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- Alexopoulos, C., Kritas, S.K., Kyriakis, C.S, Tzika, E. and Kyriakis, S.C., 2005. Sow performance in an epidemically porcine reproductive and respiratory syndrome (PRRS)- infected farm after sow vaccination with an attenuated PRRS vaccine. *Vet Microbiol.* 111: 151-157.
- Allende, R., Kutish, G.F., Laegreid, W., Lu, Z., Lewis, T.L., Rock, D.L., Friesen, J., Galeota, J.A., Doster, A.R. and Osorio, F.A., 2000. Mutation in the genome of porcine reproductive and respiratory syndrome virus responsible for the attenuation phenotype. *Arch. Virol.* 145: 1149-1161.
- Amonsin, A., Kedkovid, R., Puranaveja, S., Wongyanin, P., Suradhat, S. and Thanawongnuwech, R., 2009. Comparative analysis of complete nucleotide sequence of porcine reproductive and respiratory syndrome virus (PRRSV) isolates in Thailand (US and EU genotype). *Virol. J.* 6: 143.
- Beilage, E.G., Nathues, H., Meemken, D., Harder, T.C., Doherr, M.G., Grotha, I. and Greiser-Wilke, I., 2009. Frequency of PRRS live vaccine virus (European and North American genotype) in vaccinated and non-vaccinated pigs submitted for respiratory tract diagnostics in North-Western Germany. *Prev. Vet. Med.* 92: 31–37.
- Botner, A., Strandbygaard, B., Sorensen, K. J., Have, P., Madsen, K. G., Madsen, E. S., and Alexandersen, S., 1997. Appearance of acute PRRS-like symptoms in sow herds after vaccination with a modified live PRRS vaccine. *Vet. Rec.* 141: 497–499.
- Brouwer, J., Franken, K., de Jong, M.F., Voets, R., Dijkhuizen, A., Verheijden, J. and Komijn, R.E. 1994. PRRS: effect on herd performance after initial infection and risk analysis. *Vet. Q.* 16: 95-100.
- Cano, J.P., Dee, S.A., Murtaugh, M.P. and Pijoan, C., 2007a. Impact of a modified-live porcine reproductive and respiratory syndrome virus vaccine intervention on a population of pigs infected with a heterologous isolate. *Vaccine* 25: 4382–4391.
- Cano, J.P., Dee, S.A., Murtaugh, M.P., Trincado, C.A. and Pijoan, C.B., 2007b. Effect of vaccination with a modified-live porcine reproductive and respiratory syndrome virus vaccine on dynamics of homologous viral infection in pigs. *Am. J. Vet. Res.* 68: 565–571.
- Cavanagh, D. 1997. Nidovirales: a new order comprising Coronaviridae and Arteriviridae. *Arch. Virol.* 142: 629-633.
- Cha, S-H., Choi, E-J., Park, J-H., Yoon, S-R., Song, J-Y., Kwon, J-H., Song, H-J. and Yoon, K-J., 2006. Molecular characterization of recent Korean porcine reproductive and respiratory syndrome (PRRS) viruses and comparison to other Asian PRRS viruses. *Vet. Microbiol.* 117: 248–257.

- Cheon, D.S. and Chae, C., 2001. Distribution of porcine reproductive and respiratory syndrome virus in stillbirth and live born piglets from experimentally infected sows. *J. Comp. Pathol.* 124: 231-237.
- Christianson, W.T., 1992. Stillbirth, mummies, abortions and early embryonic death. *Veterinary Clinical of North America: Food Animal Practice* 8: 623-639.
- Christopher-Hennings, J., Nelson, E.A., Hines, R.J., Nelson, J.K., Swenson, S.L., Zimmerman, J.J., Chase, C.C.L., Yaeger, M.J. and Bemfield, D.A. 1995. Persistence of porcine reproductive and respiratory syndrome virus in serum and semen of adult boars. *J. Vet. Diagn. Invest.* 7: 456-464.
- Chung, W.B., Chang, W.F., Hsu, M. and Yang, P.C. 1997. Persistence of porcine reproductive and respiratory syndrome virus in intensive farrow-to-finish pig herds. *Can. J. Vet. Res.* 61: 292-298.
- Damrongwatanapokin, S., Arsayuth, K., Kongkrong, C., Parchariyanon, S., Pinyochon, W., Tantaswasdi, U., 1996. Serological studies and isolation of porcine reproductive and respiratory syndrome (PRRS) virus in Thailand. *J. Thai Vet. Med. Assoc.* 47: 19-31.
- Dea, S., Gagnon, C. A., Mardassi, H., Pirzadeh, B. and Rogan, D., 2000. Current knowledge on the structural proteins of porcine reproductive and respiratory syndrome (PRRS) virus: comparison of the North American and European isolates. *Arch. Virol.* 145: 659-688.
- Dewey, C.E., Wilson, S., Buck, P. and Leyenaar, J.K., 2004. Effects of porcine reproductive and respiratory syndrome vaccination in breeding-age animals. *Prev. Vet. Med.* 62: 299-307.
- Dewey, C.E., Wilson, S., Buck, P., Leyenaar, J.K., 1999. The reproductive performance of sows after PRRS vaccination depends on stage of gestation. *Prev. Vet. Med.* 40: 233-241.
- Done, S.H., Paton, D.J. and White, M.E.C., 1996. Porcine reproductive and respiratory syndrome (PRRS): a review with emphasis on pathological, virological and diagnostic aspects. *Br. Vet. J.* 152: 153-174.
- Foss, D.L., Zilliox, M.J., Meier, W., Zuckermann, F. and Murtaugh, M.P., 2002. Adjuvant danger signals increase the immune response to porcine reproductive and respiratory syndrome virus. *Viral Immunol.* 15: 557-566.
- Gagnon, C.A. and Dea, S., 1998. Differentiation between porcine reproductive and respiratory syndrome virus isolates by restriction fragment length polymorphism of their ORFs 6 and 7 genes. *Can. J. Vet. Res.* 62: 110-116.
- Karniychuk, U.U., Saha, D., Geldhof, M., Vanhee, M., Cornillie, P., Van den Breck, W. and Nauwynck, H.J., 2011. Porcine reproductive and respiratory syndrome virus (PRRSV) causes apoptosis during its replication in fetal implantation sites. *Microb. Pathogenesis.* 51: 194-202.
- Keffaber, K.K., 1989. Reproductive failure of unknown etiology. *Am. Assoc. Swine Pract. News.* 1: 1-10.

- Kim, H.K., Yang, J.S., Moon, H.J., Park, S.J., Luo, Y., Lee, C.S., Song, D.S., Kang, B.K., Ann, S.K., Jun, C.H. and Park, B.K., 2009. Genetic analysis of ORF5 of recent Korean porcine reproductive and respiratory syndrome viruses (PRRSVs) in viremic sera collected from MLV-vaccinating or non-vaccinating farms. *J. Vet. Sci.* 10: 121–130.
- Kim, S.M., Han, T.U., Kang, S.Y., Shin, K.S., Kim, C.J., Kim, J.T. and Kim, H.S., 2002. Seroprevalence of antibody to porcine reproductive and respiratory syndrome virus in diagnostic submissions. *J. Vet. Sci.* 3: 159–161.
- Labarque, G., Van Reeth, K., Nauwynck, H., Drexler, C., Van Gucht, S. and Pensaert, M., 2004. Impact of genetic diversity of European-type porcine reproductive and respiratory syndrome virus strains on vaccine efficacy. *Vaccine* 22: 4183–4190.
- Lager, K.M., Mengeling, W.L. and Wesley, R.D., 2003. Strain predominance following exposure of vaccinated and naïve pregnant gilts to multiple strains of porcine reproductive and respiratory syndrome virus. *Can. J. Vet. Res.* 67: 121–127.
- Li, B., Fang, L., Liu, S., Zhao, F., Jiang, Y., He, K., Chen, H. and Xiao, S., 2010. The genomic diversity of Chinese porcine reproductive and respiratory syndrome virus isolates from 1996 to 2009. *Vet. Microbiol.* 146: 226–237.
- Li, Y., Wang, X., Bo, K., Wang, X., Tang, B., Yang, B., Jiang, W. and Jiang, P., 2007. Emergence of highly pathogenic porcine reproductive and respiratory syndrome virus in the Mid-Eastern region of China. *Vet. J.* 174: 577–584.
- Maldonado, J., Segalés, J., Martínez-Puig, D., Calsamiglia, M., Domingo, M. and Artigas, C., 2005. Identification of viral pathogens in aborted fetuses and stillborn piglets from cases of swine reproductive failure in Spain. *Vet. J.* 169: 454–456.
- Martelli, P., Cordioli, P., Alborali, L.G., Gozio, S., de Angelis, E., Ferrari, L., Lombardi, G. and Borghetti, P., 2007. Protection and immune response in pigs intradermally vaccinated against porcine reproductive and respiratory syndrome (PRRS) and subsequently exposed to a heterologous European (Italian cluster) field strain. *Vaccine* 25: 3400–3408.
- Martelli, P., Gozio, S., Ferrari, L., Rosina, S., De Angelis, E., Quintavalla, C., Bottarelli, E. and Borghetti, P., 2009. Efficacy of modified live porcine reproductive and respiratory syndrome virus (PRRSV) vaccine in pigs naturally exposed to a heterologous European (Italian cluster) field strain: Clinical protection and cell-mediated immunity. *Vaccine* 27: 3788–3799.
- Meng, X.J., 2000. Heterogeneity of porcine reproductive and respiratory syndrome virus: implications for current vaccine efficacy and future vaccine development. *Vet. Microbiol.* 74: 309–329.
- Meng, X.J., 2000. Heterogeneity of porcine reproductive and respiratory syndrome virus: implications for current vaccine efficacy and future vaccine development. *Vet. Microbiol.* 74: 309–324.

- Meng, X.J., Paul P. S., Halbur P. G. and Lum M. A. 1995. Phylogenetic analyses of the putative M (ORF 6) and N (ORF 7) genes of porcine reproductive and respiratory syndrome virus (PRRSV): implication for the existence of two genotypes of PRRSV in the U.S.A. and Europe. *Arch. Virol.* 140: 745–755.
- Mengeling, W.L., Lager, K.M. and Vorwald, A.C., 1994. Temporal characterization of transplacental infection of porcine fetuses with porcine reproductive and respiratory syndrome virus. *Am. J. Vet. Res.* 55: 1391-1398.
- Mengeling, W.L., Lager, K.M. and Vorwald, A.C., 1998. Clinical consequences of exposing pregnant gilts to strains of porcine reproductive and respiratory syndrome (PRRS) virus isolated from field cases of “atypical” PRRS. *Am. J. Vet. Res.* 59: 1540-1544.
- Mengeling, W.L., Lager, K.M., Vorwald, A.C. and Clouser, D.F., 2003. Comparative safety and efficacy of attenuated single-strain and multi-strain vaccines for porcine reproductive and respiratory syndrome. *Vet. Microbiol.* 93: 25-38.
- Mengeling, W.L., Larger, K.M. and Vorwald, A.C., 1999. Safety and efficacy of vaccination of pregnant gilts against porcine reproductive and respiratory syndrome virus. *Am. J. Vet. Res.* 60: 796-801.
- Mortensen, S., Stryhn, H., Sogaard, R., Boklund, A., Stark, K.D.C., Christensen, J. and Willeberg, P., 2002. Risk factors for infection of sow herds with porcine reproductive and respiratory syndrome (PRRS) virus. *Prev. Vet. Med.* 53: 83–101.
- Murtaugh, M.P., Elam M.R. and Kakach, L.T., 1995. Comparison of the structural protein coding sequences of the VR-2332 and Lelystad virus strains of the PRRS virus. *Arch. Virol.* 140: 1451–1460.
- Murtaugh, M.P., Xiao, Z. and Zuckermann, F., 2002. Immunological responses of swine to porcine reproductive and respiratory syndrome virus infection. *Viral Immunology* 15: 533–547.
- Neumann, E.J., Kliebenstein, J.B., Johnson, C.D., Mabry, J.W., Bush, E.J., Seitzinger, A.H., et al. 2005. Assessment of the economic impact of porcine reproductive and respiratory syndrome on swine production in the United States. *J. Am. Vet. Med. Assoc.* 227: 385-392.
- Nielsen, J., Botner, A., Bille-Hansen, V., Oleksiewicz, M.B. and Storgaard, T., 2002. Experimental inoculation of late term pregnant sows with a field isolate of porcine reproductive and respiratory syndrome vaccine-derived virus. *Vet. Microbiol.* 84: 1–13.
- Noremark, M., Lindberg, A., Vagsholm, I. and Lewerin, S.S., 2009. Disease awareness, information retrieval and change in biosecurity routines among pig farmers in association with the first PRRS outbreak in Sweden. *Prev. Vet. Med.* 90: 1–9.
- O'Connor, B., Gauvreau, H., West, K., Bogdan, J., Ayroud, M., Clark, E.G., Konobey, C., Allan, G. and Ellis, J.A., 2001. Multiple porcine circovirus 2-associated abortions and reproductive failure in a multisite swine production unit. *Can. Vet. J.* 42: 551–553.

- Olanratmanee, E., Kunavongkrit, A. and Tummaruk, P., 2010b. Impact of porcine epidemic diarrhea virus infection at different periods of pregnancy on subsequent reproductive performance in gilts and sows. *Anim. Reprod. Sci.* 122: 42–51.
- Olanratmanee, E., Thanawongnuwech, R., Kunavongkrit, A. and Tummaruk, P., 2010a. Abortion rate in gilts and sows in porcine reproductive and respiratory syndrome virus (PRRS) sero-positive herds in Thailand. Proc. 36<sup>th</sup> International Conference in Veterinary Science (ICVS), Nonthaburi, Thailand, 3-5 November 2010.
- Olanratmanee, E., Thanawongnuwech, R., Kunavongkrit, A. and Tummaruk, P., 2011a. Sows mortality in porcine reproductive and respiratory syndrome virus (PRRSV) sero-positive herds in Thailand. Proc. 5<sup>th</sup> Asian Pig Veterinary Society Congress, 7-9 March 2011, Pattaya, Thailand, P. P24.
- Olanratmanee, E., Thanawongnuwech, R., Kunavongkrit, A. and Tummaruk, P., 2011c. Detection of porcine reproductive and respiratory syndrome virus (PRRSV) in the serum of gilts and sows after modified-lived PRRS vaccination. Proc. 10<sup>th</sup> Chulalongkorn-Veterinary Annual Conference, p. S40.
- Olanratmanee, E., Wangnaitham, S., Thanawongnuwech, R., Kunavongkrit, A. and Tummaruk, P., 2011b. Prevalence of porcine reproductive and respiratory syndrome virus (PRRSV) antigen positive uterine tissues in gilts culled due to reproductive disturbance in Thailand. *Trop. Anim. Health. Prod.* 43: 451-457.
- Oraveerakul, K., Punarriwatana, D., Luengyosuechakul, S., Tantasuparuk, W. and Kunavongkrit, A., 1995. The seroprevalence of porcine reproductive and respiratory syndrome (PRRS) virus among swine breeding farms in the central and north-eastern part of Thailand. *Thai J. Vet. Med.* 25: 233-240.
- Osorio, F.A., Zuckermann, F., Wills, R., Meier, W., Christian, S., Galeota, J. and Doster, A. 1998. PRRSV: Comparison of commercial vaccines in their ability to induce protection against current PRRSV strains of high virulence. Allen D. Leman Swine Conf, University of Minnesota College of Veterinary Medicine: p. 176-182.
- Prieto, C. and Castro, J.M., 2000. Pathogenesis of porcine reproductive and respiratory syndrome virus (PRRSV) in gestating sows. *Vet. Res.* 31:56–57.
- Prieto, C., Garcia, C., Simarro, I. and Castro, J.M., 2003. Temporal localization of porcine reproductive and respiratory syndrome virus in reproductive tissues of experimentally infected boars. *Theriogenology* 60: 1505-1514.
- Prieto, C., Suarez, P., Simarro, I., Garcia, C., Martin-Rillo, S. and Castro, J.M., 1997. Insemination of susceptible and preimmunized gilts with boar semen containing porcine reproductive and respiratory syndrome virus. *Theriogenology* 47: 647–654.
- Rathje, J.A., Andrews, J.J., Lum, M.A., Halbur, P.G., Paul, P.S. and Meng, X.J., 1996. Comparative pathogenicity of nine US porcine reproductive and respiratory syndrome

- virus (PRRSV) isolates in a five-week-old cesarean-derived, colostrum-deprived pig model. *J. Vet. Diagn. Invest.* 8: 11–20.
- Scortti, M., Jimenez, R., Prieto, C., Rio, C., Simarro, I. and Castro, J.M., 1999. Efficacy in gilts of fan inactivated PRRS vaccine against PRRS-induced reproductive disease. *Proc. 3<sup>rd</sup> International Symposium on PRRS and Aujeszky's disease*. Ploufragan, France: p. 289–289.
- Scortti, M., Prieto, C., Martínez-Lobo, F.J., Simarro, I. and Castro, J.M., 2006a. Effect of two commercial European modified-live vaccines against porcine reproductive and respiratory syndrome viruses in pregnant gilts. *Vet. J.* 172: 506–514.
- Scortti, M., Prieto, C., Simarro, I. and Castro, J.M., 2006b. Reproductive performance of gilts following vaccination and subsequent heterologous challenge with European strains of porcine reproductive and respiratory syndrome virus. *Theriogenology* 66: 1884–1893.
- Shin, J-H. and Molitor, T.W., 2002. Localization of porcine reproductive and respiratory syndrome virus infection in boars by *in situ* hybridization. *J. Vet. Sci.* 3: 87–95.
- Stevenson, G.W., Van Alstine, W.G., Kantz, C.L. and Keffaber, K.K., 1993. Endemic porcine reproductive and respiratory syndrome virus infection of nursery pigs in two swine herds without current reproductive failure. *J. Vet. Diagn. Invest.* 5: 432–434.
- Storgaard, T., Oleksiewicz, M. and Botner, A., 1999. Examination of the selective pressures on a live PRRS vaccine virus. *Arch. Virol.* 144: 2389–2401.
- Sur, J-H., Doster, A.R., Christian, J.S., Galeota, J.A., Wills, R.W., Zimmerman, J.J. and Osorio, F.A. 1997. Porcine reproductive and respiratory syndrome virus replicates in testicular germ cell, alter spermatogenesis, and induces germ cell death by apoptosis. *J. Virol.* 71: 9170–9179.
- Suradhat, S., 2006. Relationships between the immune system and stress reactivity in pig: visualizing the immune-neuroendocrine framework in action. *Thai J. Vet. Med.* 36: 9–18.
- Takai, Y. and Koketsu, Y., 2009. Double and triple matings associated with reproductive performance in first-serviced and reservised female pigs in commercial herds. *J. Vet. Med. Sci.* 71: 635–639.
- Thanawongnuwech, R. and Suradhat, S., 2010. Taming PRRSV: Revisiting the control strategies and vaccine design. *Virus Research* 154: 133–140.
- Thanawongnuwech, R., Amonsin, A., Tatsanakit, A. and Damrongwatanapokin, S., 2004. Genetics and geographical variation of porcine reproductive and respiratory syndrome virus (PRRSV) in Thailand. *Vet. Microbiol.* 101: 9–21.
- Thanawongnuwech, R., Brown, G.B., Halbur, P.G., Roth, J.A., Royer, R.L. and Thacker, B.J., 2000. Pathogenesis of porcine reproductive and respiratory syndrome virus-induced increase in Suscept to *Streptococcus suis*. *Vet. Pathol.* 37: 143–152.

- Tummaruk, P. and Tantilertcharoen, R., 2007. The antibody titer against PRRS and the viral detection by RT-PCR in replacement gilts. Proceeding of 33<sup>rd</sup> Thai Veterinary Medical Association, Sofitel Centara Grand, Bangkok, 31 October-2 November 2007. pp. 195-198.
- Tummaruk, P. and Tantilertcharoen, R., 2008a. Reproductive data and incidence of some reproductive diseases in gilts culled due to reproductive disturbance in Thailand. Proc 15<sup>th</sup> Congress of the Federation of Asian Veterinary Association, 27-30 October 2008, Bangkok, Thailand pp. P179-P180.
- Tummaruk, P. and Tantilertcharoen, R., 2008b. Seroepidemiological data on some reproductive diseases in replacement gilts in Thailand. Proc 15<sup>th</sup> Congress of the Federation of Asian Veterinary Association, 27-30 October 2008, Bangkok, Thailand pp. P181-P183.
- Tummaruk, P. and Tantilertcharoen, R., 2012. Seroprevalence of porcine reproductive and respiratory syndrome, Aujeszky's disease and porcine parvovirus in replacement gilts in Thailand. *Trop. Anim. Health Prod.* 44: 983-989.
- Tummaruk, P., Tantasuparuk, W., Techakumphu, M. and Kunavongkrit, A., 2010. Influence of repeat-service and weaning-to-first-service interval on farrowing proportion of gilts and sows. *Prev. Vet. Med.* 96: 194-200.
- Tummaruk, P., Tantasuparuk, W., Techakumphu, M. and Kunavongkrit, A., 2004. Effect of season and outdoor climate on litter size at birth in purebred Landrace and Yorkshire sows in Thailand. *J. Vet. Med. Sci.* 66: 477-482.
- Tummaruk, P., Tantasuparuk, W., Techakumphu, M. and Kunavongkrit, A., 2010. Seasonal influence on the litter size at birth of pig are more pronounced in the gilt than sow litter. *J. Agri. Sci.* 148: 421-432.
- Tun, H.M., Shi, M., Wong, C.L.Y., Ayudhya, S.N.N., Amonsin, A., Thanawongnuwech, R. and Leung, F.C.C., 2011. Genetic diversity and multiple introductions of porcine reproductive and respiratory syndrome viruses in Thailand. *Vir. J.* 8: 164.
- Wensvoort, G., Terpstra, C., Pol, J.M.A., ter Laak, E.A., Bloemraad, M., de Kluyver, E.P., Kragten, C., van Buiten, L., Den Besten, A., Wagenaar, F., Broekhuijsen, J.M., Moonen, P.L.J.M., Zeststra, T., de Boer, E.A., Tibben, H.J., de Jong, M.F., van't Veld, P., Groenland, G.J.R., van Gennep, J.A., Voets, M., Verheijden, J.H.M. and Bramskamp, J., 1991. Mystery swine disease in the Netherlands: the isolation of Lelystad virus. *Vet. Quart.* 13: 121-130.
- Yoon, K.-J., Zimmerman, J.J., Swenson, S.L., McGinley, M.J., Eernisse, K.A., Brevik, A., Rhinehart, L.L., Frey, M.L., Hill, H.T. and Platt, K.B., 1995. Characterization of the humoral immune response to porcine reproductive and respiratory syndrome (PRRS) virus infection. *J. Vet. Diag. Invest.* 7: 305-312.
- Yoshii, M., Kaku, Y., Murakami, Y., Shimizu, M., Kato, K. and Ikeda, H., 2005. Genetic variation and geographic distribution of porcine reproductive and respiratory syndrome virus in Japan. *Arch Virology* 150: 2313-2324.

- Zhou, L. and Yang, H., 2010. Porcine reproductive and respiratory syndrome in China. *Virus Research* 154: 31–37.
- Zhou, Y.J., Hao, X.F., Tian, Z.J., Tong, G.Z., Yoo, D., An, T.Q., Zhou, T., Li, G.X., Qiu, H.J., Wei, T.C. and Yuan, X.F. 2008. Highly virulent porcine reproductive and respiratory syndrome virus emerged in China. *Transboundary and Emerging Diseases* 55: 152-164.
- Zimmerman, J., Benfield, D.A., Murtaugh, M.P., Osorio, F., Stevenson, G.W. and Torremorell, M., 2006. Porcine reproductive and respiratory syndrome virus (Porcine Arterivirus), In: Straw, B.E., Zimmerman, J., D'Allaire, S., Taylor, D.J. (Eds.), *Disease of swine*, 9<sup>th</sup> edition. Blackwell Publishing, Ames, Iowa, pp. 387–417.