Hygiene – the basis for successful inseminations

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Within the last decades artificial insemination (AI) has developed into an indispensable technique in the cattle breeding industry. Today almost 85% of all offspring are produced by AI which has turned into a routine procedure on dairy farms.
Beside the fertility of dam and sire and the technical demand of staff conducting inseminations, hygiene is of paramount importance to achieve acceptable reproductive outcomes. At the time of artificial insemination not only the semen but also bacteria will find their way into the uterus. Therefore, the use of an additional cover sheath on top of the regular AI sheath is strongly recommended.

Hygienic Sheath: for QuickLock, 44 cm long, 100/roll REF.: 17028/0100

These 44 cm long hygienic covers were developed to prevent vaginal contamination and to reduce the risk of importing bacteria into the uterus, which can induce endometritis affecting fertility. The AI device is loaded with the semen straw and equipped with the Universal sheath. After that, it is introduced into the additional hygienic sheath (Figure 1). The hygienic sheath is provided with a finger slit at its lower third which helps to fix it during loading of the instrument

Fig.: 1

and during the actual AI (Figure 2). The AI device with straw and sheath within its hygienic cover sheath is then introduced into the vagina. Before starting to carefully manipulate the AI device through the cervix, the hygienic sheath is pulled back in order to ensure that no bacteria are taken from the vagina or from outside into the uterus (Figure 3). The flexible and thin synthetic material of the sheath allows to easily perforate its front end with the AI device (Figure 4). The inseminator draws the hygienic sheath backwards with his finger using the slit and can therfore perform the technique with one hand.

Fig.: 2

Fig.: 3

Bacterial contamination, especially E.coli, in the uterus is closely linked to the generation of lipopolysaccharide (LPS) since these large molecules are found in the outer membrane of Gram-negative bacteria acting as endotoxins inducing strong immune responses implicating the generation of polymorphonuclear neutrophils (PMN). It is well accepted that the presence of semen in the uterus triggers a local immune response, the so called postmating inflammatory response, which usually subsides within a few hours (Schuberth et. al 2008). A higher proportion of uterine PNM four hours post insemination has been described as a potential indicator for postmating subclinical endometritis, implicating decreased conception rates (Kaufmann et al. 2009).

Fig.: 4

Recently, it was shown that cows exhibiting an increased PMN infiltration at the time point of artificial insemination after superovulation, had significantly lower numbers of embryos after flushing on day 7 than cows classified as negative for PMN (Drillich M. et al. 2012).

Furthermore, several studies investigated the detrimental effect of LPS on the bovine embryonic development. Oocytes exposed to LPS during maturation are less likely to develop to blastocyst stage after fertilisation. Embryos exposed to inflammatory mediators during development have fewer trophectoderm cells, implicating higher risks of embryonic losses (Gilbert RO. 2011).

Additionally, financial losses are associated with uterine infection depending on the direct costs of treatments, reduced milk yields and subfertility. Despite great effort to control uterine disease in cattle, the number of animals treated annually for endometritis has steadily increased since 2001. Furthermore, it has been shown that 30 – 60 % of all aborts result from uterine infections.

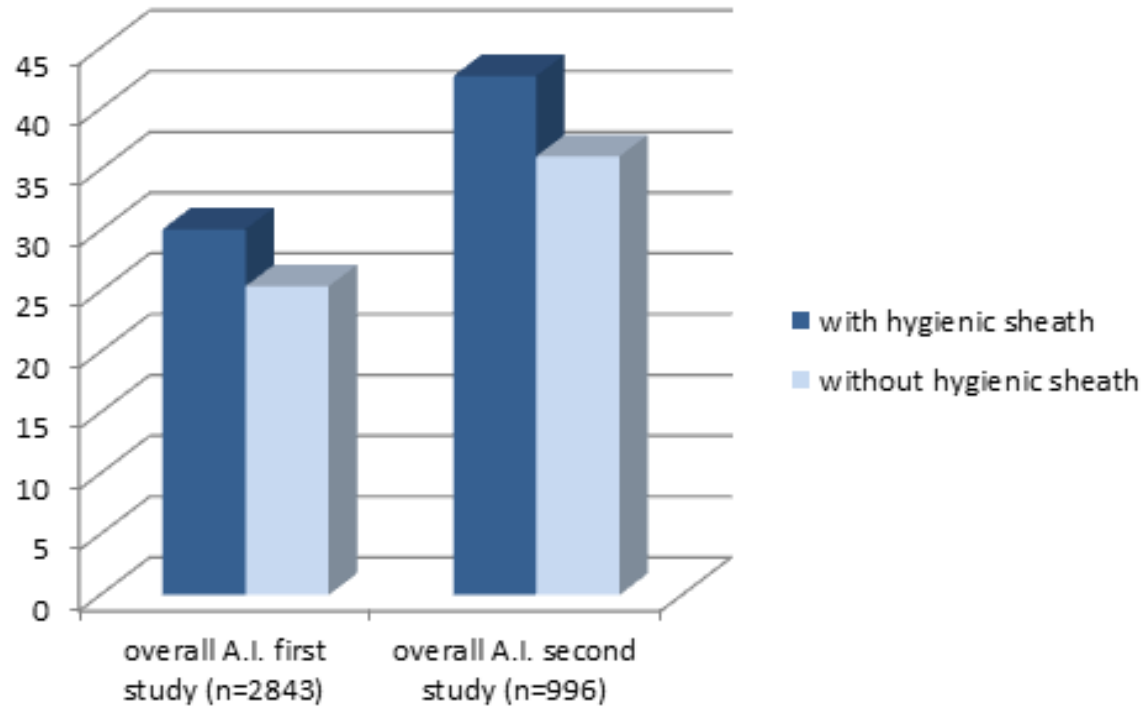
In 2011 a study of the University of Ohio demonstrated the positive effect of hygienic sheaths not only on protection of uterus infections but also on pregnancy rates (Schuenemann GM. et al. 2011). For this approach 1158 primiparous and 1062 multiparous lactating dairy cows were synchronized using the Ovsynch synchronization protocol before insemination. Altogether 2843 insemination were conducted and the cows randomly assigned to be either inseminated with or without use of disposable hygienic sheaths.
To evaluate uterine contamination a swab sample was taken from the tip of the insemination device after both treatments in order to identify the amount and type of bacteria.

The results show very clearly the protective character of hygienic sheaths. 98.2% of insemination devices which were not protected with a sheath showed a positive bacterial growth, whereas within the sheath protected counterparts only 51.9% were contaminated with bacteria at the time of artificial insemination. A similar trend could be observed regarding the bacterial density growth. The majority of positive samples from the group with cover sheaths had poor bacterial growth. Contrasting, the positive samples of the group without cover sheaths exhibited heavy colony growth of which E.coli was the essential part.

To exclude technical and environmental variance within the present experiment, all inseminations were conducted by the same technician in one herd with the same reproductive management. The results clearly indicate the positive effect of the hygienic sheath on insemination success. Inseminations in lactating dairy cows which were conducted with sheaths had a greater proportion of pregnancies (30.1%) per insemination compared to insemination procedures without sheaths (25.4%).
In a second study at the University of Ohio it was additionally differentiated between pregnancy rates after the first and second insemination. Over all inseminations those cows which were inseminated with sheaths reached pregnancy rates of 42.7% whereas the pregnancy rates of cows inseminated without sheaths were just 36.1%.

Concerning the first insemination no significant difference could be observed; 43.8% for inseminations with sheaths and 43.01% for insemination without sheaths. However, after the second insemination the effect of hygienic sheaths becomes obvious. Pregnancy rates were significantly higher for inseminations with sheaths (43.8%) than without sheaths (32.3%) (S. Bas et al. 2011).

Pregnancy rates after A.I. with and without hygienic sheaths



Conclusion

These findings underline the importance of hygiene during artificial insemination and distinguish the benefits of using additional hygienic cover sheaths in order to reduce the potential introduction of external contaminants such as E.coli into the uterine lumen at the time of insemination.

Finally, the accurate cleanliness of the whole insemination process has to become a top priority to achieve consistent reproductive results.

Literature

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