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Full Length Research Paper

Assessment of bacterial flora in the nasal cavity of free range goats in Ibarapa East local Government, Oyo State, Nigeria

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The aerobic bacterial flora of the respiratory passageways were investigated using 144 goats slaughtered at Ibarapa East Local Government. Samples were collected aseptically from the nasal cavity for bacteriological examination. Standard microbiological techniques were used for isolation and identification of bacterial species. A total of 144 goats were selected for this study. Seventy-eight (54.2%) were adults while 66(45.8%) were young; 60(41.7%) were males while 84(58.3%) were females. All (100%) were West African Dwarfs. Of the 144 goats, only 21 (14.6%) were deemed to be apparently healthy. out of the 144 goats selected for this study, Bacteria organisms were not detected in 18.8%. E coli and Bacillus spp. were found in 47.9% and 22.9% of the goats while Proteus spp, D mirabilis and Moraxella spp. were found in 4.2%, 4.2% and 2.1% of the total no of goats selected respectively. All were citrate positive, ninety-four percent were catalase positive and 62.5% were indole positive while 16.7% and 6.3% were positive to urease and oxidase respectively. *E. coli* was the most predominant micro flora in the nasal passage of goat in Ibarapa East. Stress conditions may cause a disease state. Regular surveillance activities concerning goats must be encouraged. Veterinary extension services can be extended to farmers in order for them to embrace proper goat husbandry.

Keywords: Goat, bacterial flora, nasal cavity, Ibarapa

INTRODUCTION

Goats which contribute to one quarter of the meat consumed in Nigeria are very hardy livestock animals, adapting very well to the harsh environmental conditions of the tropical rain forest in West Africa (Ademsun, 1986; Silanikove, 2000; Olapade and Onwuka, 2006). A fractional percentage of diseases affecting small ruminants are respiratory diseases (Hindson and Winter, 2002). Cuddling up of goats in groups and the rearing practices of goat owners makes these goats vulnerable to contagions (Kumar *et al.,* 2014). Viral infections can occur concurrently with bacterial infections causing grave consequences especially when the weather condition is harsh (Lacaster et al., 2008).

Organisms such as Streptococcus pneumoniae, Mannheimia haemolytica, Bordetella sarapertussis, Mycoplasma species, Arcanobacterium pyogenes,

and Pasteurella species adversely affect immunocompromised, pregnant, lactating and older animals during stressful conditions (Kumar *et al.,* 2014). Some authors reported seeing most of these seemingly non-pathogenic bacteria in the lungs of sheep, goats and most especially camel under disease condition (Shigidi, 1973; Ojo, 1976; Adekeye, 1984; Mohammed, 1999; Shemsedin, 2002).A knowledge of the bacteria flora in nasal cavity of goats is essential in the design of prevention and control measures as regards respiratory diseases of goats.

MATERIALS AND METHODS

Experimental site

Samples were collected from Ibarapa East Local Government while the analysis was carried out at the central laboratory unit of the College.

Experimental materials

Sterile universal bottles, Sterile petridish , Autoclave, Microscope, Aluminum foil, Spatula inoculating hood, Disinfectant, Glass slide, Gram's stain reagent, Methylated Spirit, Bursen burner, Beaker, MacConkey agar, Cotton wool, Cover slip, Inoculating loop, Gas burner.

Study animals

The study animals used was 144 apparently healthy and unhealthy goats reared intensively or extensively in Ibarapa East Local Government, Oyo state, Nigeria.

Sample collection

The nasal samples were collected by inserting sterile cotton-tipped applicator sticks or swab into the nasal passage after proper cleaning and disinfection of the external nares. Each nasal swab was carefully cut and put into a labeled bottle containing 2 mL brain heart infusion broth. The swabs were transported in a cool box to the laboratory for bacterial culture.

Bacteriological examination

Each nasal swab was removed from the bottle and streaked over the plates containing blood agar base supplemented with 7% sheep blood and McConkey agar. The streaking was further spread with inoculating loop to aid colony isolation. The plates were labeled and incubated aerobically at 37°C for 24-48 h. After taking note of cultural growth characteristics, positive cultures were subjected to Gram's staining properties and cellular morphology observed with a light microscope (x100). Mixed colonies and Gram negative bacteria were sub cultured on both blood and McConkey agars and further incubated aerobically for 24 h. Pure culture of single colony type from both blood and McConkey agars were transferred onto nutrient agar slants for a series of biochemical tests including catalase, oxidase and fermentative/oxidative tests for final identification following standard procedures (21). For the antibiotic sensitivity test, the disc diffusion technique was used and inhibition observed as clear zones around the antibiotics. Inhibition zones were measured and measurements greater than 0.5 cm were regarded as susceptible.

Media preparation

The agar was weighed according to manufacturer instruction using sensitive scale. The agar was then put into media bottle with distilled water and the media bottle were covered with non-absorbent cotton wool wrapped with foil paper tape, the media was put into the autoclave on tightened and the screw cap tightened also, the light was switched on thereby the outlet cock was released and the inlet was closed so as to allow diffusion of unwanted vapour after some minutes the outlet cock was closed for proper sterilization, the autoclave was then allow to ooze three times before it was timed for 15 min the autoclave was then switched off and allow to cool then both cock were released the tightened screw cap loosing and then the sterilized materials were removed and it is put on sterilized table for pouring.

Isolation and identification of isolates

Each swab stick was placed into sterile Tryptone soy broth (TSB) and cut at a level and dropped inside it and shake slightly and cut then incubated at 37^0C overnight for 18-24 h. The broth culture were sub-culture into blood and nutrient agar, if there is discrete colonies, Catalase, Oxidase, and Gram stain were carried out. Any isolate that shows gram negative reaction were sub-culture into MacConkey agar for further characterization. The isolates were identified by their biochemical characterization as a specified in the Cowan and Steel manual of bacteriology (1999).

Inoculation of samples into media plates

The inoculation method base on the stab and streak method which involve the use of inoculating wire loop and burden burner sample usually inoculating into prepared

media. For nasal, the sample were inoculated into blood agar and nutrient agar and after incubating all isolate that show gram-negative into macConkey agar for further characterization. Stab and streak method was carried out during the biochemical analysis of lactose, sucrose, glucose, gas, H_2S, by the used of triple sugar iron agar.

Incubating of cultures

By using incubating machine were used to incubate samples for about 18-24 h at 37°C. Some discrete colonies were obtained which was sub-culture onto the same media in other to obtain pure culture.

Cultural and biochemical characterization

Gram stain

A drop of distilled water was placed on a glass slide and a discrete colony was placed on it using sterile inoculating loop and spread it on a glass slide before heat fix it (Passing it through a flame). The gear was later placed on stick rack, the crystal violet was on each smear for 30seconds and was later washed away with water. PVP iodine then followed for 30 seconds before later washed away with water and 95% ethanol (Gram decolorizer) then poured on each smear to make the organism stays on each glass slide for 30 seconds. Safranin was later poured on each smear to 60 seconds and smear allowed to dry for 15 min. The smear was then taken to binocular microscope for proper observation. The smear was poured on stage of the microscope for proper viewing to classify either is gram negative or gram positive dither bacilli or cocci.

Oxidase test

The oxidase was carried out using oxidase strips. Discrete colonies were picked with the aid of tooth stick and are used to touch the moist oxidase strips. If it changes colour, it is positive but if it is in the other way it is negative.

Catalase test

The Catalase test was carried out using hydrogen peroxide solution. Each drops of H_2O_2 contain 6% and it was diluted with distilled water 1m to half 3% of H_2O_2. A drop of H_2O_2 solution is placed in glass slide using syringe and later a discrete colony was placed on the solution using tooth stick. If it is bubble it is possible test if it does not bubble it is negative test.

Identification of isolates

The isolates were identified using their cultural, morphological and biochemical characteristics with the aid of the Cowan and Steel's manual for identification of medical bacteria (1993).

RESULTS

Frequency distribution of selected goat

A total of 144 goats were selected for this study. Seventy-eight (54.2%) were adult while 66(45.8%) were young; 60(41.7%) were males while 84(58.3%) were females. All (100%) were West African Dwarfs. Of the 144 goats, only 21 (14.6%) were deemed to be apparently healthy. Table 1 shows the frequency distribution of selected goats and (Table 2) shows the association between some goat characteristics and presence of bacteria in the nasopharynx.

Table 1. Frequency distribution of selected goats.

Variable	Frequency	Percentage
Age		
Adult	78	54.2
Young	66	45.8
Sex		
Male	60	41.7
Female	84	58.3
Breed		
WAD	144	100.0
Health status		
Sick	123	85.4
Healthy	21	14.6

Table 2. Association between some goat characteristics and presence of bacteria in the nasopharynx.

Variable	Bacteria present		X^2	*p-value*
	Yes (%)	No (%)		
Age				
Adult	66(84.9)	12(15.1)		
Young	55(83.7)	11(16.3)	3.17	0.09
Sex				
Male	47(78.0)	13(22.0)		
Female	75(89.3)	9(10.7)	8.55	0.003
Health status				
Sick	96(78.0)	27(22.0)		
Healthy	21(100.0)	0(0.0)	5..67	0.02

Gram reaction

All were citrate positive, ninety-four percent were catalase positive and 62.5% were indole positive while 16.7% and 6.3% were positive to urease and oxidase respectively.

Organisms detected

Out of the 144 goats selected for this study, Bacteria organisms were not detected in 18.8%. E coli and

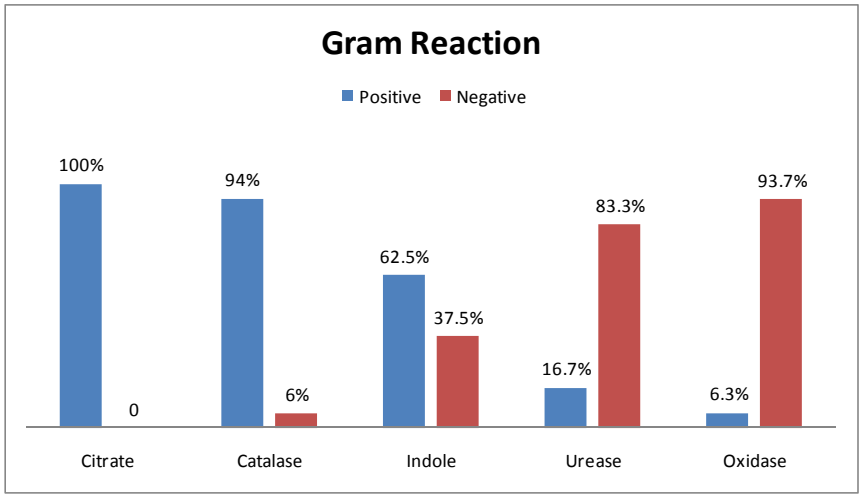

Figure 1. Reaction of the gram positive and negative bacteria to Citrate, Catalase, Indole, Urease and Oxidase tests.

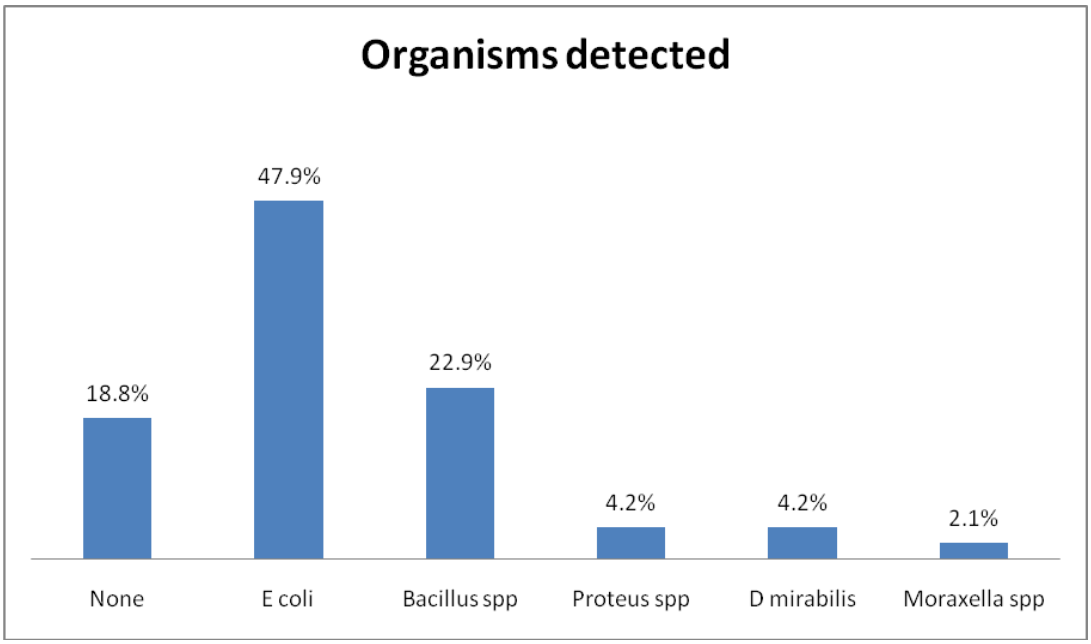

Figure 2. Organisms detected from the nasal cavity of the goats.

Bacillus spp. were found in 47.9% and 22.9% of the goats while Proteus spp. D mirabilis and Moraxella spp. were found in 4.2%, 4.2% and 2.1% of the total no of goats selected respectively.

DISCUSSION

This study showed that a variety of bacteria flora inhabited and colonized the nasal passageways of apparently healthy and sick West African Dwarf goats. *E. coli* presence in the nasal cavity, although harmless, may be capable of causing disease or aiding a disease process if found so much in abundance during a stressful episode in goats. Sex and health status were significantly associated with the presence of bacteria in the nasopharynx. *Bacteria spp.* were detected in 89.3% of female goats as against 78.0% of the males and this difference in proportion of goat with detectable bacteria in the nasopharynx was statistically significant (X^2 = 8.55, p = 0.003). Similarly, bacteria was not detected in any of the apparently healthy goats as against 22.0% of the sick

ones and this difference in proportion of goat with detectable bacteria in the nasopharynx was statistically significant ($X^2 = 5.67$, $p = 0.02$). Age was not significantly associated with the presence of bacteria in the nasopharynx ($p > 0.05$) (Figures 1 and 2).

Conclusion

The study concluded that gram positive bacteria particularly *E. coli* are the most predominant micro flora in the nasal passage of goat in Ibarapa East. Stress conditions may cause a disease state.

Recommendations

Based on the result and conclusion of this study, regular surveillance activities concerning goats must be employed within Ibarapa East local government and similar areas in order to help in timely institution of treatment and control measures where possible or speed up the culling process of those not economically viable. Proper goat husbandry practices are encouraged in order to realize healthy animals that could boost the economic activities of such areas. This can be achieved by using proper veterinary extension services to train the farmers on husbandry practices.

Authors` Declaration

We declare that this study is an original research by our research team and we agree to publish it in the journal.

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