A study of normal fecal flora and pathogenic organisms found in Grass cutter (Thryonomys swinderianus) in Aba, Abia State, Nigeria

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Grass-cutter (Thryonomys swinderianus) is a well known animal in the wild. It is commonly seen in Sub-Saharan and West African countries, like Congo, Kenya, Zambia, Tanzanian, Ghana and Nigeria. In Nigeria, several attempts have been made to domesticate this animal in order to reduce the demand of grass cutter among the wild. Grass cutter is known to be economically important as an agricultural pest and its meat is widely accepted by all classes of people (Okpara, 2010). Based on the current trend of domestication of grass cutter that the need to study the normal fecal flora and pathogenic organisms that could portend danger for the farmers. Three grass cutter farms were visited and altogether 63 samples were collected from each farm, 21 samples of adult, weanlings and neonates. Micro-organisms isolated from this study are: Bacillus spp., Staphylococcus spp., Escherichia coli, Corynebacterium spp., Enterobacter spp., Klebsiella spp. and also fungus (Candida spp). The isolation of Bacillus_cerus was significant. The toxin released by this organism poses great danger to human, because they are responsible for food poisoning. 100% occurrence was recorded in case of E. coli for all the three farms and also in all neonates. Various levels of correlations among fecal-flora exist between weanlings and neonates. Comparative study of GIT fecal-flora results indicate that no statistical significance difference (>0.05) between the studied age groups: adults, weanling and neonates, respectively.

Key words: Grass-cutter, pathogenic organisms, normal flora.

INTRODUCTION

The genus Thryonomys is retracted to Sub-Saharan Africa. It occurs through Eastern Africa and into Western Africa in the Courtiers of Cameroon, Sudan, Uganda, Ghana, Zambia, Kenya and Benin. However no records have been collected in West of Zambia Border (Antonanzas et al., 2004; Skinner and Chimimba, 2005). The Grass-cutter is one of the giant rodents of the world known scientifically as Thryonomys swinderianus and belongs to mammalian order Rodentia, Sub-order Hystriomorpha family (Thyroanomydae) (Shrage and Yewadan, 1999). This specie is considered non-aquatic, differing in habit at preference from the semi-aquatic. T. swinderianus individuals have been recorded up of altitudes of 2,6000m (Nowak, 1991). The Grass cutter is a relative of the guinea pig with a tail (Adu et al., 2000a). The Grass-cutter breeds successfully with about 89% conception, 88% deliveries and 90% weaning (Addo et al., 1999).

Grass-cutters are herbivores that feed mainly on grasses, but also feed on nuts, bark, fruits and cultivated crops. It is common for Grass cutter to also feed on groundnuts, sweet potato, cassava, and Maize (Opara, 2010b; Nowak, 1991). Thryonomys species have been domesticated and currently efforts are being made to expand the industry. The advocacies for domestication of Grass-cutter become stronger (Asibey and Addo, 2000). Report show that Grass- cutters accept indoor housing

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with about 90% of animals acclimatizing to domestic housing within three months. The expansion of this of domesticated market may also relieve pressure on wild populations of the Grass-cutter (Fiedler, 19994; Hoffman 2008). As an emerging herbivorous animal, the knowledge regarding the intestinal flora may provide useful informations needed for the formulation and administration of the appropriate probiotics to enhance feed conversion efficiency, thereby increasing productivity of the animals. In Ghana, the gastrointestinal tract of Grass-cutter is considered a delicacy because it is a hand gut digester (Adu and Wallace, 2004) with a large material suspected to be calcium occupying about 60% of the abdominal cavity (Alogninouwa et al., 19992). The aim of the present study is to investigate the normal flora and potential pathogenic bacteria in Grass-cutter given the human health hazard associated with the consumption of raw or undercooked meat obtained from this animal.

Study animals

Study animals from which samples were collected and the Grass cutters used for this research work were all located in Aba south, Aba North and Osisoma- Ngwa Local Government Area of Abia State. Three different categories of fecal samples were located and these are from the neonates, the weanlings and adult Grass cutter.

MATERIALS AND METHODS

Sampling of neonates

The neonate Grass cutters were tactfully removed from the mother and swab sticks already moistened with sterile physiological saline was swabbed via the anus carefully to prevent contamination. The swab stick was placed back into the swab casing and transported to the Veterinary Microbiology Laboratory of Michael Okpara University of Agriculture, Umudike for processing samples of weanling and adult feces.

All the samples of the neonate, weanlings and adults were collected between 8am and 10 am in the morning and the sample was collected over a period of four months from November 10th 2013 to March 10th 2014. The sampling of weanling and adult was carried out by first feeding the Grass cutters on very tender fresh pastures as purgatives (Stoetzler et al., 1998) overnight and manually applying pressure on the lower abdomen of the grass cutter in the morning. To avoid contact with the hand, the use of non disposable gloves was employed. Seven samples each were collected from neonates, weanlings adult, each sample collected were placed in bijou bottle and 5 ml of the sample were transfer to sterile physiological saline, well capped and transported to the laboratory for isolation, culture and identification.

Sample processing

The processing of all the samples collected were carried out using various types of media because of the various range of enteric bacteria that may likely be detected. All agar used for this work was obtained from (Oxoid,UK). Mac-Conkey agar was used to isolate enteric organism, other media included Mannitol salt agar which was used to isolate Staphylococcus spp., nutrient agar for suspected Bacillus spp. species, Blood agar for sub culturing of isolated organism. Mac-Conkey (MAC) agar was used to isolate enteric bacteria. The full biochemical test was carried out using Analytical Profile Index (API), however, partial biochemical test was done using Triple Sugar Iron agar (TSI), Urea agar base, In-dole and motility test. A standard colony counter was used to estimate the viable bacteria organisms.

Statistical analysis

Descriptive statistical procedure was used to determine means and standard errors of intestinal micro floral populations for the neonates, weanlings and adult Grass cutter. However, for normality and homogeneity of micro flora populations, the parametric statistical procedure was used for the various analyses. The differences between populations of different micro flora groups were determined using one way Analysis of Variance (ANOVA) while correlation was used to evaluate micro flora population dynamics among different micro flora groups for all Grass cutters.

RESULTS

Total viable counts

The total viable mean counts were $10^{10.15}$, $10^{10.25}$ and $10^{9.80}$ for neonates, weanlings and adult respectively. There was no significant difference between the total viable count of neonates, weanlings and adults (P > 0.05).

The total viable count (TVC) of the weanlings was significantly different (P < 0.05) from the total viable count of neonates.

Discussion

From the results as obtained presented in the Table 1, a total of 63 fecal samples was collected for inoculation,
isolation and identification, hence equal number of sample was collected from the three farm visited.

Good seed farm presented the highest Grass-cutter in the farm, while Goodluck farm had the least. Also the adult Grass-cutter had a total of 168 while the neonate was the least 49.

From the result obtained in Table 1, a total of 63 fecal sample was collected for inoculation isolation and identification, hence equal number of sample was collected from the three farm visited.

However, Table 2, shows the micro organisms that were isolated from the grass cutter. There are Staphylococcus specie, Bacillus specie, Klebsiella species, Candida specie, Escherichia coli, Enterobacter specie and Corynebacteria. Salmonella which is a very important organism in the Enterobactericeae was not present in the isolate. From the table there was 100% Escherichia coli isolates which was isolated from all the three groups of Grass cutter. Similar findings were reported by Mitsuoka (1992). The micro flora isolated from the three groups of Grass cutter here under study was supported by similar study by Xing et al. (2004), the proliferation of Candida species as obtained in this study in adult and weanlings was in agreement with the findings of Tannock (1994).

The staphylococcus species in the three groups of Grass cutter studied, it did not shown any significance different.

This is an indication that the lack of significance different implies that the Staphylococcus species could have been acquired via skin micro flora. This is because the Grass-cutter is known for scratching or grooming the skin with the claws and nails.

This study shows that apart from the Enterobactericeae, Bacillus species was also isolated. This is of great interest because bacillus organisms are responsible for causing food poisoning especially Bacillus cereus, since Grass cutters are delicacy in our country and is consumed by many, the need to be cautious why consuming Grass a cutter arises. The isolated bacillus species is quite unusual because previous study did not indicate this.

A correlation exists between the total viable count of micro flora and the Enterobactericeae family. Also, there is an exists correlation between Staphylococcus and Bacillus which were seen to be significant (P < 0.05). The correlation between the two organisms was not positive (Table 3). The possible explanation for this aspect could be that, one group of the organism utilizes nutritive substance that could prevent the growth of the other.

The correlation between the total viable count of micro flora and the Enterobactericeae and between Staphylococcus and Bacillus were significance (P < 0.05).

<table>
<thead>
<tr>
<th>Farms</th>
<th>Adult</th>
<th>Weanling</th>
<th>Neonate</th>
<th>Number Sampled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good Seed integrated Farms</td>
<td>62</td>
<td>26</td>
<td>18</td>
<td>21</td>
</tr>
<tr>
<td>Ikoratex Farms</td>
<td>48</td>
<td>19</td>
<td>16</td>
<td>21</td>
</tr>
<tr>
<td>Goodluck Mixed Farms</td>
<td>58</td>
<td>29</td>
<td>15</td>
<td>21</td>
</tr>
<tr>
<td>Total</td>
<td>168</td>
<td>74</td>
<td>49</td>
<td>63</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Farms</th>
<th>Adult</th>
<th>Weanlings</th>
<th>Neopanates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goodseed Integrated</td>
<td>Staphylococcus</td>
<td>Enterobacter</td>
<td>E.coli,</td>
</tr>
<tr>
<td></td>
<td>spp</td>
<td>spp.</td>
<td>Klebsiella</td>
</tr>
<tr>
<td></td>
<td>Bacillus spp.</td>
<td>E. coli</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Candida spp.</td>
<td>Klebsiella spp.</td>
<td></td>
</tr>
<tr>
<td>Ikoratex</td>
<td>Klebsiella spp.</td>
<td>E. coli</td>
<td>E. coli</td>
</tr>
<tr>
<td></td>
<td>E. coli,</td>
<td>E. coli,</td>
<td>Bacillus</td>
</tr>
<tr>
<td>Goodluck</td>
<td>E. coli, Candida</td>
<td>Enterobacter</td>
<td>E. coli</td>
</tr>
<tr>
<td></td>
<td>spp.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>Total viable count</th>
<th>Candida Spp.</th>
<th>Staphylococcus Spp.</th>
<th>Enterobacteriaceae</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adults 5</td>
<td>11.05+0.05xy</td>
<td>10.55+0.14x</td>
<td>10.25+0.15y</td>
<td>10.20+xy</td>
</tr>
<tr>
<td>Weanlings 5</td>
<td>11.10+0.08y</td>
<td>10.35+0.08y</td>
<td>10.10+0.20y</td>
<td>10.45+0.18x</td>
</tr>
<tr>
<td>Neonates 5</td>
<td>10.10+0.16x</td>
<td>10.40+0.10x</td>
<td>10.05+0.18x</td>
<td>10.15+0.14y</td>
</tr>
</tbody>
</table>

Means with similar subscript are (P > 0.05).
The studies also show that one or more of the specific microorganism of enteric bacteria was present at specific ages at the categories of the Grass cutter.

This is in agreement with the findings Li Jianwen et al. (2004). This was demonstrated from Table 2. Escherichia coli was present specifically for the neonate of all three farms visit while Enterobacter was present specifically in the weanlings. It is possible to isolate several other micro organisms from Grass-cutter; however, this study has some limitation as non-availability of some material that would be needed for further study could not be accessed. The use of fecal sample for this research is justifiable as it has shown that single stomach host, freshly passed feces collected under strict conduction give very good result even higher than if the gastrointestinal tract (GIT) were used and this is in agreement with Williams et al. (1997). It should be recalled that the three categories of grass cutters from which samples were collected were devoid of any antibiotic treatment 1 week before sample collection and were observed to be disease free.

Conclusion

This study showed that Bacillus species which is not a member of the Enterobacteriaceae family was isolated and this could portent danger to human that consume the meat without adequate cooking, since the organism is the cause of food poisoning in human (B. cereus), the findings of this study will give the Veterinary clinician a better understanding of the carrier state that could be found in Grass- cutters and possible ways to avoid fecal contamination of meat.

REFERENCES


Shrage R, Yewudan L (1999). Raising Grass-cutter, Deutsche Gessellschaft fur Technische Zusammenarbeit (GTZ) GMDH.


