Epidemiological, Clinical and Bacteriological Studies on Bacterial Lamb Enteritis at Behera Province, Egypt

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Key words: Bacterial, Lamb Enteritis

ABSTRACT: Lamb enteritis is economically important problem because several agents may be involved in the etiology of it. This study was conducted to throw light on bacterial enteritis in some sheep flocks in Behera province. From 1200 examined lambs, 650 showed enteritis (54.16 %). Enteritis rate were higher in closed system (83.70 %) than in open system (46.80 %). Mortality rate was (4.16 %) and case fatality was (7.69 %). Bacteriological examination of fecal samples revealed that 190 lambs (29 %) were positive for pathogenic bacterial culture and 460 lambs (71 %) were negative. The isolated bacteria were E. coli pathogenic form from 65 cases (34.20 %) which was the most predominant bacterial isolate. Other bacteria isolated were salmonella from 10 cases (5.26 %), clostridia isolated from 15 cases (7.89 %), proteus species isolated from 25 cases (13.10 %), shigella isolated from 20 cases (10.52 %), klebsiella isolated from 15 cases (7.89 %) and mixed infection was reported in 40 cases (21 %). Serotyping of E coli revealed that O55/K50 (B5) (2 isolates), while O78/K80 (B-), O125/K70 (B15), O101/K99 and O22/K11 (L) and each of them (1 isolates), while the untypable isolates was (4 isolates). Salmonella typing revealed that S. typhimurium serotype B (2 isolates), S. enteritidis serotype D1 (1 isolate) and the un typable salmonella isolates (2 isolates). The antimicrobials susceptibility of isolated bacteria was done to determine its susceptibility.

1. INTRODUCTION

Diarrhea is an important problem in young domestic animals although its etiology is not well understood since several agents may be involved concurrently. Moreover, many of these agents are capable of infecting the host without inducing the clinical illness (Smith and Sherman 1994). In lambs and goat kids, rotavirus, enterotoxigenic Escherichia coli (ETEC) and Cryptosporidium parvum are considered among the most prevalent organisms associated with diarrhoea (Nagy et al., 1983, Ramisse et al., 1979 and Fassi-Fehri et al., 1988). Clostridium perfringens and Salmonella species are also thought to play an important role (Nagy et al., 1987), but few cases in which any of these pathogens were involved have been reported. Other agents, such as enteroviruses, astroviruses, coronaviruses or E. coli bearing virulence attributes different from those typical of ETEC (verotoxigenic, F1 7+ or attaching effacing E. coli), have been found in diarrheic and healthy lambs and goat kids but the pathogenic significance for these species is unknown (Snodgrass et al., 1980, Adesiyun et al. 1994, Beutin et al., 1993 and Drolet et al., 1994).

Acute infectious diarrhea encountered in a herd is often difficult to manage because of the large number of potential enteropathogens involved, differences in individual animal immunity within the herd, population dynamics, environmental stresses, nutritional status, and difficulty in establishing an etiologic diagnosis (Javed et al., 2012). The etiologic diagnosis is not determined for a large percentage of cases of neonatal diarrheas. Diarrhea can be attributed to infection with a single agent (in very young or stressed animals) or more commonly to multiple agents. Its severity depends partially on non-infective contributing factors and on the nature of involved organism (Ahsani et al., 2011). The most important being is certain strain of Escherichia coli that possessing virulent factors and also other members of Enterobacteriaceae. These pathogens are responsible for great mortality and various morbidity changes and at the same time constitute a hazard to public health (Orden et al., 2000).

The objectives of this study were to investigate clinical and epidemiological patterns of lamb enteritis in some flocks in Behera provinces and to isolate and typing the bacteria associated with diarrhea in lambs with special references to pathogenic E.coli and Salmonella.
2. MATERIAL AND METHODS

Table 1: Distribution of Lambs among different localities.

<table>
<thead>
<tr>
<th>Locality</th>
<th>No. of examined lambs</th>
<th>No. of diarrhotic lambs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open flocks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Abu homous</td>
<td>314</td>
<td>100</td>
</tr>
<tr>
<td>- Abu-Elmatamear</td>
<td>377</td>
<td>200</td>
</tr>
<tr>
<td>- Etay El-Baroud</td>
<td>165</td>
<td>100</td>
</tr>
<tr>
<td>- Damanhour</td>
<td>105</td>
<td>50</td>
</tr>
<tr>
<td>Closed flocks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Al-Nobaria</td>
<td>239</td>
<td>200</td>
</tr>
<tr>
<td>Total</td>
<td>1200</td>
<td>650</td>
</tr>
</tbody>
</table>

2.1. Animals:
This study was carried out on 1200 lambs (one day to 6 months) from different localities, 650 of them were suffering from enteritis (tab. 1).
The lambs in open system were in mobile flocks graze along the day. Lambs in closed flocks were kept in properly ventilated pens at night and during day they were kept in wide yard with hygienic condition and good plans nutrition.

2.2. Clinical examination:
All animals were subjected to thorough clinical examination including general health condition and body temperature, pulse, respiration, character of mucous membranes, auscultation of chest and abdomen and characters of the diarrhea according to (Kelly, 1984).
Fecal samples:
Rectal swabs were taken from diarrhoeic (lambs) by means of sterile cotton swabs and transported to laboratory as soon as possible in sterile nutrient broth that incubated at 37 °C for at least 4-8 hours to increasing chances of isolation.

2.3. Tissues samples:
Samples from liver, kidney, heart, spleen and intestine were collected from infected obligatory slaughtered or freshly dead animals. All samples were collected, labeled and transported with minimum of delay in ice box to the laboratory of Department of Bacteriology, Animal Health Research Institute-Damanhur.

2.4. Bacteriological examination:
The samples (rectal swabs or tissue organs) from lambs were cultivated aerobically and anaerobically and bacterial isolates were subjected to characterization by studying their morphological, cultural, and biochemical characteristics as well as their motility according to (Quinn et al., 2002).

2.5. Serological identification of E. coli isolates:
In these studies, the E. coli isolates were confirmed biochemically to be E. coli and subjected to serological identification by using poly-specific and mono-specific antisera according to Ewing (1986), using slide agglutination test using somatic (O) antisera with heat inactivated bacteria.

2.6. Anti-biogram test:
The sensitivity of isolated bacteria to different antibiotics was carried-out using the disc diffusion technique according to (Lennette et al., 1980).

3. RESULTS

3.1. Prevalence of enteritis among lambs:
As shown in Table (2) from 1200 examined lambs 650 showed enteritis (54.16 %). The highest prevalence was (83.70 %) in Al-Nobaria followed by (60.6 %) in Etay-Elbaroud, followed by (53 %) in Abu-El-Matamear, followed by (47.62 %) in Damanhur. While, the lowest percentage was observed in Abu-Homous (31.85 %). In comparison between open and closed system of breeding, enteritis rate were higher in closed system (83.70 %) than in open system (46.80 %).

3.2. Morbidity, mortality and case fatality rates of enteritis in lambs:
As shown in Table 3 out of 1200 lambs examined 50 dead or slaughtered emergency due to rapid course or failure of treatment. Total mortality rate was (4.16 %) and case fatality was (7.69 %), the highest mortality rate was observed in Al nobaria (closed system) (10.88 %) followed by Abu-Homous (open system) (4.14 %), followed by Abu-El-Matamear (2.92 %) and highest case fatality rate were recorded in Al-Nobaria and AbuHomos (13 %) followed by Abu-El-matamear (5.50 %).
Table 2: Prevalence of enteritis among lambs.

<table>
<thead>
<tr>
<th>Locality</th>
<th>No. of examined lambs</th>
<th>No. of cases of enteritis</th>
<th>% of enteritis cases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Live</td>
<td>Dead</td>
</tr>
<tr>
<td><strong>Open flocks</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abu homous</td>
<td>314</td>
<td>87</td>
<td>13</td>
</tr>
<tr>
<td>Abu-Elmatamear</td>
<td>377</td>
<td>189</td>
<td>11</td>
</tr>
<tr>
<td>Etay El-Baroud</td>
<td>165</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>Damanhour</td>
<td>105</td>
<td>50</td>
<td>-</td>
</tr>
<tr>
<td><strong>Closed flocks</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Al-Nobaria</td>
<td>239</td>
<td>174</td>
<td>26</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1200</td>
<td>650</td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Morbidity, mortality and case fatality rates in lambs with enteritis.

<table>
<thead>
<tr>
<th>Locality</th>
<th>No. of examined lambs</th>
<th>Diseased lambs</th>
<th>Mortality rate</th>
<th>Case fatality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>%</td>
<td>No</td>
</tr>
<tr>
<td><strong>Open flocks</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abu homous</td>
<td>314</td>
<td>100</td>
<td>31.85</td>
<td>13</td>
</tr>
<tr>
<td>Abu-Elmatamear</td>
<td>377</td>
<td>200</td>
<td>53</td>
<td>11</td>
</tr>
<tr>
<td>Etay El-Baroud</td>
<td>165</td>
<td>100</td>
<td>60.60</td>
<td>-</td>
</tr>
<tr>
<td>Damanhour</td>
<td>105</td>
<td>50</td>
<td>47.62</td>
<td>-</td>
</tr>
<tr>
<td><strong>Closed flocks</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Al-Nobaria</td>
<td>239</td>
<td>200</td>
<td>83.70</td>
<td>26</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1200</td>
<td>650</td>
<td>54.16</td>
<td>50</td>
</tr>
</tbody>
</table>

3.3. Clinical features observed in diarrheic lambs:

Clinical examination of lambs showed that, presence of diarrhea which characterized by yellowish to greenish coloration, and may by bloody diarrhea, profuse watery diarrhea with bad odor and fibrinous casts, Toxemia or septicemia with fever 41°C, dehydration occur leading to death. In dead lambs: (Postmortem) showed that, dehydration carcass characterized by intestine contain numerous small hemorrhages, ulcers and congestion with mild atrophy of villi of intestine.

3.4. Prevalence of pathogenic bacteria associated enteritis in lambs:

Bacterial culture of fecal swabs from enteritis suffering lambs was done and it was found that 190 lambs (29 %) were positive for pathogenic bacterial culture and 460 lamb (71 %) were negative. In open rearing system 130) lamb (29 %) were positive distributed as, 25 lamb (25 %) in Abu-Homous , 50 lamb (25 %) in Abu-Elmatamear , 40 lamb (40 %) in Etay-El-Baroud, 15 lamb (30 %) in Damanhour. In closed rearing system 60 lamb were positive (30 %)for pathogenic bacterial culture, this is in Al-Nobaria.

Table 4: Prevalence of pathogenic bacteria associated enteritis in lambs.

<table>
<thead>
<tr>
<th>Locality</th>
<th>No. of examined lambs</th>
<th>+ve pathogenic bacterial culture</th>
<th>-ve pathogenic bacterial culture</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td><strong>Open flocks</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abu homous</td>
<td>100</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Abu-Elmatamear</td>
<td>200</td>
<td>50</td>
<td>25</td>
</tr>
<tr>
<td>Etay El-Baroud</td>
<td>100</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Damanhour</td>
<td>50</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td><strong>Closed flocks</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Al-Nobaria</td>
<td>200</td>
<td>60</td>
<td>30</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>650</td>
<td>190</td>
<td>29</td>
</tr>
</tbody>
</table>
Table 5: Bacteria isolated from cases of enteritis in lambs.

<table>
<thead>
<tr>
<th>Bacteria isolated</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>E. coli</td>
<td>65</td>
<td>34.20</td>
</tr>
<tr>
<td>Salmonella</td>
<td>10</td>
<td>5.26</td>
</tr>
<tr>
<td>Clostridia</td>
<td>15</td>
<td>7.89</td>
</tr>
<tr>
<td>Proteus</td>
<td>25</td>
<td>13.10</td>
</tr>
<tr>
<td>Shigella</td>
<td>20</td>
<td>10.52</td>
</tr>
<tr>
<td>Klebsiella</td>
<td>15</td>
<td>7.89</td>
</tr>
<tr>
<td>Mixed infection</td>
<td>40</td>
<td>21</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>190</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

3.5. Bacteria isolated from cases of enteritis in lambs:

Table 5 showed that the bacteriological examination of 190 fecal swabs samples and tissue samples showed; isolation of E. coli from 65 cases (34.20 %) which was the most predominant bacterial isolate, then salmonella from 10 cases (5.26 %), clostridia isolated from 15 cases (7.89 %), proteus isolated from 25 cases (13.10 %), shigella isolated from 20 cases (10.52 %), klebsiella isolated from 15 cases (7.89 %) and mixed infection was reported in 40 cases (21 %) (Tab. 5).

3.6. Bacteria isolated from postmortem tissue samples:

Table 6 shows the bacteria isolated from tissue samples from 50 freshly dead and obligatory slaughtered lambs were examined postmortem and 50 liver sample showed 18 sample (+ve) for bacteria culture where the bacteria isolated were E. coli (8 isolates), Salmonella (5 isolates), clostridia (4 isolates), 50 lung sample showed 11 samples +ve for bacterial culture where the bacteria isolated were E. coli (4 isolates) and proteus (2 isolates), Salmonella (3 isolates) + Klebsiella (2 isolates).

Intestinal samples showed 32 sample +ve for bacterial culture where the bacteria isolated were E. coli (10 isolates), salmonella (3 isolates), colestridia (8 isolates), proteus (3 isolates), klebsiela (3 isolates) and shigella (5 isolates). From 50 kidney samples there is 13 samples +ve for bacterial culture where the bacteria isolated were clostridia (4 isolates), E. coli (5 isolates), proteus (2 isolates) and shigella (2 isolates). 50 spleen samples showed 14 samples +ve for bacterial culture where the bacteria isolated were salmonella (3 isolates), clostridia (4 isolates), E. coli (4 isolates) and shigella (3 isolates). Also, 50 eart samples showed 8 samples +ve for bacterial culture where the bacteria isolated were salmonella (3 isolates), E. coli (2 isolates), Klebsiella (2 isolates) and Shigella (2 isolates).

Table 6: Bacteria isolated from postmortem tissue samples:

<table>
<thead>
<tr>
<th>Tissue</th>
<th>Number of diarrheic lambs</th>
<th>Bacterial isolates</th>
<th>E. coli</th>
<th>Salmonella</th>
<th>Clostridia</th>
<th>Proteus</th>
<th>Klebsiella</th>
<th>Shigella</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liver</td>
<td>50</td>
<td></td>
<td>9</td>
<td>5</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lung</td>
<td>50</td>
<td></td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spleen</td>
<td>50</td>
<td></td>
<td>4</td>
<td>3</td>
<td>4</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Heart</td>
<td>50</td>
<td></td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Kidney</td>
<td>50</td>
<td></td>
<td>5</td>
<td>4</td>
<td>2</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Intestine</td>
<td>50</td>
<td></td>
<td>10</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>
3.8. Serotyping of E. coli isolated from cases of diarrhea in lambs:
Ten random E. coli isolated were sent for clinical miceobiology units in Animal Health Research Institute, Dokki- Giza to be serotyped, the serotypes found were. O55/K50 (B5) (2 isolates), while O78/K80 (B-), O125/K70 (B15), O101/K99 and O22/K11 (L) and each of them (1 isolates), while the untypable isolates was (4 isolates).

3.9. Serotyping of salmonella isolates from cases of diarrhea in lambs:
Five random salmonella isolates were sent for serotyping in clinical microbiology unit in Animal Health Research Institute, Dokki- Giza. S. typhimurium serotype B (2 isolates), S. enteritidis serotype D1 (1 isolate) and the untypable salmonella isolates (2 isolates).

4. DISCUSSION
Diarrhea is an important problem in young domestic animals although its etiology is not well understood since several agents may be involved concurrently. Moreover, many of these agents are capable of infecting the host without inducing the clinical illness (Smith and Sherman 1994; Akeila et al., 2013).1200 lambs of (1-6 months old) were examined clinically in the field for investigation of the animals which suffered from signs of enteritis manifested by diarrhea that was profuse and watery in some cases, in others it was pasty white or yellowish and rancid and fecal material was accumulated on the tail and hind limbs. The lambs were suffered from fever associated with dullness, anorexia, dehydration and acidosis, mildly affected lambs were recovered spontaneously, untreated severely affected lambs were died within few days. Similar signs were described by Radostits et al. (1995), Jensen and swift (1982) Schoning and Sagartz (1995).

At Al Nubaria farm, there were cases of sudden deaths in lambs, abdominal pain, bloody diarrhea and recumbancy suspecting lamb dysentery outbreak. The same symptoms was described before by Gkiourtzidis et al (2001) and Grazia et al (2005).Table 1 shows the prevalence of enteritis in lambs which was 54.16% The highest prevalence was observed in Al_Nobaria (83.7%) where sheep were raised in closed farm system. In open system the prevalence rates ranged from 31.85% to 60.6%. The higher prevalence was described before by Andres et al (2007), wobart reported that the organization of lambing periods, the cleaning of lambing areas and the accumulation of lambs in the pens seem to be predisposing causes to neonatal diarrhea in this area. Continuous breeding in a flock means lambing during all the year and the unbroken permanence of lambs in the pens, hampering cleaning and resulting in the coexistence of lambs of different ages. This permits the accumulation of pathogens and a progressive recharge of the fecal-oral cycle (Coop and Wrigth, 2000) and the poor hygiene, together with the accumulation of lambs in the pens (more than 2 lambs/m2), contributes to the contamination of the area and the spreading of the disease (Radostits et al., 1999 and Causape et al., 2002).

The lamb enteritis rate was independent of the flock size which is similar to the results recorded by

<table>
<thead>
<tr>
<th>Bacteria isolates</th>
<th>Gentamycin</th>
<th>Cefotaxime</th>
<th>Amoxicillin</th>
<th>Tetracycline</th>
<th>Chloramphenicol</th>
<th>Enroflox</th>
<th>Marbofloxacin</th>
<th>Neomycin</th>
<th>Streptomycin</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A-E. coli</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O78/K80</td>
<td>++</td>
<td>++</td>
<td>-</td>
<td>-</td>
<td>+++</td>
<td>++</td>
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<td>O125/K70</td>
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<td>O101/K99</td>
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<tr>
<td>O55/K50</td>
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</tr>
<tr>
<td>O22/K11</td>
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<td>-</td>
<td>+</td>
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<td>+++</td>
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<td>+++</td>
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<td>+</td>
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<tr>
<td><strong>B-Salmonella</strong></td>
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<td></td>
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<td></td>
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</tr>
<tr>
<td>S. typhimurium</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+++</td>
<td>++</td>
<td>++</td>
<td>-</td>
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<tr>
<td>S. enteritidis</td>
<td>+</td>
<td>++</td>
<td>-</td>
<td>-</td>
<td>+++</td>
<td>+</td>
<td>++</td>
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<tr>
<td><strong>C-Proteus</strong></td>
<td></td>
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<tr>
<td><strong>D-Shigella</strong></td>
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<td></td>
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<tr>
<td><strong>E-Klebsiella</strong></td>
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</tbody>
</table>

(--) Resistant (++) Low sensitive (+++) moderately sensitive (++++) Highly sensitive

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**Table 7: Antimicrobial sensitivity testing of bacteria isolated from diarrheic lambs.**
Andres et al (2007) in contrast to the finding of Causape et al. (2002), who recorded a higher risk of infection in larger flocks. Table 3 showed that, Morbidity, mortality and case fatality rates studied on (1200) diarrheic lambs. The morbidity rate was 54.16%, mortality rate was 4.16 and fatality rate was 7.69% Similar results were reported by Schoning and Sagartzte (1995), who found that enteritis was responsible for mortality of 5.11% of 8-28 days old lambs while Jensen and swift (1982) recorded that the mortality rate varied from 15-75% in affected animals.

Table 4 showed that, 190 fecal swabs from 190 diarrheic lambs give positive bacterial isolation (29%) while 460 samples were negative (71%). Lower percentages of negative samples were recorded by Munoz et al (1996) who found that enteric pathogens were not found (8-7%) and (20%) outbreaks of diarrhea in lambs and goat kids, respectively. This is attributed to the fact that enteritis in lambs is multifactorial and protozoa like cryptosporidium, virus like rotavirus and helminthes (Bentounsi et al 2012), this may be attributed in causing diarrhea in addition to the nutritional causes of diarrhea.

Table 5 showed bacterial isolates from fecal samples collected from diarrheic lambs. The bacteriological examination from lambs showing diarrhea revealed that Escherichia coli was present in (65) samples (34.20%), Salmonella in 10 samples (5.26%), clostridia in 15 samples (7.89%), proteus in 25 samples (13.10%), klebsiella from 15 samples (7.89%) shigella from 20 samples (10.52%) while 40 samples were mixed infections. Nearly similar bacteria were isolated by Ahmed et al. (2010) from fecal samples from diarrheic lambs who isolated E. coli (36.8%), Salmonella (15.8%), Klebsiella (13.16%), Aracanobacterium pyogenes (9.65%). Other isolated bacteria was staphylococcus aureus (8.77%), shegella (7%), proteus vulgaris (5.3%) and streptococcus species (3.15%). E. coli was the most common bacteria isolated from sheep with enteritis as it was isolated from 36 cases (20.6). Similar results were recorded by Ansari et al. (1978), who found that ETEC were isolated from 10 out 23 diarrheic lambs at a rate of 43.4% and Holland (1990), who reported that among the bacterial causes of diarrhea in sheep, E. coli and Salmonella spp. are the most common. Also Sharif et al. (2005) concluded that the main cause of neonatal mortality in lambs was diarrhea. E. coli were the most frequent bacterial species identified as a cause of neonatal diarrhea in lambs. Schoning and sagartz (1995) found that E.coli was the only etiological agent found in lambs of this age that died from enteric diseases.

The prevalence of E. coli from lambs in this study was in disagreement with reports of survey conducted in other countries. E. coli was isolated from 4% of ewes and lambs in the Netherlands (Heuvelink et al. 1998), 1.4 of sheep with monthly variation of zero to 4.8% in UK (Chapman et al. 1997). However, a prevalence of 84% was reported by Metasebia et al. (2013) in Etheupia. In this study salmonella was isolated from (10) cases at a percentage of (5.26%). Many previous works isolated salmonella from diarrheic lambs (Meshrham, et al., 2009). Ahmed et al. (2010) isolated it from 15% of cases of lamb diarrhea. The lower percentages of isolation of salmonella may be because multiple fecal samples are required for higher rates of isolation (Duijkeren et al., 1995) and also because salmonella cause diarrhea in older lambs and newborn lambs die suddenly without diarrhea (Ahmed et al., 2010).

Salmonella types isolated from lambs were S. typhimurium serotype B (2 isolates), S. enteritidis serotype D1 (1 isolate) and the untypable salmonella isolates (2 isolates). This results supported by Molla et al. (2004) found that of the 22 Salmonella isolates from sheep and goats the common serovars isolated were S. typhimurium, followed by S. heidelberg, S. reading, S. give, and S. poona. Proteus species were isolated from 25 cases and Klebsiella from 15 cases. This results support the observation of Mottelib et al. (1992), Ahmed et al., (2010) who suggested that klebsiella spp. and proteus spp. appeared to play a major role as causative agent of diarrhea in young lambs. Shigella sp. Was isolated from 20 cases (10.52%) this agree with results of Pospischily et al (1987) who isolated Shigella sp. from the intestines, mesenteric lymph nodes, livers, and spleens of calves suffering from diarrhea. Clostridia species was isolated from 15 cases at AlNubaria farm which is closed farm which has concentrated ration and overcrowded number of animals which predispose the animals for development of clostridial enterotoximia. This is supported by (Aschfalk et al (2002) who mentioned that enterotoximia in sheep not only depends on presence of the bacteria or their toxin but other factors that alter the balance in the intestine after sudden shift to food rich in protein or carbohydrate. This creates optimal condition for growth of clostridium and production of the toxin. In similar study Mounz et al (1996) found that C. perfringens have important role in diarrhea in goats, being detected as a single agent in a 11% of the diarrheic goat kids. Because all types of C. perfringens can be normal inhabitants of the intestine of most animals, the mere culture of this microorganism from intestinal contents of animals is not diagnostic.
for enterotoxemia. Quantitation of C. perfringens in intestinal content is believed by some authors to be an indicator of disease occurrence in animals (Dart, 1988, Uzal et al 2004). Further detection of the toxin is required for conformation of pathogenesis. From standpoint of pathogenic mechanisms four major categories of E. coli recognized are enterotoxigenic E. coli (ETEC), enteropathogenic E. coli (EPEC), enteroinvasive E. coli (EIEC) and enterohemorrhagic E. coli (EHEC), which are represented by different serotypes based on O (cell-wall lipopolysaccharide), H (flagellar protein) and K (capsular polysaccharide or envelope) antigens (Collee et al., 1996).

In this study, 10 random E coli isolates were serotypes and the O22, O55, O78, O101 and O125, Aerotypes were detected In this study Serogroup O78/K80 was isolated . This Serogroup O78 was isolated from hemorrhagic gastrointestinal outbreak in sheep in India (Sharma et al., 2003). In previous study, Wani et al (2004) isolated the serogroups O8, O20, O21, O25, O26, O30, O39, O43, O45, O69, O75, O76, O82, O102, O104, O107, O113, O120, O127, O132, O139, O141, O143, O153 and O157 from diarrheic lambs, while Cid et al. (2001) isolated attaching and effacing E. coli belonging to serogroups O2, O4, O26, O80 and O91 from diarrheic lambs. None of these serogroups, isolated in the present study belonged to these STEC serogroups. This may be due to different locality of each study which differs from Egypt. The pathogenic significance of these serogroups in lamb diarrhea is to be established as serogrouping of E. coli isolates though useful is not known in Egypt. The information about the serotyping of E. coli in sheep is scanty. In other study, the serotypes O22, O55, O101 which was isolated in this study were isolated by Bhat et al (2008) from healthy non diarrheic lambs. They detected stx1 and stx2 toxin gene in O55 serogroupe E. coli, salmonella and some pathogenic bacteria are part of the intestinal microbiota in sheep and colonize the neonatal gut soon after birth. The categories of such pathogen are divided into two major groups; the diarrheogenic and the extraintestinal pathogen.). Septicemic pathogen), those strains are able to invade the blood stream, most probably after crossing the intestinal wall, and to localise in the internal organs (Cecilie et al 2013).

In this study Postmortem samples were collected from recently died and emergency slaughtered lambs due to diarrhea and cultured bacteriologically. As shown in tab. 7, E coli could be isolated from liver, lung, spleen, heart, kidney and intestine while Salmonella was isolated from same organs except kidney and clostridia were isolated from liver, spleen, kidney and intestine. Also, proteus, klebsella and Shigella were isolated from different organs. In similar studies Bacteriology confirmed the colonization of the intestine by the challenge strains which were also recovered from the heart blood, the lungs and/or the liver (Sigrid et al 2001). Also E. coli O128:H2 isolated from lungs, liver, spleen and intestine in a percent of 40%, 70%,80 and100% respectively. While E. coli O146:H8 isolated in a percent of 20%, 50%, and 80% and100% respectively. E. coli O157:H7 isolated in a percent of 40%, 80%, 80% and100% respectively (Abdulaziz et al, 2012).

The antibiogram of isolated bacteria show that most E. coli isolates isolates were highly sensitive to chloramphenicol, marbofloxacin, enrofloxacin, gentamycin, and sulfa trimethoprim But most of them were resistant to streptomycin, neomycin, tetracycline and amoxicillin (that are most generally used antibiotics in Egypt) Salmonella species, proteus, klebsella and shigella were highly sensitive to chloramphenicol and marbofloxacin. In similar studies All isolates of E. coli serovars isolated from lamb diarrhea were highly sensitive to Ampicillin, ciprofloxacin, ofloxacin and tobramycin (100% each) On the contrary all isolates were resistant to erythromycin (Abdulaziz et al., 2012).

Jorge Blanco et al. (1994) Isolated E. coli from diarrheic lamb and found that the highest percentages of antibiotic resistance were reached in the group of antibiotics (tetracycline, streptomycin, sulphadiazine, ampicillin, kanamycin, neomycin, chloramphenicol, trimethoprим and cotrimoxazole). Molla et al. (2004) reported that Salmonella typhimurium isolated from sheep and goats is multidrug resistance strain to antimicrobial drugs commonly used to treat bacterial infections in animals

In conclusion, lamb diarrhea is economically important health problem in sheep in behera which causes high mortality and morbidity. The bacterial causes of lamb diarrhea is multiple with E coli being the most important bacterial pathogen associated with lamb diarrhea. The distribution of the E. coli isolates in to different serotypes indicates the diverse nature of the organism. Therefore, further detailed study should be carried out to understand the role of E. coli in lamb diarrhea and identify the virulent strains involved. The antibiogram of pathogens could be variable from place to place and from case to another. This may be explained by the wide use of chemotherapeutic drugs and the variation in its use which may produce new resistant mutants.
REFERENCES


