Isolation of *Erysipelothrix rhusiopathiae* from aborted lambs in Iran: A case report

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Abstract:

Ewe abortion and neonatal mortality are serious problems to sheep farmer. The objective of this paper was to report isolation of *Erysipelothrix rhusiopathiae* from aborted fetuses in a flock in Tehran, Iran. Abortion occurred in 10% of ewes in the flock. The fetuses were well developed and pinpoint, necrotic-like lesions were recorded on the placental cotyledons, whilst the inter-cotyledonary areas appeared normal. *E. rhusiopathiae* was isolated in pure culture and heavy growth were seen in abomasumal fluid, lungs, heart and liver of fetuses and vaginal discharge of the aborted ewes. The grown bacteria were identified using conventional bacteriological technique and *Erysipelothrix rhusiopathiae* was confirmed. On the basis of the available evidence, *Erysipelothrix rhusiopathiae* might be one of the ovine abortion causes in Iran.

Case history

The most pathogens involved in ewe abortions in Iran are *Brucella melitensis*, *Campylobacter fetus fetus*, *Salmonella abortus ovis*, and *Chlamidophila abortus*. These pathogens are responsible for about 80% of abortions in ewes (Baird and Gonzalez, 2003; Burriel, 2004; Martin and Aitken, 2000; West et al., 2002; Youngquist and Therelfall, 1997). Many reports have described other pathogens as the causative agents of ovine abortion.

Erysipelothrix (E.) rhusiopathiae is a slender gram-positive nonsporulating rod shaped bacterium, belonging to the family Erysipelotrichaceae that is a facultative anaerobe (Verbarg et al., 2004). This organism is the well-known causative agent of erysipelas septicemia in swine (Radostits et al., 1994). *E. rhusiopathiae* and infections caused by this organism are spread worldwide, and affect a wide variety of vertebrate and invertebrate species. This organism causes infections in humans, birds, ewes, fishes, reptiles and may cause clinical disease in dogs as well (Brooke and Riley, 1999; Takahasi et al., 2000).

Infection with *Erysipelothrix* also occurs in sheep and most common manifestation is polyarthritis and lameness (Giles, 1981; Jubb et al., 1985). Other forms of the infection reported are valvular endocarditis (Maclachlan, 1978), pneumonia and septicemia with pulmonary abscesses in adult ewes (Griffiths et al., 1991), septicemia with diarrhea, arthritis, and meningitis (Nicolas et al., 1980), cutaneous infections (Griffiths et al., 1991) and abortion (Fthenakisa et al., 2006). From literature review available there is only a report of abortion associated with *E. rhusiopathiae* in Greece (Fthenakisa et al., 2006).

Clinical presentation

The outbreak of abortion and stillbirth has occurred on a sheep farm that has 250 heads of native-breed ewes and goats around Tehran province. In early November 2010, two aborted fetuses along with their mother brought to veterinary research and teaching hospital (VRTH), University of Tehran.

In clinical examination of aborting ewes, there

Table 1. Results of bacteriological works on the isolated bacteria from fetuses and placenta of affected ewes.

Bacteriological characteristics	
Colonial morphology Growth on Columbia agar	**Convex, circular, pinpoint colonies with -haemolysis**
Microscopic morphology	**Gram + rod, arranged in single cells or in short chains**
Aerobic growth	+
Growth under CO2	+
Results of biochemical tests	
Growth on Methyl Red (MR)	-
Growth on Voges Prokauer (VP)	+
Growth on Mac Conkey Agar	-
Growth on Loffler	-
Lactose fermentation	+
Arabinose fermentation	-
Catalase activity	-
Aesculin hydrolysis	-
Motility	-
Trehalose fermentation	-
Salicine fermentation	+
Maltose fermentation	+
Galactose fermentation	+
Oxidase activity	-
Sucrose fermentation	+
Glucose fermentation	+
Indole production	-
Sorbitol fermentation	+
Mannitol fermentation	+
H2S production on TSI agar	+
Nitrate reduction	-
Citrate	-
lactase activity	+

was no sign of other diseases; however, blood samples for serological test were taken. The Rose-Bengal test (brucellosis detector) was negative. The aborted fetuses were well-developed and their crown-rump length was 33 and 35 centimeter (fetuses had about 100 days age).

On the fetal membranes, pinpoint, necrotic-like lesions on the cotyledons were seen and there was no abnormality in the inter-cotyledonary areas. The aborted fetuses were necropsied for further examinations. Emphysematous lungs were the only defect found.

Diagnostic testing

Samples were taken from lungs, liver, heart, abomasumal fluid and vaginal discharge for bacteriological culture. The samples were cultured on blood agar incubated aerobically and an anaerobically at 37 °C for up to 72 h. Circular, convex, pinpoint, mildly -hemolytic colonies, with similar morphology were isolated in pure culture and heavy growth was seen in all cultured samples. All the colonies, from all samples, were identified as *E. rhusiopathiae*. The results of bacteriological works are summarized in Table 1.

Assessments

E. rhusiopathiae is a well-established causal agent of reproductive problems (including abortions) in sows (Henry and Kelly, 1979; Hoffmann and Bilkei, 2002) it had also been associated with abortions in women (Anusz, 1986) and guinea pigs (Okewole, 1989). According to the authors' knowledge there is only one report of abortion associated with *E. rhusiopathiae* in sheep. In that report, pigs and sheep were rearing together, hence pigs play the main role in transmitting the organism to ewes. Also, there is a short communication about *Erysipelothrix* septicemia in neonatal lambs in Mashhad in 1997. In that outbreak, it appears that the rout of infection was

through the umbilical cord (Rad et la., 1998). The main reservoirs of the organism in nature are pigs and they may excrete the organism primarily in their feces, but also in their oral or nasal secretions (Norrung, 1987) and consequently contaminate their environment.

Erysipelas in sheep is usually a percutaneous infection, entry being gained through docking castration wounds, shear wounds and cut abrasions acquired during dipping. The possibility of the infection being transmitted via the umbilical cord has been mentioned, although it has not been proved (Jubb et al., 1985).

This organism is able to produce a neuraminidase, which enhances adhesion of the organism in endothelium thus; it facilitates blood vessel destruction leading to ischemic lesions (Nakato et al., 1986; Nakato et al., 1987). This enzyme is considered to be the principal factor of pathogenicity for this bacterium (Wood, 1999). Necrosis of placental cotyledons, and consequently fetal death were some pathological findings in the placenta of affected animals.

These lesions also were present in report of Fthenakisa et al., 2006. The yellow-colored amniotic plaques found on the fetal membranes, likely meconium staining, were consequence of fetal stress, as it has previously been suggested in macaque and human embryos (King and Blankenship, 1997).

Although penicillin is the antibiotic of choice in erysipelas infections, enrofloxacin was effectively used as a prophylactic agent.

According to the latest available and updated information, isolation of *E. rhusiopathiae* from aborted fetuses has not been reported in Iran. As no sow farming exist inside Iran, therefore, the source of this bacterium warranted further studies.

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References

1. Anusz, Z. (1986) Brucellosis and other zoonoses-1984. Przegl. Epidemiol. 40: 205-211.
2. Baird, G., Gonzalez, L. (2003) Campylobacter and *Salmonella* abortion in sheep. Moredun Found. News 4: 1.
3. Brooke, C., Riley, T. (1999) "*Erysipelothrix rhusiopathiae*: bacteriology, epidemiology and clinical manifestations of an occupational pathogen". J. Med. Microbiol. 48: 789-99.
4. Burriel, A.R., Christodoulopoulos, G., Bisias, G., Fthenakis, G.C. (2004) Comparison of fluorescence polarization assay, indirect ELISA and competitive ELISA methods for diagnosis of *Brucella melitensis*-infection in small ruminants. Small. Rumin. Res. 54: 243-247.
5. Fthenakisa, G.C., Christodoulopoulosa, G., Leontidesa, L., Tzorab, A. (2006) Abortion in ewes associated with *Erysipelothrix rhusiopathiae*. 63: 183-188.
6. Giles, N. (1981) Sheep lameness after dip. Vet. Rec. 108: 523.
7. Griffiths, I.B., Done, S.H., Readman, S. (1991) *Erysipelothrix pneumonia* in sheep. Vet. Rec. 128: 382-383.
8. Henry, S., Kelly, B. (1979) Swine abortion associated with use of live erysipelas vaccine, J. Am. Vet. Med. Assoc. 175: 453-454.
9. Hoffmann, C.W., Bilkei, G. (2002) Case study: chronic erysipelas of the sow-a subclinical manifestation of reproductive problems, Reprod. Dom. Anim. 37: 119-120.
10. Jubb, K.V.F., Kennedy, P.C., Palmer, N. (1985) Pathology of Domestic Animals. (3rd ed.). Academic Press. London, UK.
11. King, B.F., Blankenship, T.N. (1997) Immuno-histochemical localization of fibrillin in developing macaque and term human placentas and fetal membranes, Micros. Res. Tech. 38: 42-51.
12. Maclachlan, G.K. (1978) Ovine endocarditis from *Erysipelothrix* insidiosa. Vet. Rec. 102:150.
13. Martin, W.B., Aitken, I.D. (2000) Diseases of Sheep. (3rd ed.) Blackwell Science Publications, Oxford, UK.
14. Nakato, H., Shinomiya, K., Mikawa, H. (1986) Possible role of neuraminidase in the pathogenesis of arthritis and thrombocytopenia induced in rats by *Erysipelothrix rhusiopathiae*. Pathol. Res. Pract. 181: 311-319.

15. Nakato, H., Shinomiya, K., Mikawa, H. (1987) Adhesion of *Erysipelothrix rhusiopathiae* to cultured rat aortic endothelial-cells-role of bacterial neuraminidase in the induction of arthritis, Pathol. Res. Pract. 182: 255-260.
16. Nicolas, J.A., Pestre-alexander, M., Chauchef, S. (1980) *Erysipelothrix rhusiopathiae*: its pathogenic role in the lamb. Bull. I'Acad. Vet. France. 53:529-532.
17. Norrung, V., Munch, B., Larsen, H.E. (1987) Occurrence, isolation and serotyping of *Erysipelothrix rhusiopathiae* in cattle and pig slurry. Acta. Vet. Scand. 28: 9-14.
18. Okewole, P.A. Odeyemi, P.S., Oyetunde, I.L., Irokanulo, E., Chima, J.C. (1989) Abortion in guinea pigs. Vet. Rec. p.124: 248.
19. Rad, M., Seifi, H.A., Movassaghi, A.R. (1998) *Erysipelothrix* Septicaemia in Neonatal Lambs. J. Vet. Med. B. 45:573-574.
20. Radostits, O.M., Blood, D.C., Gay, C.C. (1994) Veterinary medicine. (8^{th} ed.) Bailliere Tindall, London, UK.
21. Takahasi, T., Fujisawa, T., Yamamoto, K., Kijima, M., Takahashi, T. (2000) Taxonomic evidence that serovar 7 of *Erysipelothrix* strains isolated from dogs with endocarditis are *Erysipelothrix* tonsillarum. J. Vet. Med. B. 47: 311-313.
22. Verbarg, S., Rheims, H., Emus, S., Fruhling, A., Kroppenstedt, R.M., Stackebrandt, E., et al. (2004) *Erysipelothrix* in opinata sp. nov., isolated in the course of sterile filtration of vegetable peptone broth, and description of Erysipelotrichaceae fam. nov. Int. J. Syst. Evol. Microbiol. 54: 221-225.
23. West, D.M., Bruere, A.N., Ridler, A.L. (2002) The Sheep: Health, Disease and Production. 2nd edition. Veterinary Continuing Education-Massey University, Palmerston North.
24. Wood, R.L. (1999) Erysipelas. In: Diseases of Swine. Straw, B.E., Allaire, S.D., Mengeling, W. L., Taylor, D.J. (eds.). (8^{th} ed) Blackwell, Oxford, UK. p. 419-430.
25. Youngquist, R.S., Therelfall, W.R. (1997) Current Therapy in Large Animal Theriogenology, Saunders, Philadelphia, USA.

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جداسازی اریزی پلوتریکس روزیوپاتیه از جنین‌های سقط شده در یک گله گوسفند در ایران- گزارش مورد

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چکیده

سقط جنین و مرگ و میر نوزادان در میش، مشکل جدی پرورش دهندگان گوسفند است. هدف این مقاله گزارش جداسازی اریزی پلوتریکس روزیوپاتیه از جنین‌های سقط شده در یک گله گوسفند در تهران، ایران می باشد. سقط جنین ۱۰٪ از میش‌های گله را درگیر کرده بود. جنین‌ها به خوبی رشد یافته بوند و در کوتیلودن‌ها نقاط سفید رنگ نکروزه‌ای جلب توجه می‌کرد، ولی جفت در حد فاصل کوتیلودن‌ها سالم بود و ضایعه ماکروسکوپی در این قسمت‌ها مشاهده نگردید. اریزی پلوتریکس روزیوپاتیه از محتویات شیردان، ریه‌ها، قلب و کبد جنین‌ها و ترشحات واژن میش‌های سقط کرده به صورت کشت خالص و با رشد زیاد جدا شد. هویت باکتری جدا شده با استفاده از روش‌های مرسوم باکتریولوژیک تأیید شد. آزمون‌هایی برای تشخیص سایر علل شایع سقط جنین گوسفند انجام شد، اما هیچ مدرکی دال بر دخالت عوامل دیگر وجود نداشت. بر اساس تمام شواهد موجود، عامل سقط جنین در این گله اریزی پلوتریکس روزیوپاتیه تشخیص داده شد.

واژه‌های کلیدی: گوسفند، سقط جنین، اریزی پلوتریکس روزیوپاتیه، مرده‌زایی.

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