



A088E FTAI, FTET and AI

Cow and calf factors affect PAG values analysed in routine test milking

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Keywords: artificial insemination, milk recording, pregnancy diagnosis.

Detection of empty dairy cows early post-AI ensures rapid rebreeding and improved reproduction efficiency. Analysis of pregnancy-associated glycoproteins, PAG (IDEXX Laboratories, Portland, USA), is since September 2014 a service in the Swedish monthly milk recording. Herds enrolled in the official milk recording scheme (SOMRS) can analyse PAG at the earliest d 28 post-AI with a follow up analysis from d 100. Our aim was to evaluate cow (breed, lactation number, milk yield) and calf (gender, twins) effects on PAG values using results from the first year of service, until October 2015, and compare fertility statistics for cows with PAG analysis with cows diagnosed by rectal palpation. We also wanted to investigate if the d 100 follow-up could be analysed earlier to minimize days open.

The data set contained 33070 lactations, (32578 cows, mainly Swedish Red and Holstein breeds) with PAG analyses (n = 46214). PAG values <0.1 were recorded as non-pregnancy, 0.1-0.25 as insecure diagnosis and >0.25 as pregnancy. Effects of cow and calf factors were tested using linear regression with PAG as dependent and cow ID as random variable, including 21436 calvings. Fertility data, reported calvings, intervals from calving to last AI (CLI) and calving intervals (CI), were collected from SOMRS and analysed with linear regression with CLI and CI as dependent variables, including 86515 calvings.

Median sample day was d 54. Swedish Red cows (36.0% of lactations) had higher PAG values than Holstein (49.1% of calvings, P = 0.012). Values decreased with increasing lactation number (P < 0.001) and milk yield (P < 0.001). Pregnancies with a male calf (50.7% of the calves) and twins (4.1% of calvings) had higher PAG values (P < 0.001) than female calf and singleton pregnancy. Cows with insecure diagnosis (n = 2723) at analysis after d 28 were to 95% non-pregnant, only 5% gave birth. Calving to last AI was shorter in PAG herds than in herds using rectal palpation (P < 0.001), and CI was shorter in PAG herds during 2014 (P = 0.019) but not during 2015.

Comparing pregnancy outcome after PAG analysis from d 80 (13863 analyses, median day post-AI 117) and d 100 post-AI (11763 analyses, median day post-AI 121), the proportion non-pregnant not giving birth was 98.5% and 98.2%, respectively, and the proportion pregnant cows eventually giving birth was 80.9% and 81.3. We conclude that using the time-saving PAG analysis for pregnancy diagnosis will improve or maintain the herd fertility statistics compared to rectal palpation. PAG levels in milk vary significantly depending on cow and calf factors, which may have to be taken into account when investigating possible causes for false positive or negative analyses. Cows with insecure diagnosis should in most cases be considered to be empty and subjected to examination in order to be rebred. The follow-up sample at d 100 can be analysed at d 80 in order to decrease days open.



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A new deep-intrauterine artificial insemination device for cattle: XTREMIA.FIRST fertility results and a possible new instrument for embryo transfer

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Keywords: deep intra uterine insemination, embryo transfer.

One of the factors that can affect Non Return Rates (NRRs) is the insemination technique. Most commercial AI in cattle are performed into the uterine body by means of the Cassou device. Nevertheless, in horses and pigs semen deposition closer to the site of fertilization has been shown to improve pregnancy rates (PRs) while using lower insemination doses and poorly fertile semen (Verberckmoes, 2004).

A new AI concept called XtremiA was developed by a French start-up, Elexinn. The principle is to associate an ultrasonographic peri-ovulation check-up to verify the female's ability to be inseminated with a new device that can adapt to the horn's shape for semen deposition near the utero-tubal junction (UTJ).

A 5-months trial was set-up (July to November 2014) in cooperation with 3 French AI societies. 9 experienced AI technicians have tested the concept following a daily alternation: classic AI without peri-ovulatory check-up vs. the XtremiA method.

2377 females (229 heifers, 2148 cows) were inseminated using the new method vs. 5674 females (689 heifers, 4985 cows) for the control group (CG). Each AI technician performed between 123 and 447 XtremiAs. The main breeds in the sample were Montbéliarde (55.57% for XtremiA – 50.79% for CG) and Holstein. Most cows were inseminated for the 1st or 2nd time (59.66% and 23.52% for XtremiA – 61.02% and 23.44% for CG). 662 AIs were performed with sexed semen in the CG and 314 using the XtremiA method.

PRs were obtained by ultrasounds between D35 and D90 and were significantly higher ($P < 0.05$) for the sexed AI for the group with the XtremiA method (48.73%) than for the CG (42.30%) which means an improvement of 15.2% of the results (Linear effects mixed model – R). A non-significant improvement of PRs was obtained in conventional semen with XtremiA vs CG. Differences were obtained for heifers (51.97% with XtremiA and 46.01% for CG), animals in 1st lactation (45.06% vs 42.16%) and animals in 3rd lactation (41.78% vs 38.79%), but non-significant. PRs were also analysed regarding the AI technicians performances. Whilst variability between the lowest results and the others were between 4.40% and 10.86% for the control group, it increased from 9.86% to 20.23% with the XtremiA method. One of the best technicians increased his results from 41.18% of gestations for the CG to 53.65% for the tested group.

One of the most interesting advantages of the device is the capacity of its flexible catheter to follow the horn's shape. This property highlights an interest for another technical act: the embryo transfer. It could be an alternative to the conventional transfer technique in order to avoid spinal anaesthetic and to be more homogenous in the embryo deposition since each of them will be dropped up to 25cm inside of the chosen horn. The first samples of the catheter have been sent to Serge Lacaze and his team in order to undertake a field trial and get results of PRs to this new method of ET by fall 2016.



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Comparative study of seasonal epigenomic effects on sperm cells from Spanish and Swedish bulls

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Keywords: CASA, sperm viability, SCSA.

Parental stress induced by heat stress in summer could potentially cause adverse epigenetic changes in male gametes. The aim of this study was to compare possible seasonal epigenetic effects on the sperm quality of dairy bulls in Spain (n = 11) and Sweden (n = 10). Sperm samples were collected for freezing in winter (W), spring (S) and summer (SU); post-thaw sperm quality was analysed as follows: Computer-assisted analysis of sperm motility, Flow cytometric analysis of membrane integrity (SYBR14-PI; Invitrogen, Eugene, OR, USA), acrosome status (FITC-PNA; Sigma-Aldrich, Stockholm, Sweden) and chromatin integrity (DNA fragmentation index (%DFI)) were made and morphology was evaluated.

Analysis of variance was performed using Statistical Analysis System software. The statistical model (PROC MIXED) included the fixed effects of season, country and the interaction between season and country. The model also included the random effect of effect of bull, nested within country. Pairwise tests of significance were performed using t-test. $P < 0.05$ was considered statistically significant.

Curvilinear velocity was significantly higher in the Swedish samples in all seasons (mean \pm SD, W: 108.86 ± 15.25 vs. 138.11 ± 16.79 ; S: 115.65 ± 19.52 vs. 134.14 ± 18.69 ; SU: 104.95 ± 16.50 vs. 137.68 ± 14.78 , respectively), while straightness was significantly higher in the Spanish samples (W: 0.80 ± 0.03 vs. 0.69 ± 0.05 ; S: 0.81 ± 0.02 vs. 0.73 ± 0.05 ; SU: 0.79 ± 0.03 vs. 0.71 ± 0.04 ; respectively; $P < 0.05$). Spanish samples collected in summer showed a significantly higher ($P < 0.05$) proportion of sperm cells with intact membranes (55.19 ± 14.86 vs. 41.50 ± 23.35 , respectively). No significant differences ($P > 0.05$) in membrane integrity were found in the other seasons. The proportion of viable spermatozoa with reacted acrosome was significantly higher ($P < 0.05$) in the Spanish samples than in the Swedish samples in all seasons (W: 0.78 ± 0.40 vs. 0.36 ± 0.22 ; S: 0.83 ± 0.18 vs. 0.30 ± 0.24 ; SU: 0.93 ± 0.47 vs. 0.28 ± 0.28 ; respectively). No significant differences ($P > 0.05$) were found in sperm morphology and %DFI between countries. In conclusion, no epigenetic effects of season on sperm quality in terms of chromatin integrity were demonstrated. Spanish samples appear to have better quality than the Swedish.

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