

VAGINAL MICROECOLOGY AND VULVAL DISCHARGE IN SWINE

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SUMMARY

This article reviews current knowledge concerning the occurrence of vulval discharges in sows. Both the role of the vaginal flora and the management practices on the herd are emphasised. It appeared that the vaginal flora changes with the reproductive stage of the sow, and that many of the bacteria of the vaginal flora are similar to those frequently reported in clinical cases of the vulval discharge syndrome. Factors that contribute to a high contamination of the urogenital tract of sows, such as low hygiene standards and poor housing conditions are important risk factors for the disease. Poor management of the boar and insufficient oestrus detection also increase the risk of infection. The cyclic variation of uterine defence capacities throughout the reproductive cycle plays an important role in the pathogenesis of vulval discharge. Defence mechanisms decrease towards the end of oestrus and at onset of metoestrus i.e. when oestrogen levels have become low and when progesterone levels increase. Criteria that can be used to discriminate between physiological and pathological discharge, and that permit to pinpoint the exact infection site in case of a pathological discharge, are discussed. There is no uniform treatment and the results of antimicrobial therapy are often disappointing. Prevention rather than treatment should be encouraged. Preventive measures are largely based on minimising or eliminating the different risk factors for the disease.

INTRODUCTION

Infections of the urogenital tract in sows are commonplace in many modern swine facilities. Although the infection can affect one or more organs of either the reproductive or urinary tract, the most common clinical sign associated with these infections is the appearance of a vulval discharge. This article will review conditions that influence the occurrence of the vulval discharge syn-

drome. Although the vaginal flora in sows is not documented that much in veterinary medicine as it received attention in human medicine (*Spiegel*, 1991; *Sobel*, 1998), its role in the occurrence and prevention of vulval discharges will be emphasised. The role of the boar and management practices will also be discussed.

ANATOMICAL CHARACTERISTICS OF THE SOW'S REPRODUCTIVE TRACT

The vulva of the sow has two fleshy lips that contain many blood vessels. The vagina is approximately 400 mm long, and consists of two parts: the vestibula (approximately 70 mm), situated caudally from the opening of the urethra, and the fornix vaginae situated between the opening of the urethra and the cervix. The cervix is approximately 100 mm long. Tortuous cartilaginous folds form a corkscrew cervical canal that can be passed only at farrowing and

during oestrus. The folds are less prominent to the uterine side. The uterus or womb consists of a short body (50 mm) and two horns. The length of the horns is approximately 500 mm in non-pregnant gilts, but the horns can reach 1-1.8 m during pregnancy. The junction from the uterus to the oviduct is not sharply delineated. The oviduct is 40-80 mm long. The ovaries are 10-20 mm and are embedded in a great bursa ovarica.

THE VAGINAL FLORA

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* spp., *Staphylococcus* spp., Enterobacteria, *Corynebacterium* spp., *Micrococcus* spp. and *Actinobacillus* spp. Many of these bacteria are similar to those frequently reported in clinical cases of the vulval discharge syndrome (De Winter et al., 1995). The number of bacteria decreases steadily from the caudal to the cranial vagina (Berner, 1984). Bara et al. (1993) demonstrated in a longitudinal study that the cervical-vaginal microflora changes continuously due to intrinsic mechanisms of the sow's reproductive tract, such as cyclic hormonal pattern, secretion of immunoglobulins and mucus, and the phagocytic activity of the granulocytes. The highest isolation rates were obtained on the day of farrowing and the lowest 3 weeks after mating. The second highest number of positive samples was found immediately after mating. Although there was no significant difference among sows of different parities, there was a trend for older sows to have more positive samples af-

ter farrowing. Fifty-five percent of the cultures were pure, 45% were mixed. McLean and Thomas (1974) documented that parturition and a dietary change resulted in an upgrowth of *E. coli* and other bacteria in the reproductive tract of sows. *Staphylococcus hyicus*, the aetiological agent of exudative dermatitis in piglets, is also part of vaginal flora of the sow (Elliott, 1986). Wegener and Skov-Jensen (1992) showed that *Staphylococcus hyicus* strains are transferred from the vagina of sows to the piglet at birth, and that these bacteria become part of a stable skin flora of the offspring.

Several investigators isolated bacteria from the uteri of normal sows. Scoffield et al. (1974) and Ludwig-Stössel (1985) isolated bacteria in the uterus in about 50% of the sows they examined at slaughter. They isolated mainly *E. coli*, *Staphylococcus* spp. and *Streptococcus* spp., in some cases *Arcanobacterium pyogenes*, *Enterococcus* spp. and *Pasteurella multocida*. However, positive isolation rates in uteri from slaughtered sows should be interpreted with great caution, because breeding pigs are often culled due to reproductive failure

and uteri from slaughtered sows may be contaminated by urine passing retrograde via the vagina through the cervix. *Meredith* (1986) reported that a normal uterus must be sterile. He only isolated bacteria from the uterus within a few days after parturition or during the first day after service. The degree in which

the presence of bacteria in the uterus of normal sows influences early pregnancy is poorly understood. *Scofield et al.* (1974) showed that pregnancy can be established in an infected uterus, but that embryonic survival rates are much lower than in a sterile uterus.

THE VULVAL DISCHARGE SYNDROME

The potential areas from which vulval discharges can arise include the vulva, the vagina, the cervix and the uterus. Discharges can also arise from infection of the kidneys (pyelonephritis) or the bladder (cystitis) with pus being passed in the urine. In this article, emphasis will be placed on infections of the genital tract. Vaginal infections mostly occur concomitant with chronic infections of the uterus or with chronic urinary tract infections. Occasionally, some sows and virgin gilts with vulval discharge have obvious vaginitis and cervicitis, with no or only minimal changes in their uteri. This finding suggests either that an ascending infection of the reproductive tract has not yet

reached the uterus, or that a uterine inflammation has resolved. The spontaneous appearance of the syndrome in many unrelated herds supports the view that the infection arises from the existing bacterial population in the herd, rather than from the introduction of a specific organism. *De Winter et al.* (1995; 1996) were able to reproduce the syndrome vulval discharge experimentally by inoculation of *E. Coli* or *Staphylococcus hyicus* strains into the uterus. In one study, *Streptococcus suis* type II has been shown to be the cause of an outbreak of vaginitis in gilts (*Sanford et al.*, 1982). Evidence is lacking that viral infections play an important role in the vulval discharge syndrome.

EPIDEMIOLOGICAL ASPECTS

Vulval discharges are often seen in sows during the first and second oestrus after weaning, after farrowing and in gilts, but they are rare in immature gilts, lactating sows, and in pregnant sows. Some epidemiological factors that should be considered in the syndrome are shortly discussed here.

Hygienic measures

Poor hygienic measures in the farrowing, gestation and mating units lead to an accumulation of wastes, and to an increased risk of vulval discharge. When units are continuously used without cleansing, the vulvovestibular tis-

sues of the sows are dirty and highly contaminated (*Muirhead*, 1986; *Heard*, 1986). Poor hygiene in the boar units also increases the risk of infection. Strict hygiene is also required during intervention at farrowing and during mating or artificial insemination (AI) procedures.

The role of the boar and AI

The male reproductive tract and especially the preputial diverticulum of the boar contains many bacteria similar to those found in the sow's reproductive tract. Many of these bacteria may be transmitted from boar to sow during

coitus. The risk for infection of the sow is much higher when the content of the preputial diverticulum is manually squeezed into the vagina at service. Remating discharging sows, multiple matings and the use of cross-servicing one sow with a number of boars provide a potential risk for the spread of venereally related infections. Trauma to the female urogenital tract at breeding facilitates colonisation by facultative pathogenic bacteria. Trauma occasionally occurs when the size of the boar and the sow is quite different. If a boar has very long back legs, the penis enters the vagina in a downward movement and the tip of the penis may enter and damage the urethral orifice.

Infection of the sow's reproductive tract may also occur during AI. Fresh semen from fertile boars used in different AI centres contained 10^2 - 10^5 bacteria per ml (Weitze and Rath, 1987). Although contamination of diluted sperm used for insemination cannot be ruled out, it is probably of lesser importance because of addition of antibiotics. Only in case of antibiotic resistance, the diluted sperm can be a source of infection. However, infection of the uterus during AI is mainly due to unhygienic procedures and to incorrect time of insemination. The latter is very important under practical circumstances and is mainly due to insufficient oestrus detection.

Housing conditions

Urogenital infections occur more frequently in sows housed in crates and in tethered sows compared to sows grouped in stalls (Busse et al., 1982). Discharges in virgin gilts are often seen within a few days after addition to the breeding herd, and usually after initial boar exposure to initiate oestrus cyclicity. Housing these gilts in stalls facilitates the spread among penmates.

Under intensive confinement conditions, the vulva of sows is often placed in direct contact with faeces for long

periods, both in farrowing and dry sow accommodations (Smith, 1983). When the construction lacks a good drainage of faeces, there is a build up of faeces behind the sow at the bottom of the tailgate. Insufficient ventilation rates can lead to high relative humidity levels, and consequently to a higher bacterial contamination of the units and the animals. Sows housed in crates and tethered sows often have a lack of exercise. This causes less frequent urination and predisposes to urogenital infection, especially to infection of the urinary tract (Madec, 1984).

General health of the sow

Sows with leg-weakness will assume a dog-sitting position which helps to force faecal material into the vagina. Sows with urinary tract disease are more susceptible to ascending infections of the vagina, cervix and uterus (von Both et al., 1980; Moller et al., 1981; Berner, 1984). Prolonged farrowings, retention of remnants of the placenta, and dead piglets lead to more contamination of the genital tract. Congenital defects of the urogenital tract or trauma during parturition e.g. incomplete closure of the vulva and erosion of the thick folds of the cervix in old sows, facilitate colonisation of possible pathogenic bacteria. Apart from an infectious cause, vulvovaginitis may be caused also by oestrogenic mycotoxicosis (Campbell, 1988).

Other management practices

An inadequate replacement policy of the breeding stock leads to a higher incidence of vulval discharge. An imbalance in the age structure of the sows appears if there are many gilts (start-up herds and herds with a high turn-over) or many old sows (>30% of females \geq fifth parity) in the herds. Vulval discharge problems can be more severe and more prevalent in herds with a short lactation length (<21 days).

PATHOGENESIS

The presence of bacteria in the uterus does not always result in endometritis. Except for overwhelming infections, bacteria that enter the uterus at coitus or parturition are eliminated within a few days (*Vandeplassche et al.*, 1960). The hormonal status of the sow, however, plays an important role in the elimination of uterine bacteria (*De Winter et al.*, 1992). During pro-oestrus and at the beginning of oestrus, the sow has high blood oestrogen and low progesterone levels (*Dial and Britt*, 1986). Uteri of pigs and other animal species are better able to eliminate infections caused by intrauterine deposition of either contaminated semen or an inoculum of one of several bacteria while under oestrogen domination than when under progesterone influence (*Meredith*, 1986; *De Winter et al.*, 1994). Experimental infections conducted by *De Winter et al.* (1996) showed that vulval discharge occurred only in sows with blood progesterone levels exceeding 3.00 ng/ml. It appeared from studies in other animal species (*Roth et al.*, 1982) that the higher resistance to infection during oestrus is mainly due to the influence of oestrogen. Higher oestrogen levels enhance migration of leukocytes into the uterus, and increase uterine blood flow and vascular permeability.

The secretory immune response in pigs to uterine pathogens is also influenced by ovarian cyclicity (*Hussein et*

al., 1983). The number of plasma cells in different parts of the female reproductive tract appeared to be higher during oestrus than during di-oestrus. Studies in other animal species demonstrated that elevations of immunoglobulins during the follicular phase of the cycle, block the attachment sites of bacteria, agglutinate bacteria, and opsonise bacteria for subsequent phagocytosis (*Parr and Parr*, 1985; *Watson*, 1985). In addition to facilitory effects on uterine immunity, elevated oestrogen concentrations may promote evacuation of septic uterine secretions by stimulating uterine contractions and by maintaining cervical patency.

Especially in herds where the sows are served by AI, it is possible to inseminate at any time. In cases where oestrus detection is not carried out properly, sows may be inseminated after the end of standing oestrus. Such sows are more susceptible to uterine infections because at the end of oestrus, blood oestrogen concentrations are already low, while blood progesterone concentrations are already at 10 ng/ml (*Dial and Britt*, 1986; *Meredith*, 1986). Much knowledge about relationship between hormonal status and uterine defence has been obtained in studies conducted in different animal species. It merits further studies in sows specifically to confirm many of the aforementioned mechanisms.

CLINICAL SIGNS

Discharges resulting from urogenital tract infections may appear as dried deposits around the vulva and perineum. More often, they are observed as a pool on the floor underneath affected sows (*Dial and MacLachan*, 1988a). In some cases, it is necessary to separate the labia manually or to use a speculum in

order to visualise the discharged exudate. Vulval discharges may result from either physiological or pathological conditions.

Physiological discharge

The periods in which it is quite normal for healthy sows to show evidence

of a slight discharge are: at pro-oestrus and oestrus, after service or insemination, during pregnancy and after parturition (*Muirhead, 1986*). During pro-oestrus, there is a small discharge of watery or slightly tacky mucus that can be clear or turbid. This discharge lasts until the first part of standing oestrus. The first hours after service or insemination, a discharge, probably consisting of seminal plasma is observed. The discharge observed 8 to 48 hours after service is of low volume and has a white, grey or yellow colour. It is probably caused by a reaction of the vagina and uterus to seminal debris (*Meredith, 1982*). A low volume of white to white-greyish discharge of thick mucus may be observed during pregnancy. It is generally believed that this discharge originates from the cervix and that it is caused by reaction to ascending infections (*Meredith, 1982*). Since histological processes occurring in the endometrium after parturition and during endometritis resemble each other, it is not always easy to pinpoint whether the puerperium takes a physiological or a pathological course. During a normal puerperium, lochia are expelled up to 5 days post-partum. Malodorous and excessive amounts of lochia should be considered as abnormal.

Pathological discharge

Discharges observed during other stages of the reproductive cycle cannot be considered as physiological. Clinical signs associated with pathological discharge depend upon the infection site(s). Parameters used to investigate the exact infection site include: amount of discharge, characteristics and frequency of discharge, age at which discharge occurs, presence of fertility fail-

ure, and general health status (*Dial and MacLachlan, 1988a*). Vaginal infections are characterised by a moderate amount of purulent discharge that occurs independent of the reproductive cycle. Generally, they are not associated with reduced fertility or systemic clinical signs. Vaginal infections are more common in gilts, and may appear in individual gilts or as epizootics. Uterine infections, except for puerperial infections, are associated with copious amounts of discharge. The discharge does not contain mucus; it is usually purulent or occasionally haemorrhagic. It is commonly seen during pro-oestrus and oestrus. 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. Postcoital endometritis typically does not produce discharge until 14 to 21 days after mating. The discharge of sows with cervicitis is small in volume, usually purulent, and not associated with the oestrous cycle. Infections of the cervix may result in reduced fertility but they are not associated with systemic signs. All parities may be affected and cervicitis often occurs concomitant with endometritis or vaginitis. A modest amount of discharge is seen with infections of the lower urinary tract. The discharge is usually purulent and/or mucoid, but it can also be mucohaemorrhagic. Occasionally, the discharge is more chalky. Urinary tract infections occur independent of the reproductive stage, and initially they do not affect fertility. There is dysuria and the general health status of the sows may be affected. Urinary tract infections can appear in all parities but they typically occur in older sows.

DIAGNOSIS

The diagnosis should start with a complete anamnesis and a study of the farm records. In many cases the obtained information permits to evaluate the duration of the problem and its possible relationship with reproductive performance results. A thorough examination of clinical signs is time-consuming but it may provide very useful information. Vulval discharges may be missed easily because the volume is often mixed up with dirt and faeces, and it can disappear quickly through the slats of the floor. Microscopical examination of discharge for presence of crystals, amorphous material or leukocytes permits to differentiate between urolithiasis and discharge resulting from inflammation. Bacteriological examination of discharged material from the vulval lips has no diagnostic value because it is always contaminated (*Meredith, 1986*).

Vaginocopy is very useful to ascertain the site of origin of discharge. A speculum of 2 cm external diameter and a length of 30 cm allows visualisation of the vestibule, vagina and cervix. A longer speculum (40 cm) may be required in older sows to investigate the cranial part of the vagina. A more narrow speculum is advisable for gilts. Attention should be paid to the urethral orifice, sinus vaginalis, vaginal mucosa, and external os of the cervix. Increased vascularity or erosions of the vaginal epithelium, and accumulations of purulent exudate around the cervix or urethra may be present in affected animals.

Swabs for bacteriological examination can be taken from the vagina and cervix. Swab samples should be collected by rigorous rubbing of the surface of the mucosa with a sterile cotton swab inserted through and beyond the speculum. Contact with the surface skin and external vestibule should be avoided upon introduction and withdrawal of the swab and speculum. Unless the cervix

is patent, as it is at oestrus, it is not possible to take uterine swabs through the cervical canal. However, isolates from the cervix relate well to those obtained from the uterus (*Brummelman, 1980*). Swabs from different sows may elicit the predominating organisms in the herd, and permit to carry out antibiotic sensitivity tests. Swabs from individual sows are worth examining but the results may not be representative for the herd. Further studies on the microbiology of healthy and diseased reproductive tracts are necessary to permit a more useful interpretation of isolation results.

Examination of the reproductive tract of sows at slaughter may be very useful to detect possible gross and histopathological lesions and to take samples for microbial culture. Inspection at slaughter, however, has some limitations that should be considered in the interpretation of the results. First, a representative number of sows should be investigated from an infected herd. This condition is not easily fulfilled since sows are often culled in small numbers, and since not every affected sow is sent to slaughter instantly. Second, affected sows should be slaughtered within two days after onset of the first observed discharge. *Muirhead (1986)* slaughtered 47 sows two to four days after occurrence of vaginal discharge, and surprisingly, there was a total lack of lesions in the urogenital tract in 21 of these sows. Third, the possibility exists that uteri of slaughtered sows are contaminated with urine that passes retrograde via the vagina through the cervix. Hence, it is advisable to complete microbial cultures with results of histopathological examinations (*Meredith, 1986*). However, the interpretation of endometrial biopsies is not easily established and requires some experience to do properly because the number of inflammation cells in the endometrium depends upon the cycle stage

(*De Winter et al.*, 1995). Finally, slaughter inspection measures possible lesions at one particular point in time. No information is obtained with respect

to onset and duration of infection. However, such epidemiological data may be imperative to effectively solve the problem at herd level.

TREATMENT

Treatment of urogenital infections of sows is not that much documented as it is for cows and mares. Vaginitis in sows is normally self-curing. The possibility exists, however, that the infection ascends and results in a cervicitis and endometritis (*Muirhead*, 1986). Because the corpora lutea of swine are non-responsive to prostaglandins until after day 11 to 12 of the oestrous cycle (*Conner et al.*, 1976; *Guthrie and Polge*, 1976), it is not useful to shorten di-oestrus or to decrease the inter-oestrus interval for treatment of porcine uterine infections.

Sows with vulval discharges can be treated with antimicrobials by intrauterine, parenteral and oral routes (*Dial and MacLachlan*, 1988b). Drugs with potential efficacy in the therapy or prophylaxis of urogenital diseases of swine include tetracyclines, (potentiated) sulphonamides, penicillins, aminoglycosides, and nitrofurans. The choice of the antibiotic should be determined by antimicrobial sensitivity testing after the isolation of one of the more commonly observed pathogens. *Busse et al.* (1982) found that many bacteria involved in urinary tract infections show resistance to different antimicrobials. In addition, a potentially effective antimicrobial should be delivered to either the urinary tract or the uterus in concentrations that exceed the minimum inhibitory concentration (MIC) of the pathogen. The mode of administration for antimicrobials depends upon the reproductive stage of the sow or gilt. Intrauterine therapy is not always applicable because of the complex cervix. It is feasible in recently farrowed sows before cervical closure, and

in the majority of dry sows and gilts during pro-oestrus and oestrus. It is seldom possible to apply intrauterine therapy in lactating sows or in cyclic sows during di-oestrus. Although the local application of antibiotics in the uterine lumen is beneficial especially in the acute stages of disease, it has also some drawbacks. The volume of infusate may be inadequate for optimum distribution throughout the genital tract, the antimicrobial may be present for an insufficient time, the therapy is time consuming, requires some experience to do properly and may introduce additional pathogens into the uterus. Thus, the oral or parenteral routes should be used for treatment of dry sows and gilts, while all three treatment routes can be used in recently farrowed sows and females in oestrus.

Muirhead (1983; 1986) reported that treatment of sows with vulval discharge due to endometritis is not very useful because subsequent farrowing rates are low. Therefore, he advised to cull all affected non-pregnant sows. All remaining sows should be injected with a long acting oxytetracycline preparation at weaning, and additionally, they should be treated by in-feed medication with 300 ppm oxytetracycline for 3 weeks. The prepuce of the boars should be injected daily with long acting oxytetracycline intramammary tubes for 5 days. These treatment regimens should be repeated every three months on at least four occasions. Treatment of the boars appeared to be essential, because discharges returned in more than 50% of the herds when treatment of the boars was neglected. *Walton* (1984) also

showed that the number of sows with vulval discharge decreased significantly when the boar's prepuces were treated every three months. According to *Plonait* (1988), intrauterine infusions with lotagen or lugol are effective. Lotagen or lugol solutions should be infused 18 hours before or 24 hours after insemination. These solutions cause a mild necrosis of the endometrium, and allow a quick regeneration within 24 hours.

In conclusion, the literature concerning treatment of urogenital infections of swine does not proclaim one standard method. Most authors agree that clinical responses to treatment are inconsistent, and that the choice of antimicrobial should follow a sensitivity testing. Although antibiotics may be useful to suppress the infection temporarily, preventive rather than therapeutic measures should be emphasised.

PREVENTION

Preventive measures are mainly based on management practices that minimise or eliminate the aforementioned risk factors for occurrence of vulval discharge (*Muirhead and Alexander, 1998*). Good sanitation of the units may prevent heavy faecal contamination of the vulvo-vestibular tissues. Cleansing, disinfection, and a stand-empty period of the pens are beneficial. However, these measures require that an all-in/all-out policy is adopted. Farmers should institute a routine to pursue high hygienic standards during manual interventions at farrowing, mating or insemination. Dirt on the vulva must be removed before service and boars must be assisted to minimise contamination of the penis, and to prevent injuries of the sow. In case of AI, semen collection, dilution, storage, and insemination should be performed under strict hygienic circumstances.

Sows may only be mated when they are totally receptive for the boar. Only one boar may be used to one sow, and old boars may not be used to young females, and vice versa. The identification of carrier boars in a herd may decrease coital transfer of pathogens. A policy not to mate discharging sows should be adopted. In case of AI, it is very important not to inseminate towards the end of the oestrus period. Sows may only be

inseminated when there is a standing reflex for the inseminator in the absence of a boar. Consequently, it is imperative to perform a correct oestrus detection. Because oestrus detection rarely is conducted more than once daily on most commercial farms, it is usually not possible to obtain sufficiently accurate estimates of the time of ovulation. Multiple inseminations increase the likelihood that one or more breedings occur near the time of optimal fertility, but they also increase the likelihood that the last insemination takes place too late i.e. when oestrogen levels have dropped already and when progesterone levels are high (*De Winter et al., 1996*). Transrectal ultrasonic echography of the ovaries can be used to monitor the time of ovulation (*de Koning, 1991*). Optimal fertility occurs when insemination takes place within 24 hours before ovulation (*Waberski et al., 1994; Kemp and Soede, 1996*) i.e. 20-36 hours after the onset of oestrus.

Optimal prophylaxis is achieved by designing farrowing, breeding and gestation accommodations in such a manner that the sow is prevented from lying down in her own excreta. Wet pens for the sows and the boar can be avoided by a good drainage of urine and faeces, and by an optimal temperature and ventilation rate in the units. Ensurance of ade-

quate water intake and minimisation of the sedentary behaviour of sows may prevent infection of the lower urinary tract. Sows with locomotor disorders should be treated properly or they should be culled.

The culling of repeat-breeding, discharging sows decreases the likelihood of horizontal transfer of pathogens and minimises environmental contamination. In addition, culling of chronically affected sows may allow improvements in conception rates, facility utilisation, and consequently economic returns. Purchase of breeding stock from herds without history of urogenital disease

should be encouraged. A balanced age-structure without too many gilts and without too many old sows should be pursued. In some herds, extending the lactation period to more than 21 days appeared to be beneficial.

Prophylactic treatment of all sows and boars is occasionally practised in an attempt to reduce the infection pressure on the farm, and to support the aforementioned routines. However, antimicrobial treatments are usually disappointing and they should not be recommended in most cases of vulval discharge.

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