools

No	Equipment and tools
1	Incubator
2	Oven
3	Water bath
4	Micro-pipette
5	Micro-fuge
6	Vortex
7	Centrifuge
8	Millipore filter
9	Distillatory
10	Shaking water both
11	Light microscope
12	Autoclave
13	Refrigerator
14	Gel-electrophoresis
15	Benzene flame
16	Test tube
17	Petri dishes
18	Durham tubes
20	Slide
21	flask
22	Camera

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List of chemical reagent

Reagent	Manufactured
01	Ethanol Absolute
02	Agarose
03	Ethidium bromide
04	Distil water

Culture media

Media	Manufactured
01	MacConkey agar
02	Eosin methylene blue agar (EMB)
03	Peptone water
04	Voges-proskaur (VP) and Methyl-red broth
05	Citrate agar
06	MacConkey Sorbitol agar
07	Mueller Hinton agar

Computer application programs

Software and application	Version
Microsoft office (excel)	2013

Sample collection

A total of 306 meats sample will collected randomly from three-marked in Ndjamena city Démbe 74 sample (46 lambs and 28 beefs), Diguél 116 sample (86 lambs and 30 beefs), Gougi 116 samples (46 lambs and 28 beefs). Collection using a purposive random sampling technique. The samples will take in the sterile container, and transferred to the University hospital for mother and children laboratories.

Sterilization method

Dry sterilization

The glass ware test tube, flask and poster pipette) were sterilized after washing with soap and water by using dry oven for 20 munite at 180co. glass equipment should not be removed from a hot air directly after sterilization period has ended, but rather allowed to cool gradually and stored until use. (Ahmed,2004).

Aseptic technique

10% formalin is diluted to be used to disinfect surfaces, then 10% ethanol is used to sterilize hands.

Study design

This study will be cross sectional, during the period of December 2025 to January 2026.

Study population

Is a beef and lamb meet simple from the Market from meets seller in Ndjamena city. A total of 306 samples (116 samples from Diguél, 116 Gougi and 74 sample.) for this study between December 2025 to January 2026.

Preparation of Media

Preparation of MacConkey Agar

Dissolve 47.00 grams in 1000ml distilled water. Boil to dissolve the medium completely. Sterilize by autoclaving at 15lbs pressure (121c^{o}) for 15min, cool it to 42-45 c^{o} and distribute aseptically in petri plates and allow to solidify. Ensure complete solidification and inoculate test sample. (ready MED 2025)

Preparation of EMB Agar

Dissolve 28.00 grams in 1000ml distilled water. Boil to dissolve the medium completely. Sterilize by autoclaving at 15lbs pressure (121c^{o}) for 15min, cool it to 42-45 c^{o} and distribute aseptically in petri plates and allow to solidify. Ensure complete solidification and inoculate test sample. (ready MED 2025

Preparation of peptone water broth

Dissolve 47.00 grams in 1000ml distilled water. Boil to dissolve the medium completely. Sterilize by autoclaving at 15lbs pressure (121c^{o}) for 15min, cool it to 42-45 c^{o} and distribute aseptically in petri plates and allow to solidify. Ensure complete solidification and inoculate test sample. (ready MED 2025).

Preparation of MR-VP Broth

Dissolve 17.00 grams in 1000ml distilled water. Boil to dissolve the medium completely. Sterilize by autoclaving at 15lbs pressure (121c^{o}) for 15min, cool it to 42-45 c^{o} and distribute aseptically in petri plates and allow to solidify. Ensure complete solidification and inoculate test sample. (ready MED 20

Preparation of Simmons citrate agar

Dissolve 27.27 grams in 1000ml distilled water. Boil to dissolve the medium completely. Sterilize by autoclaving at 15lbs pressure (121c^{o}) for 15min, cool it to 42-45 c^{o} and distribute aseptically in petri plates and allow to solidify. Ensure complete solidification and inoculate test sample. (ready MED 2025).

Mueller Hinton agar :

Suspend 38 grams in 1l distilled water. Mix until the suspension is uniform. Heat to boiling to dissolve the medium completely. Sterilized by autoclaving at 10bls pressure(115co) for 20 minute. Cool to 45-50co pour about 20- 25ml into sterile Petri plates and allow solidifying (oxoid).

Preparation of reagents

Methyl red solution

Suspend 0.06 gram powder of Methyl red in 100ml of Ethanol. Mixed well and stored for using. (Sagar 2022 and Najik2003)

Kovac,s solution

Prepare a solution by adding 5ml dimethyl-aldehyde amine benzene in amine alcohol 75%. in 50-55 co in water bath after cooling at HCL in stored 4 co (Sagar 2022 and Najik2003).

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Alfa naphthol solution

Prepare a solution by adding 0.6ml of alcoholic solution of phenaphthol and 0.2 ml of potassium hydroxide. Shake the solution and then store it until use

Sorbitol MacConkey Agar:

Suspend 51.5 grams in 1l distilled water. Mix until the suspension is uniform. Heat to boiling to dissolve the medium completely. Sterilized by autoclaving at 10bls pressure(115co) for 20 minute. Cool to 45-50co pour about 20- 25ml into sterile Petri plates and allow solidifying (oxoid)

Method

Primary test for E.coli Isolation

a) Culture on MacConkey agar

Using the sterile swap trick, the sample will streake, by using cross line method near a benzene flame to prevent contamination. where they are distributed to give a chance for clear colonies to grow. The plate incubated at 37 c° for 24h. Pink-colored colonies will consider presumptive of *E.coli*.

Confirmatory test for isolation of E.coli

a) Culture on eosin methylene blue agar

Using sterile inoculation needle the portion of the growing colonies on MacConkey agar medium, by using cross line method near a benzene flame to prevent contamination, the plate incubated at 37 c° for 24h. Green metallic shine colony was consider as *E.coli.*

b) Test IMVC

i) Indole test

The culture bacteria colony grow in EMB agar (Green metallic shine) were cultured in pejou tube containing peptone water and then placed in an incubator at 37co for 24 hours at the end of the incubation period, indole will detected by 0.5 ml of Kovac's reagent the red circle consider as positive.

ii) Methyl red test (MR test)

The culture bacteria colony grow in EMB agar (Green metallic shine medium) were cultured in pejou tube containing MR and VP Broth and then placed in an incubator at 37co for 24 hours at the end of the incubation period, **Methyl red** reagent will detected by 0.5 ml of **Methyl red** reagent the red circle considered as positive.

iii) Voges Proskauer (VP test)

The culture bacteria colony grow in EMB agar (Green metallic shine medium) were cultured in Pejou tube containing MR and VP Broth and then, placed in an incubator at 37co for 24 hours. At the end of the incubation period **Voges Proskauer test** will detected by adding 40% of potassium hydroxide and 5% Alpha naphtha reagent the no coulour change consider as Negative.

iv) Citrate test

The culture bacteria colony grow in EMB agar (Green metallic shine medium) were cultured in pejou tube containing **Citrate agar** and then placed in an incubator at 37co for 24 hours at the end of the incubation period, no color change consider as negative.

v) Culture on MacConkey sorbitol agar medium

Using sterile inoculation needle the portion of the growing colonies on EMB agar (Green metallic shine medium) MacConkey **sorbitol** agar medium, by using cross line method near a benzene flame to prevent contamination, the plate incubated at 37 c° for 24h. the colorless colony was consider as Enteroheamoraghic *E.coli O157:H7.*

Antimicrobial sensitivity test (Culture on Muller Hinton agar)

Using sterile inoculation needle the portion of the growing colonies on MacConkey sorbitol agar medium, are dissolved in the test tubes with distilled water. Using swap near benzene flame to prevent contamination, the antibiotic discs are placed in the pate, and then the plate incubated at 37 c° for 24h. To read the zoom.

Table antimicrobial sensitivity

Number	Antimicrobial	Code	Content
01	Cefotaxime	CTX	30 µg
02	Gentamicin	GM	120 µg
03	Ofloxacin	OFX	5 µg
04	Amoxicillin/Clavulanic acid	AUG	30 µg
05	Ciprofloxacin	CIP	5 µg
06	Ceftriaxone	CR	30 µg
07	Cefepime	FEP	30 µg
08	Tetracycline	TC	75 µg
09	Amoxicillin	AML	25 µg
10	Ampicillin	AMP	10 µg

RESULT

Out of the 306 meat Samples, 167 samples were positive for *E.coli* while 139 sample was negative for isolation.

Out of the 167 positive samples, 100 samples were positive for *Enteroheamoraghic E.coli* microbiological method. Table (1,2)

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Table 1: culture on MacConkey agar

No	Type of sample	Location	Number	Positive	Negative
1	Lambs meat		86	86	0
2	Meat beef	Gougi	30	30	0
3	Lambs meats		86	86	0
4	Meat beef	Diguél	30	30	0
5	Lambs meats		46	46	0
6	Meat beef	Démbe	28	28	0
7	Total		306	306	0

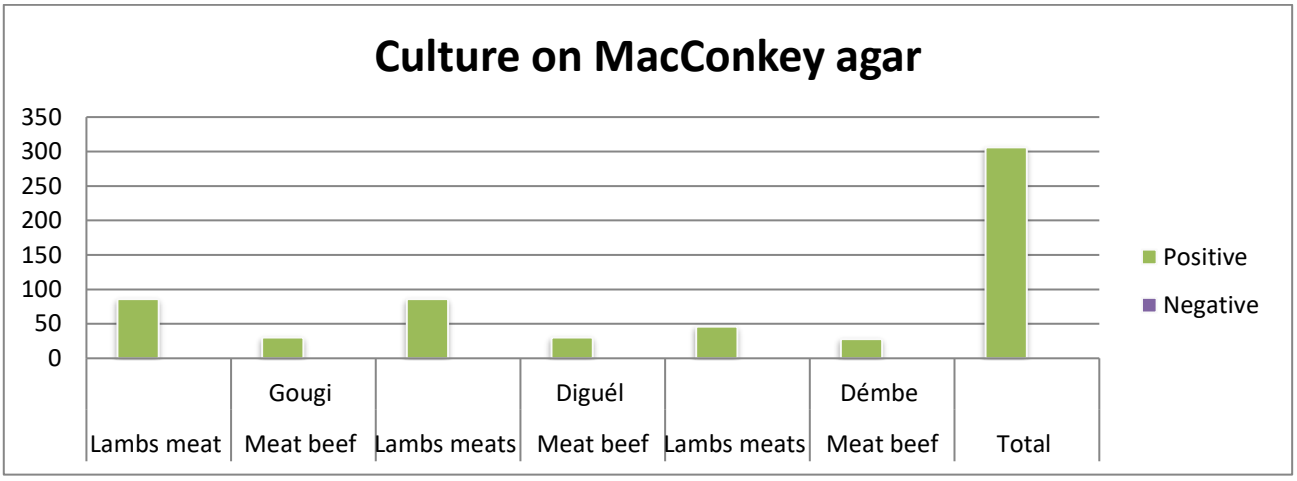
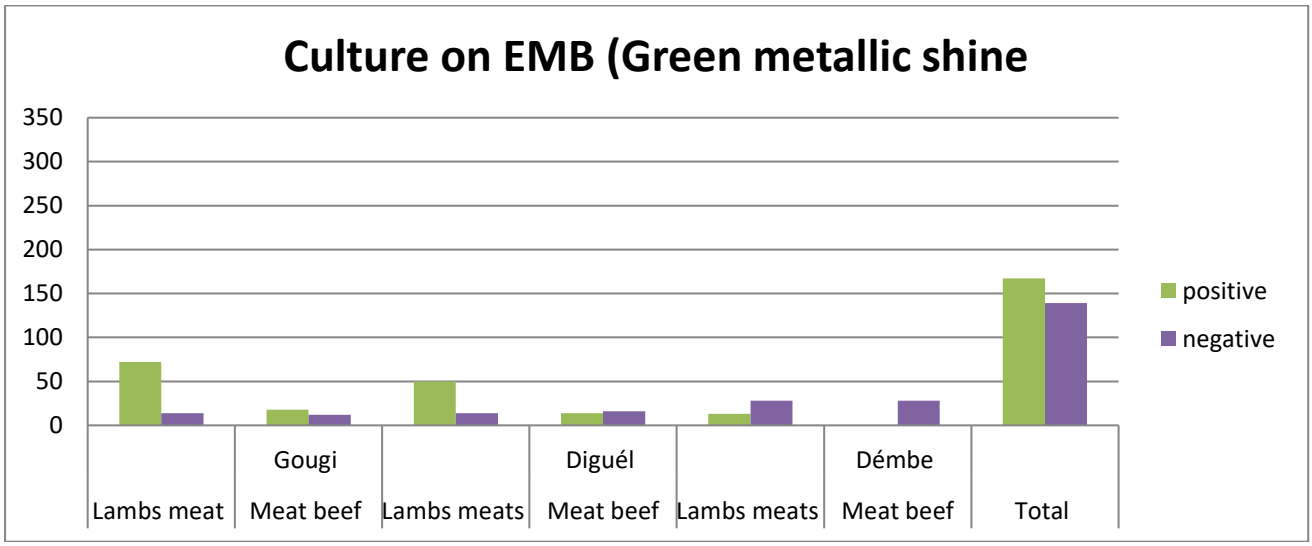


Table 2: Culture on Eosin methylene blue agar (Green metallic shine)

No	Type of sample	Location	Number	Positive	Negative
1	Lambs meat		86	72	14
2	Meat beef	Gougi	30	18	12
3	Lambs meats		86	50	14
4	Meat beef	Diguél	30	14	16
5	Lambs meats		46	13	28
6	Meat beef	Démbe	28	0	28
7	Total		306	167	139



Biochemical test

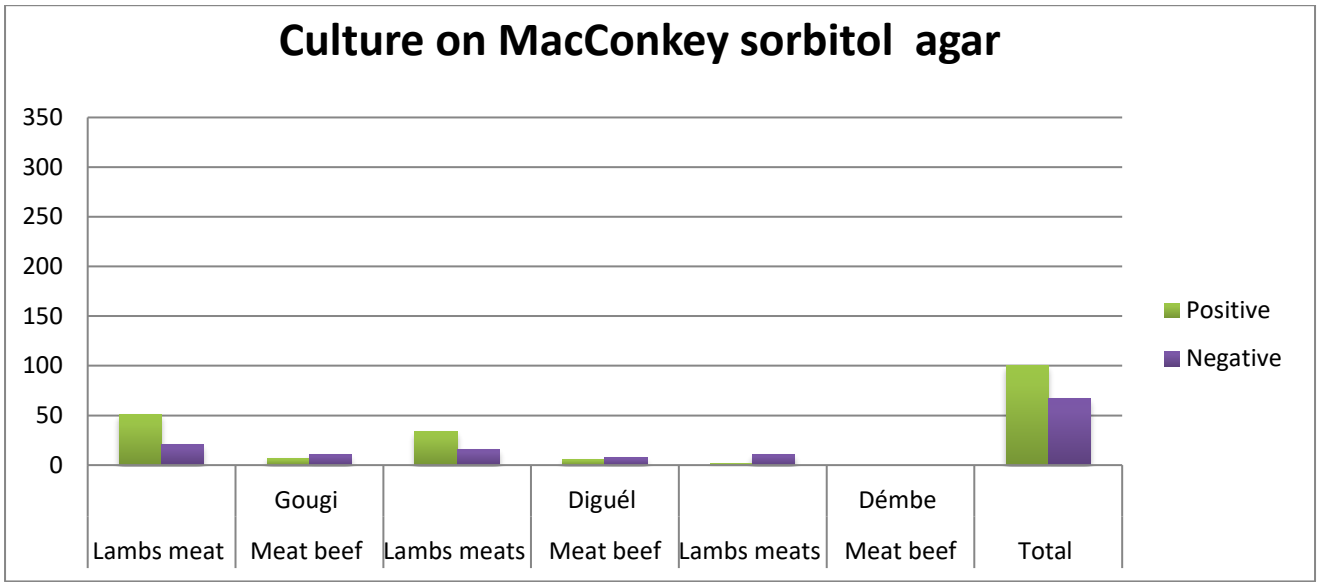
All green metallic shine showed following result

Table of biochemical test

No	Type of biochemical test	Result
1	Citrate	Negative
2	Indole	Positive
3	Methyl red	Positive
4	Vosges Proskauer	Negative

Table 3: Culture on MacConkey Sorbitol agar (colorless colony)

No	Type of sample	Location	Number	Positive	Negative
1	Lambs meat	Gougi	72	51	21
2	Meat beef		18	7	11
3	Lambs meats	Diguél	50	34	16
4	Meat beef		14	6	8
5	Lambs meats	Démbe	13	2	11
6	Meat beef		0	0	0
7	Total		167	100	67



Antimicrobial sensitivity

Antimicrobial sensitivity of the 100 colorless colony from MacConkey sorbitol agar

Table 4: Culture on Muller Hinton agar lambs meat Gougi (colorless 51)

No	Type of sample	Dis conc µg	Sensitive		Intermediate		Negative	
			NO	%	NO	%	No	%
1	Cefotaxime (CTX)	30 µg	30	58.82	8	15.68	13	25.49
2	Gentamicin (GM)	120 µg	40	78.43	7	13.72	4	7.84
3	Ofloxacin (OFX)	5 µg	12	23.52	16	31.37	23	45.09
4	Amoxicillin/Clavulanic acid (AUG)	30 µg	39	76.47	8	15.68	4	7.84
5	Ciprofloxacin (CIP)	5 µg	38	74.50	4	7.84	9	17.64
6	Ceftriaxone (CR)	30 µg	35	68.62	10	19.60	6	17.76
7	Cefepime (FEP)	30 µg	58	100%	00	00	00	00
8	Tetracycline (TC)	75 µg	23	45.09	12	23.52	16	31.37
9	Amoxicillin (AML)	25 µg	9	17.64	19	37.25	23	45.09
10	Ampicillin (AMP)	10 µg	00	100	00	00	51	100

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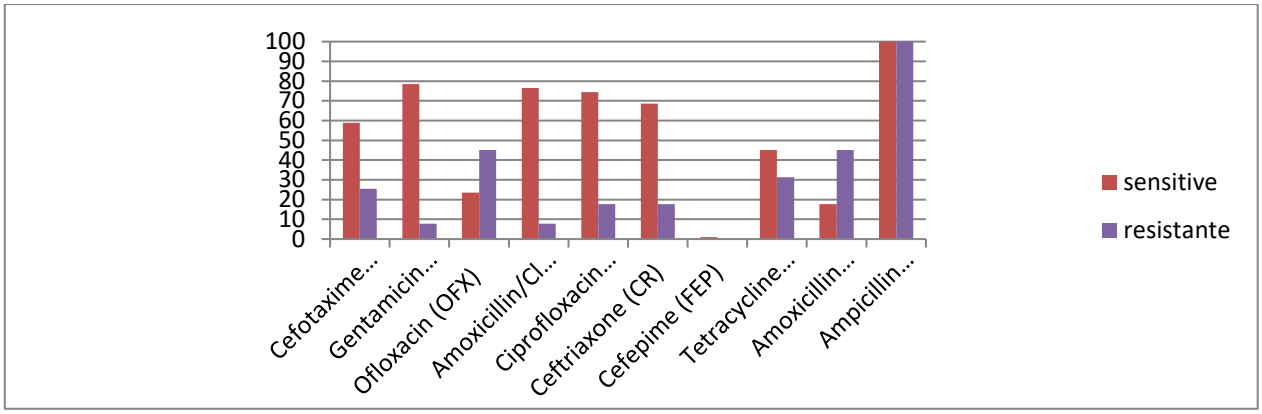

Table 5: Culture on Muller Hinton agar beefs meat Gougi (Colorless 7 sample)

No	Type of sample	Dis conc µg	Sensitive		Intermediate		Negative	
			NO	%	NO	%	No	%
1	Cefotaxime (CTX)	30 µg	5	71.42	00	00	2	28.57
2	Gentamicin (GM)	120 µg	7	100	00	00	00	7.84
3	Ofloxacin (OFX)	5 µg	4	57.14	2	28.71	1	14.28
4	Amoxicillin/Clavulanic acid (AUG)	30 µg	7	100%	00	00	00	00
5	Ciprofloxacin (CIP)	5 µg	6	85.71	1	14.28	00	00
6	Ceftriaxone (CR)	30 µg	7	100	00	00	00	00
7	Cefepime (FEP)	30 µg	58	100%	00	00	00	00
8	Tetracycline (TC)	75 µg	58	100%	00	00	00	00
9	Amoxicillin (AML)	25 µg	3	42.84	3	42.6	00	00
10	Ampicillin (AMP)	10 µg	00	00	00	00	7	100

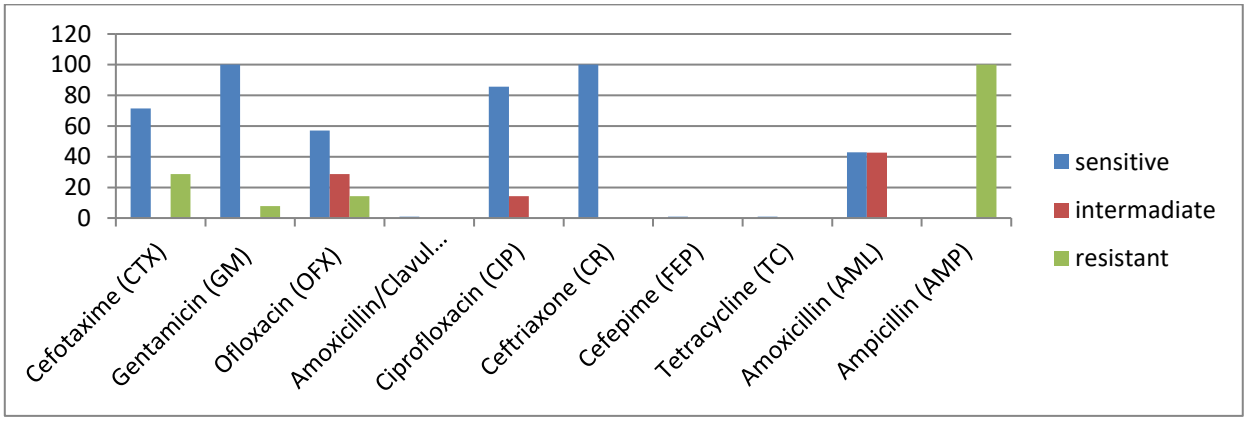

Table 6: Culture on Muller Hinton agar Diguél lambs meat (colourless 34 sample)

No	Type of sample	Dis conc µg	Sensitive		Intermediate		Negative	
			NO	%	NO	%	No	%
1	Cefotaxime (CTX)	30 µg	10	29.41	5	14.70	19	55.88
2	Gentamicin (GM)	120 µg	22	64.70	8	23.52	4	11.76
3	Ofloxacin (OFX)	5 µg	28	82.34	2	58.88	4	11.76
4	Amoxicillin/Clavulanic acid (AUG)	30 µg	28	76.47	2	5.88	2	5.88
5	Ciprofloxacin (CIP)	5 µg	18	52.92	12	35.29	4	11.76
6	Ceftriaxone (CR)	30 µg	26	72.47	4	11.76	4	11.76
7	Cefepime (FEP)	30 µg	58	100%	00	00	00	00
8	Tetracycline (TC)	75 µg	20	58.82	8	23.52	6	10.34
9	Amoxicillin (AML)	25 µg	18	52.94	10	29.41	6	17.64
10	Ampicillin (AMP)	10 µg	00	00	00	00	34	00

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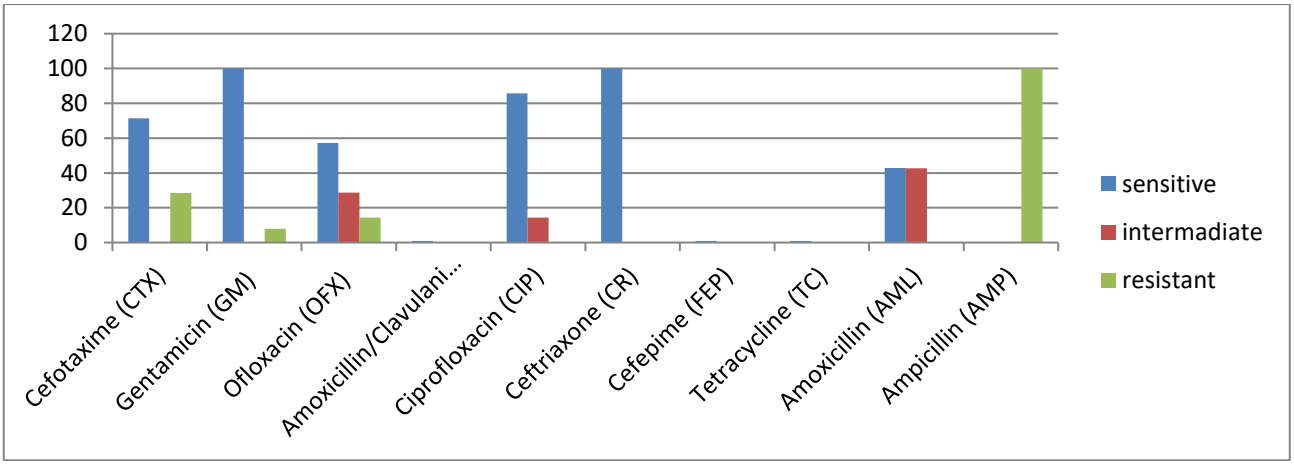

Table 7: Culture on Muller Hinton agar Diguél beefs meat (colorless 6 sample)

No	Type of sample	Dis conc µg	Sensitive		Intermediate		Negative	
			NO	%	NO	%	No	%
1	Cefotaxime (CTX)	30 µg	6	100	00	00	00	00
2	Gentamicin (GM)	120 µg	3	50	3	50	00	00
3	Ofloxacin (OFX)	5 µg	6	100	00	00	00	00
4	Amoxicillin/Clavulanic acid (AUG)	30 µg	5	83.33	1	16.66	00	00
5	Ciprofloxacin (CIP)	5 µg	6	100	00	00	00	00
6	Ceftriaxone (CR)	30 µg	6	100	00	00	00	00
7	Cefepime (FEP)	30 µg	5	83.33	1	16.66	00	00
8	Tetracycline (TC)	75 µg	4	66.66	2	33.33	00	00
9	Amoxicillin (AML)	25 µg	2	33.33	1	16.66	3	50
10	Ampicillin (AMP)	10 µg	00	00	00	00	6	100

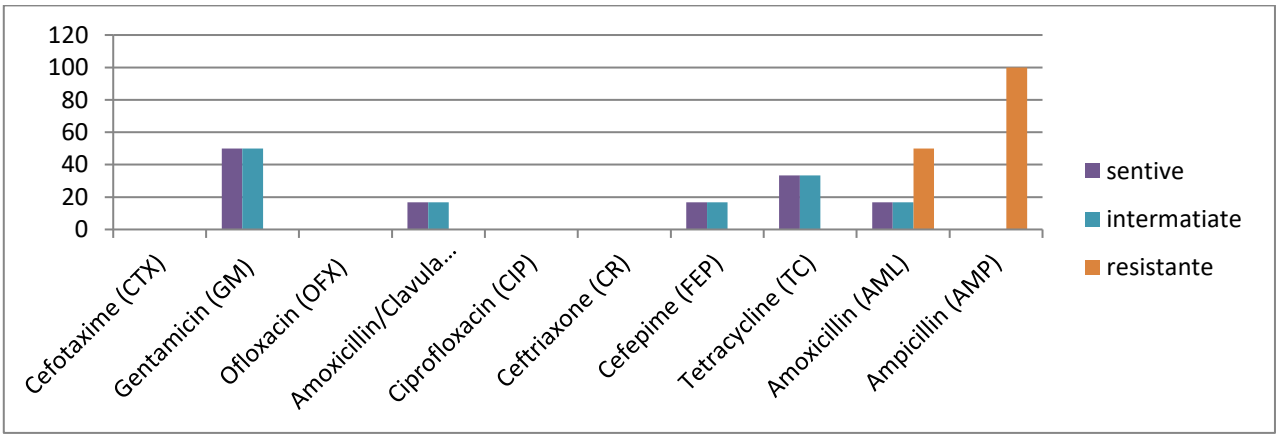

Table 8: Culture on Muller Hinton agar Démbe lambs meat (colourless 5 sample)

No	Type of sample	Dis conc µg	Sensitive		Intermediate		Negative	
			NO	%	NO	%	No	%
1	Cefotaxime (CTX)	30 µg	2	100	00	00	00	00
2	Gentamicin (GM)	120 µg	2	100	00	00	00	00
3	Ofloxacin (OFX)	5 µg	1	100	00	00	00	00
4	Amoxicillin/Clavulanic acid (AUG)	30 µg	2	100	00	00	00	00
5	Ciprofloxacin (CIP)	5 µg	2	100	00	00	00	00
6	Ceftriaxone (CR)	30 µg	2	100	00	00	00	00
7	Cefepime (FEP)	30 µg	2	100	00	00	00	00
8	Tetracycline (TC)	75 µg	2	100	00	00	00	00
9	Amoxicillin (AML)	25 µg	1	50	1	50	00	00
10	Ampicillin (AMP)	10 µg	00	00	00	00	5	100

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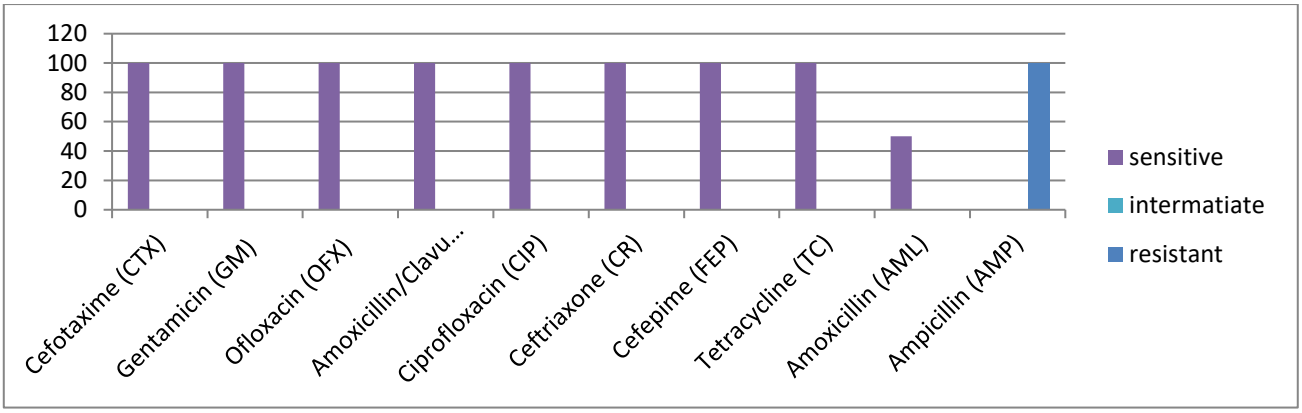

STATISTICAL ANALYSIS

Data was entered, checked, verified and analysed using statistical package for sciences (Excel 2013, version)

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