Retained foetal membranes in cattle: Relationship between bacterial isolates, blood picture and systemic involvement

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ABSTRACT

Cows with retained foetal membranes (RFM) on day 3 or 4 after calving were used. From each cow, blood samples for haematology were taken, the case of removal of the RFMs, the appetite and the cow's temperature were recorded. RFMs (35) yielded bacterial organisms, mainly gram-negative organisms (20/35) either in pure culture or in mixed cultures. Staphylococci and C. pyogenes were the main gram-positive bacteria isolated. The bacterial isolates were not related to the appetite, temperature, ease of removal of the RFMs or the haematological picture of the animals. Thirteen cows with RFMs had reduced appetite and 9 cows had temperature of above 39.5°C. The RFMs were easy to remove in 23 cows (60.5%) and the ease of removal was related (P<0.05) to white cell count (WCC). The WCC and eosinophils were lower (P<0.05) in cows with RFMs than in normal cows. About 17% of the cows with RFMs had systemic involvement.

Retention of foetal membranes (RFMs) is a common postpartum complication in the bovine and results in great economic loss to dairy industry unless treated in time. Several methods have been suggested for the treatment.

This study was carried out in an area where the retained foetal membranes are usually removed on days 3 or 4 after calving. Removal of the RFMs is followed by either intrauterine (IU) antibiotic treatment or both IU and systemic antibiotic treatments if the cow had systemic involvement. This study investigated the factors which might be related with the ease of removal of the RFMs and development of systemic involvement in dairy cows with RFMs.

MATERIALS AND METHODS

The 41 cows used were reported on various days to the Ambulatory Clinic in the Department of Clinical Studies, University of Nairobi as having RFMs 3 or 4 days after calving. Gross examination of the animals was done, and temperature, appetite, demeanour, respiratory and heart rates were recorded. Although some cows were depressed, inappetant and with elevated body temperature; physical examination revealed no reason other than the RFMs. From each cow blood samples for haematology were collected into EDTA bottles from the coccygeal blood vessels. After washing the perineum and vulva area with clean water containing a disinfectant (10% w/v cetrimide) and drying it with paper towels the RFMs were carefully removed. The removal of the RFMs was classified either as easy to detach or difficult to detach depending on how facile they were detached from the placental attachments. The removed RFMs were taken to the laboratory for bacterial isolation. After removal of the RFMs intrauterine (IU) penicillin (1 million units) or tetracycline boluses (3 g) were
administered. In cows with systemic involvement, IU treatment was followed by parenteral administration of the same antibiotic.

Ten dairy cows which had calved normally and expelled the foetal membranes spontaneously were used as control. They were examined on day 3 or 4 after calving. From each cow uterine swabs for bacterial isolation and EDTA blood samples for haematology were collected.1 The uterine swabs were collected using guarded sterile uterine swabs according to the method described by Stephens et al. (1986).

Bacterial isolation was done according to the methods described by Agumbah et al. (1983) and haematological analysis was done according to the standard methods (Jain 1986). Statistical analysis of the data was carried out using the statistical analysis software package STATISTIX (Analytical Software, St. Paul, MN, USA, 1989).

RESULTS AND DISCUSSION

The relationships between the appetite, temperature, bacterial isolate, ease of removal of the RFMs and haematological parameters are given in Table 1. Table 2 gives the haematology of the cows with or without RFMs. Streptococcus and E. coli were isolated from 3 uterine samples of the control cows. After calving the vaginal flora may invade the uterus through the open cervix (Laing 1961). Most of these bacteria that invade the uterus from the vaginal flora are enteric gram-negative rods (especially E. coli) and streptococci which are primarily nonpathogenic inhabitants of the normal digestive tract but which may have invasive properties (Laing 1961). Bacterial organisms were isolated in 35 (85.4%) RFMs, and in 21 (60.0%) of these E. coli was isolated either in pure culture or in mixed cultures. Of the samples yielding bacteria, gram-negative bacteria were isolated in 26 (74.3%) samples. The main gram-positive bacteria were streptococci (11) and C. pyogenes (6) either in pure or mixed cultures. Contamination of the uterus with bacterial organisms decreases with involution of the uterus up to about 2 weeks postpartum (Eduvie et al. 1984, El-Azab et al. 1988, Hussain et al. 1990). This may explain why some of the RFMs samples did not yield any bacterial organisms. Retention of the foetal membranes in addition exposes the uterus to broad range of bacterial contamination mainly cilliform and incidental bacteria (especially streptococci) (Olson et al. 1986, Hussain et al. 1990). These bacteria are normally not associated with any particular uterine problem or infertility in cows (Hartigan et al. 1974, Hartigan 1978, Olson et al. 1986) and isolating them may not mean much (Hartigan et al. 1974, Hartigan 1978). However, they might be important in causing dissolution of the foetal membranes attachments and so facilitate the

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Table 1. Correlation coefficients between appetite, temperature, ease of removal of RFMs and haematological values in cows with retained placenta

<table>
<thead>
<tr>
<th></th>
<th>Apparite</th>
<th>Removal</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appetite</td>
<td>1.00</td>
<td>0.168</td>
<td>0.373*</td>
</tr>
<tr>
<td>Removal</td>
<td>0.373*</td>
<td>1.00</td>
<td>0.015</td>
</tr>
<tr>
<td>Haemoglobin</td>
<td>0.258</td>
<td>0.058</td>
<td>0.148</td>
</tr>
<tr>
<td>PCV</td>
<td>-0.118</td>
<td>0.037</td>
<td>0.316</td>
</tr>
<tr>
<td>RCC</td>
<td>-0.187</td>
<td>-0.246</td>
<td>0.226</td>
</tr>
<tr>
<td>WCC</td>
<td>-0.256</td>
<td>-0.448*</td>
<td>0.349</td>
</tr>
<tr>
<td>Neutrophils</td>
<td>0.170</td>
<td>0.133</td>
<td>0.340</td>
</tr>
<tr>
<td>Immature</td>
<td>0.261</td>
<td>-0.191</td>
<td>0.278</td>
</tr>
<tr>
<td>Lymphocytes</td>
<td>-0.151</td>
<td>0.029</td>
<td>-0.239</td>
</tr>
<tr>
<td>Total proteins</td>
<td>-0.071</td>
<td>-0.151</td>
<td>-0.044</td>
</tr>
</tbody>
</table>

*Significance (P<0.05).

Table 2. Haematological picture of cows with and without retained foetal membranes

<table>
<thead>
<tr>
<th>Blood parameter</th>
<th>With RFMs Mean</th>
<th>s.e</th>
<th>Without RFMs Mean</th>
<th>s.e</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hæmoglobin (mg%)</td>
<td>10.9</td>
<td>0.25</td>
<td>11.0</td>
<td>0.13</td>
</tr>
<tr>
<td>Packed cell volume (%)</td>
<td>30.8</td>
<td>0.62</td>
<td>31.6</td>
<td>0.6</td>
</tr>
<tr>
<td>Red cell count (x10⁶)</td>
<td>5.8</td>
<td>0.13</td>
<td>5.78</td>
<td>0.11</td>
</tr>
<tr>
<td>White cell count (x10⁶)</td>
<td>6.6</td>
<td>0.46</td>
<td>10.4*</td>
<td>0.40</td>
</tr>
<tr>
<td>Neutrophils (%)</td>
<td>30.1</td>
<td>2.50</td>
<td>33.4</td>
<td>2.02</td>
</tr>
<tr>
<td>Immature (%)</td>
<td>1.6</td>
<td>0.59</td>
<td>1.2</td>
<td>0.24</td>
</tr>
<tr>
<td>Lymphocytes (%)</td>
<td>65.9</td>
<td>2.47</td>
<td>57.9</td>
<td>2.23</td>
</tr>
<tr>
<td>Eosinophils (%)</td>
<td>3.8</td>
<td>0.64</td>
<td>8.63**</td>
<td>0.98</td>
</tr>
<tr>
<td>Total proteins (mg%)</td>
<td>7.9</td>
<td>0.14</td>
<td>8.1</td>
<td>0.14</td>
</tr>
</tbody>
</table>

*Significant difference (P<0.05).
**Significant difference (P<0.1)
NS-Not significant.
detachment of the RFMs. Their presence in the uterus can also influence responses of pathogenic bacteria to therapeutic agents, since some elaborate substances such as penicillin which can protect other sensitive organisms (Olson et al. 1986). Most of the bacterial organisms of the RFMs disappear spontaneously except C. pyogenes which tend to remain in the uterus for a long period (deBois 1982). The continuous flushing effect of the myometrial contractions, phagocytic activity of leucocytes and lysosomal enzyme (NAGase) from the glandular and epithelial secretion help to eliminate most of the uterine bacterial infections (Hussain et al. 1989). The type of bacterial isolates was not related to the appetite, temperature, ease of removal of the RFMs and any of the haematological parameters analyzed. This indicates that none of the bacteria was related to either the ease of removal of the RFMs or development of the systemic involvement.

The blood picture did not differ significantly within the animals with RFMs or between animals with and without RFMs except for the white cell count (WCC) and eosinophil counts which were lower (P<0.01) in cows with RFMs than in the normal cows (Table 2). In the cows with RFMs the range for WCC was very wide (2.2–12.5), whereby 7 cows had leucopenia (WCC<4,000) and 3 cows had mild leucocytosis (WCC>12,000). Though normally there is no significant WCC changes in cows with RFMs (Roberts 1986), in severe cases with fever and systemic involvement the leucocytes are reduced in number (Straub et al. 1958, Doxey 1979). Stress reduces the number of circulating eosinophils (Wildeke and Davis 1982) therefore in some cows the stress of retention of fetal membranes could have led to decrease in their eosinophil counts. The WCC was negatively related to temperature (P<0.05) and positively related to the ease of removal of the RFMs (P<0.05). Thus low WCC was associated with high body temperature while high WCC was associated with ease of removal of the RFMs. In 24 cows (58.5%) it was easy to remove the RFMs while in 17 cows (41.5%) it was not so easy to remove the RFMs. Detachment of foetal membranes has been associated with the activity of the peripheral leucocytes and the number of leucocytes in the cotyledons (Gunnink 1984). Therefore it is possible that high WCC were associated with high leucocyte activity and increased number of leucocytes in the cotyledons which would thus promote detachment of the RFMs. Difficulty to remove RFMs are commonly encountered especially in cows with shortening gestation period (Dyrendahl et al. 1977, Bolinder et al. 1988). Among the cows with RFMs, 9 cows had body temperature above 39.5°C and 13 cows had reduced appetite. The temperature was negatively correlated (P<0.05) to appetite. Normally only a small percentage (20%) of cows with RFMs show systemic involvement (Robert 1986). In this study systemic involvement was observed in 7 cows (17.1%) which had both reduced appetite and body temperature of above 39.5°C.

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