PREVENTION OF SOW UTERINE INFLAMMATION

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Abstract

The purpose of the study was to determine the efficacy of antibiotic preparations: 2.5% Cobactan, Metricure, and Clamoxyl® Metritis in the prevention of postpartum inflammation of the uterine. Before parturition, swabs from the uterus cervix were taken from 56 sows and examined bacteriologically. Bacteriological examinations showed mixed microflora in 85.4% and pure cultures in 14.3% of the swabs. The animals were divided into 4 equal groups immediately after parturition. Group I received 2.5% Cobactan (4ml/100kg) i. m. once daily for 2 consecutive days. Group II received 2.5% Cobactan (4ml/100kg) i. m. once daily, for 2 consecutive days and additionally a single intrauterine dose of Metricure. Group III received a single intrauterine dose of Clamoxyl® Metritis. Group IV was set to be a control, and all manipulations were limited to the observation of uterus involution. Samples from the cervix of the uterus were taken 4 - 5 days after repeated treatment. Treatment efficacy was determined by artificial insemination index after weaning, number of piglets born alive, and dead, mean weight of litter and piglets at weaning, and litter weight at weaning. After treatment, bacteriological examination of cervix samples showed that for group I in 50% cases pure cultures and in 50% - mixed cultures of bacteria were isolated. For group II, pure cultures of bacteria were isolated in 42.8% and mixed cultures in 14.3% of the samples. No microbial growth was evidenced in 42.9% of the samples. For group III, pure cultures were isolated in 37.1%, and mixed cultures in 21.4%. No growth was evidenced in 41.4% of the samples. For group IV, 14.3% of pure cultures and 85.7% of mixed cultures were isolated. After weaning, 1.5 semen doses for group I, 1.0 dose for groups II and III and 1.64 semen doses for group IV were used to obtain fertility. The number of piglets born alive and weight of piglets were approximately equal in all experimental groups and in control group, but mean weight of litter was higher in experimental groups, especially for groups II and III. It can be stated, that intrauterine treatment with antimicrobial preparations ensures the sterile environment during puerperal period. Histological investigations of culled sows confirmed uterine inflammatory processes in the control group.

Key words: sow, metritis, antibiotics, prophylaxis.

Porcine reproductive organ disorders are a current and important problem. In some Lithuanian pig farms, the incidence of these disorders is 20.4%, while in large complexes it can be as high as 61.38%. Normally, uterine involution period ends 20-25 d postpartum. During this time, uterine smooth muscles and ligaments contract, the uterine girth and mass are reduced and the cervix closes (2, 5). Reproductive organs then return to the state prior to fertilization. During the initial 5-6 d postpartum, body temperature is approximately 39.4°C, lochial secretion either ceases or greatly diminishes (18, 21). In sick sows the body temperature rises to 39.5-39.7°C, and pulse and respiration rates increase. Pink-coloured lochia are noticed within the cervix (6). Inflammation processes in the reproductive organs occur commonly. This is due to infections of the reproductive tract and deficiencies in the neuroendocrine system (17). Inflammation develops when vaginal pathogenic or facultatively pathogenic microflora pass to the uterus. Infection-caused acute inflammation often becomes chronic, complicating reproductive functions either temporarily or permanently (13, 21).

Literature sources indicate that causative agents of reproductive tract inflammations are usually Streptococcus sp., Staphylococcus sp., E.coli, and Enterobacter sp. (4, 16). In addition, PRRS virus, Chlamydia and Brucella sp. may cause the inflammation (1, 20).

Different antimicrobial preparations are used to treat sow uterine inflammation. Markowska - Daniel et al. (15) treated sow MMA syndrome using Amoksiklav, Oxyvet, Clamoxyl LA, Neomycin, or Engemycin. Following the use Oxyvet 86.4% of sows were fertilised. Similarly Clamoxyl, LANeomycin, Engemycin, and Amoksiklav resulted in 100%, 70%, 92.5%, and 89.9% conception rates, respectively. The authors explained that the reason for the different fertilization percentages was due to various sensitivity of bacteria, in relation to the preparation of active ingredients. Kotowski (9) injected Evetsel prior to parturition and repeated the treatment during the 3rd- 4th week of lactation.
Postpartum sow MMA syndrome was observed in 5% of the test group and in 12.5% of the control group. Kotowski and Szymon (10) applied Uterovet into the uterus immediately after parturition. MMA syndrome was observed in 16.6% of sows, versus 36.65% of control animals. After applying Metrisan granulocyte phagocytic activity increased and 24–48 h following intrauterine infusion of the preparation, lochia colour returned to normal, as did milk secretion. To weaning age (35 d), piglets showed no signs of diarrhoea and mortality rate was reduced (8). Postpartum preventive therapy reduced incidence of reproductive organ inflammation (18).

The aim of this trial was to investigate vaginal and uterine microflora in postpartum sows and to determine the efficacy of some antibiotic preparations in preventing the reproductive tract inflammation.

Material and Methods

Examinations were performed at the Limited Joint Stock Co.”Sistem” pig farm on 56 sows (2nd - 3rd breeding). Caudal vaginal smear samples were collected from all sows using single-use transportable media (Invasive sterile, EUROTUBO, Mfg.I.A.S.A. Spain). Cervical samples for bacteriological testing were collected 1-3 d before parturition and on 4-5 d after treatment using single-use sterile pipettes.

Seeding was performed on McConkey agar (Oxoid, England), mannitol salt agar (E&O Laboratories Ltd, Scotland), Columbia agar chocolate (E&O Laboratories Ltd, Scotland), and Strept. Sel.C.O.B.A. (E&O Laboratories Ltd, Scotland).

The plates were incubated for 24-48 h at 37°C under aerobic conditions. Every 24 h the grown colony size and their colour were evaluated. The colonies were tested with 3% hydrogen peroxide solution. To identify Staph. Aureus, the latex kit (“Staphytec Plus Test DR 850″, Oxoid, England) was used. Bacteriological investigations were performed at the Animal Reproduction Laboratory of the Lithuanian Veterinary Academy.

The sows were divided into 4 equal groups, immediately after parturition. Group I received an injection of 2.5% Cobactan (Cefquinome 25 mg/ml, Intervet International GmbH, Germany), i. m., in a dose of 4ml/100kg for two consecutive days. Group II - 2.5% Cobactan i. m. for two consecutive days and a single intrauterine dose of Metricure (Cefapirini 500 mg, excipient 19 g, Intervet International B.V., Holland). Group III received a single intrauterine dose of Clamoxyl® Metritis (Amoxicillin trihydrate 0.8 g, excipient 17.8 g, Pfizer Animal Health, Belgium). Group IV was subjected to observation of the uterus involution. All the preparations were injected following manufacturer’s instructions.

The criteria for the evaluation of Cobactan, Metricure or Clamoxyl® Metritis efficacy in sows after piglet weaning, were, artificial insemination index (AI), number of piglets alive and dead, mean litter of delivered piglets (kg), litter weight at weaning (kg) and the results of bacteriological examinations of material taken from the cervix of the uterus. Additionally, 3 sows were culled from the control group due to unsuccessful fertilization.

Results

Bacteriological examinations of vaginal smears taken before parturition showed mixed microflora in 85.4% of them, including: Enterobacter sp. - 42.9%, Streptococcus sp. – 57.1%, and Staphylococcus sp. – 62.3%. Pure cultures of Staphylococcus sp were evidenced in 14.3% of sows. In 50% of uterine samples taken 4–5 d after treatment from group I, the growth of Enterobacter sp. in pure cultures was observed. Mixed microflora (Enterobacter sp. and Streptococcus sp.) were found in 50% of the smears.

In smear samples from group II, 42.9% of pure cultures (Enterobacter sp. - 14.3% and Staphylococcus sp. – 28.6%) were isolated. Only in 14.3% of the samples from in this group mixed cultures were noted (Enterobacter sp. - 7.1% and Staphylococcus sp. - 7.1%). No cultures grew in 42.9% of the samples.

No bacterial growth was observed in 41.4% of smear samples from group III. Pure cultures were identified in 37.1% (Enterobacter sp. 14.3%, Streptococcus sp. 22.8%) and mixed microflora in 21.4% (Enterobacter sp. - 7.1%, Streptococcus sp. - 7.1%, Staphylococcus sp. – 7.2%). In the control group (IV) mixed microflora was found in 85.7% and pure culture in 14.3% of the samples taken after farrowing.

Prevention of reproductive organ inflammation had an influence on the health of the piglets. The average weight of the litter was larger in the test groups in comparison to the control group (Table 1). This was particularly evident for group II, where Cobactan was combined with Metricure. Successful post-weaning fertilization required different number of insemination doses. The control group required 1.64 ± 0.23 semen doses, whereas in Cobactan (group I) – 1.5 ±0.14 doses, Cobactan and Metricure (group II) – 1.0 dose, and intrauterine Clamoxyl® Metritis (group III) also 1 dose. Comparing the used preparations with the control group, we noticed that the fertilization data obtained from the test groups II and III were statistically significant (P< 0.034 and P< 0.024).

The uterine content in slaughtered sows was dirty and greyish yellow. The endometrium was congested and swollen, small laminal haemorrhages and eosinophilic infiltrations in all parts of the endometrium, including glands and blood vessels, were observed. Uterine glands were depleted and dilated (Fig. 1).
Table 1
Comparison of the efficiency of preparations

<table>
<thead>
<tr>
<th>Group</th>
<th>Preparation</th>
<th>Number of sows</th>
<th>Route of administration</th>
<th>AI index</th>
<th>Number of piglets born alive</th>
<th>Number of piglets born dead</th>
<th>Mean weight of delivered piglets (kg)</th>
<th>Number of piglets at weaning</th>
<th>Mean weight of a litter at weaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>2.5 % Cobactan</td>
<td>14</td>
<td>i.m.</td>
<td>1.5 ± 0.52</td>
<td>10.86 ± 0.95</td>
<td>0.93 ± 1.59</td>
<td>13.64 ± 1.55</td>
<td>61.79 ± 6.68</td>
<td>9.93 ± 0.92</td>
</tr>
<tr>
<td>II</td>
<td>2.5 % Cobactan and Metricure</td>
<td>14</td>
<td>i.m. i.u.</td>
<td>1.0 ± 0.51</td>
<td>10.57 ± 0.61</td>
<td>0.29 ± 0.61</td>
<td>13.86 ± 0.77</td>
<td>75.00 ± 10.57</td>
<td>9.57 ± 0.51</td>
</tr>
<tr>
<td>III</td>
<td>Clamoxyl® Metritis</td>
<td>14</td>
<td>i.u.</td>
<td>1.0 ± 0.97</td>
<td>10.79 ± 0.99</td>
<td>0.71 ± 0.99</td>
<td>14.21 ± 1.19</td>
<td>69.64 ± 10.43</td>
<td>10.43 ± 1.02</td>
</tr>
<tr>
<td>IV</td>
<td>Control</td>
<td>14</td>
<td>-</td>
<td>1.64 ± 0.84</td>
<td>10.50 ± 1.51</td>
<td>0.93 ± 1.14</td>
<td>12.93 ± 1.69</td>
<td>61.29 ± 9.57</td>
<td>9.57 ± 1.28</td>
</tr>
</tbody>
</table>

Fig. 1. Suppurative endometritis. Abundant neutrophilic and eosinophilic infiltrations. H&E, 400x.

Fig. 2. Chronic endometritis. Periglandular fibrosis, infiltration of lymphocytes and atrophy of glands. H&E, 400x.

Post-slaughter examinations of sow reproductive organs revealed exudate and gross changes in the endometrium. Macroscopic diagnosis (chronic endometritis) was confirmed by histological examination of uterine mucosa (Fig. 2). Periglandular fibrosis and lymphocyte infiltrations were noted. The endometrium was congested and lumen of vessels included lymphocytes and neutrophils. Accumulations of neutrophils and eosinophils were found in the stroma and glands. Granules of haemosiderin were seen in the stratum compactum. The glands were depleted and those which survived were atrophic, flattened, and cystic. Dilation of lymphatic vessels in the stratum compactum was evident.

Discussion

Postpartum uterine involution can be inhibited by various factors such as deficiency of oxytocin, oestrogens, or PGF2α during parturition (12). Deficiencies prolong parturition time and later involution processes. This creates suitable conditions for bacteria to multiply and cause inflammation of the reproductive tract. The data obtained from this trial confirm the conclusions of other authors (5, 10, 16, 20).

The flora of the vagina of healthy sows consists of a wide range of bacteria, including aerobic and anaerobic species. The most representative are Streptococcus sp., Staphylococcus sp., enterobacteria, Corynebacterium sp., Micrococcus sp., and Actinobacillus sp. The number of bacteria decreases steadily from the caudal to the cranial vagina. In our bacteriological examinations of vaginal smears before parturition mixed microflora, including Enterobacter sp., Streptococcus sp., and Staphylococcus sp., and pure bacterial cultures were evidenced. Bara et al. (3) demonstrated that the vaginal-cervical microflora changes continuously due to intrinsic mechanisms of the sow reproductive tract, such as cyclic hormonal pattern,
secretion of immunoglobulins and mucus, and the phagocytic activity of granulocytes.

The presence of bacteria in the uterus does not always result in endometritis. The hormonal status of the sow plays an important role in the elimination of uterine bacteria. Higher oestrogen levels enhance migration of leukocytes into the uterus, and increase uterine blood flow and vascular permeability (14).

The vaginal orifice of sows is usually contaminated with various microflora that can infect the uterus during parturition. Uterine infections are associated with copious amounts of discharge. The discharge does not contain mucus; it is usually purulent or occasionally haemorrhagic. Uterine infections cause a transient or persistent infertility, may affect the general health of the sows, and are more common in higher-parity sows and in gilts. Literature data (2, 6, 9, 15, 18, 23) indicate that using of antimicrobial preparations stimulates the reproductive tract involution and improves subsequent fertilization. Sows with vulvæ discharges can be treated with antimicrobials by intrauterine, parenteral, and oral routes. Drugs with potential efficacy in the therapy or prophylaxis of urogenital diseases of swine include tetracyclines, penicillins, aminoglicosides and nitrofurans (6, 15). Our investigations showed that using systematic treatment with antibiotics as well as a single intrauterine application of Clamoxyl® Metritis preparation not only reduces amounts of uterine cervical microflora, but also improves fertilization post weaning. Treating systematically (using antimicrobials i.m. and intrauterine), a high recovery percentage was achieved. This is shown by sow fertilization after piglet weaning. It seems that the examination of the reproductive tract of sows at slaughter may be very useful to detect possible gross and histopathological lesions.

In conclusion, it can be suggested that examinations of uterine structure, its histopathological image and presence of microflora, confirm the necessity of preventive treatment when it is needed after weaning.

References