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SHORT COMMUNICATION

Vaginal Mucus Resistivity Evaluation in Cattle: Reliability of the Swine Estrous Detector Probe During 16th-Hour Insemination Following Ovulation Synchronization

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ABSTRACT

Accuracy of insemination timing is a key determinant of high pregnancy rates in livestock breeding stations. The estrous detector probes are a recent introduction into the Nigerian livestock farming sector. Many often these probes are species-labeled and they measure changes in the vaginal mucus resistivity (VMR) during the stages of the estrous cycle. With respect to size and shaft conformation, the Draminski® swine estrous detector probe (sEDP) is quite similar to the bovine type. We investigated the reliability of the sEDP at insemination time on two farms designated as FM A and FM B. Cows (Bunaji, n=20 per farm) were evaluated for VMR at 16th hour post standard OvSynch protocol, with concurrent insemination on FM B only. The difference in the mean VMR between FM A (221(±)24.36) Ohms and FM B (254(±)35.59) Ohms was not significant ($p>0.05$). Sixteen cows (80%) at FM B were later (day 70) confirmed pregnant via rectal palpation and all calved at term. These findings suggest consistency in VMR evaluated with sEDP at insemination aswell as a high predictability for VMR associated with good pregnancy rates in dairy cattle. We conclude that Draminski® swine estrous detector probe is reliable in determining time of insemination in cattle breeding stations.

Key words: Swine estrous probe, vaginal mucus resistivity, insemination, OvSynch protocol,cattle

INTRODUCTION

Various methods have been employed over the years for optimizing breeding in dairy cattle and among such is evaluation of the vaginal mucus resistivity (VMR). Evaluation of VMR is a recent introduction into livestock husbandry in many parts of Africa, especially Nigeria. Vaginal mucus is produced by secretory cells of the endocervix in the cervical region of the genitalia and its resistivity, as a result of changing composition of its biochemical constituents, differ across the various stages of the estrous cycle (Elthohamy *et al.*, 1990; Noonan *et al.*, 1995; Tsiligianni *et al.*, 2001). Vaginal estrous probes are available in the market for the evaluation of VMR. These probes come in varying sizes for different species but it is

not clear if there are any more specific differences apart from the sizes. Hence, this study investigated the reliability of swine probe, which is of same thickness but slightly shorter shaft length compared to bovine probe, in evaluating VMR in Bunaji cows subjected to ovulation synchronization protocol.

MATERIALS AND METHODS

Study Site

The study was carried out at two private dairy farms located at Ido and Ibadan North Local Government Areas of Oyo State, Southwest, Nigeria. Both areas lie at latitude 7 ˚23' N and Longitude 3˚ 56'E.

Animals and Management

Forty Bunaji cows (n=20 per farm, >1-2 parities, >30-60 days post calving) were used for the study. The farms were designated FM A and FM B. The age of the animals ranged from 3-5 years with body weight of about 245-350kg and body condition score of 3.5-4 (no visible bony structure and abundant muscling) on a scale of 5 (Rasby *et al*., 2014). Cows on each farm were housed together in a large pen and were routinely taken out for grazing from 8am to 5pm daily. Supplementation of feeding with dried cassava peels and concentrates was done after cows have returned from grazing daily. Also, access of animals to clean water was not restricted on both farms.

Estrus Synchronization

Synchronization of estrus was carried out on both farms using OvSynch protocol.(Pursley *et al*., 1998). Cows were administered 100µg Lecirelin® (Bioveta, Czech Republic) on day 0 followed by 25mg Lutalyse® (Zoetis Inc., Spain) on day 7 and then a repeat of 100µg Lecirelin® (Bioveta, Czech Republic) on day 9. All injections were administered via intramuscular route.

Evaluation of Vaginal Mucus Resistivity (VMR)

The Swine Estrous detector probe (Draminski® Owocowa, Poland) was used to evaluate the VMR of the cows at the 16th hour post-OvSynch protocol. The vulva of each cow was cleaned with a moist cotton wool and the labia sparingly lubricated with K-Y jelly. Thereafter, the shaft of the probe was gently wiped with slightly moist cotton wool and then inserted into the anterior vagina through the vulva. The start button of the probe was turned on and the probe was briskly rotated thrice while pressing the start button each time to view the reading displayed on the monitor. The average of three consecutive readings was computed after examination of each cow.

Artificial Insemination (AI)

Cows on FM B only were inseminated at 16th hour post synchronization with Holstein-Friesian semen (ELVIS PL 005317975027 Poland) using standard artificial insemination protocol (Tsuma and Leigh, 2018).

Pregnancy Confirmation and Pregnancy Rate (PR)

Pregnancy confirmation was done via palpation per rectum of cotyledons at 70-day post insemination (Leigh, 2018). Pregnancy rate (PR) was obtained as the number of cows confirmed pregnant following AI, expressed in percentage (Pursley *et al*., 1998; Reiling, 2011).

Calving Rate

Calving rate (CR) was calculated as the number of calves obtained from cows that were inseminated, expressed in percentage (Reiling, 2011).

Statistical analysis

Data was analyzed using descriptive statistics. Mean and standard deviation of vaginal mucus resistivity at 16th hour post-OvSynch treatment from both farms were compared with Student t-test using the Statistical Package for Social Science (SPSS 23).

RESULTS

Figure 1 shows the comparison of the mean values of vaginal mucus resistivity (VMR) evaluated with the Swine probe at the 16th-hour post-

OvSynch treatment on Farm A and B. The difference between the mean values of VMR at FM A (221±24.36) Ohms and FM B (254±35.59) Ohms was not significant P>0.05.

Table I shows the pregnancy and calving rates of cows on FM B inseminated at 16th-hour post-OvSynch treatment. It showed that 80% (i.e.16 cows) were pregnant while 20% (i.e. 4 cows) were open at 70-day following rectal examination. All pregnant cows (80%) calved at term.

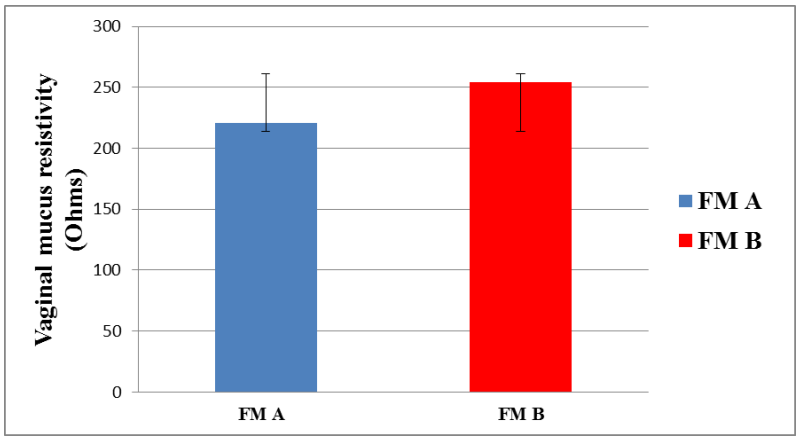

Figure 1: Values of vaginal mucus resistivity obtained with Swine probe at 16th-hour post-OvSynch treatment on Farm A and B.

TABLE I: Pregnancy and calving rates of cows on FM B following insemination at the 16th-hour post OvSynch treatment

Time of Pregnancy Diagnosis	Pregnancy rate %	Calving rate %	Open Cows %
70-day (n=20)	80	80	20

DISCUSSION

The close similarity in the vaginal mucus resistivity values suggests reliability as well as repeatability of the swine estrous detector probe in dairy cows. This observation ignites some interest first, because the probe was not specific for the species and second, its consistency in the values of vaginal mucus resistivity obtained in cows on both farms. Within the limits of the present study, it may not be possible to justify why a swine estrous probe will elucidate estrous parameters with such level of closeness in the bovine. However, our previous study (Leigh *et al*., 2018), which concluded that the swine estrous detector probe may be used in cow appeared to be consistent with the present finding with respect to repeatability of swine probe-monitored-vaginal mucus resistivity in cows. Information contained in Table I further supports the previous observation in this study. Both the pregnancy rate and calving rate were high suggesting the swine estrous detector probe as a reliable tool in the determination of the time of insemination that is associated with good conception and pregnancy rates. Although, cows in FM A were not inseminated, the comparability between the vaginal mucus resistivity on both farms suffices to suggest that such pregnancy rate would be obtained on FM A, had the cows been inseminated. The pregnancy rate obtained is not only high but appears to be associated with good conception rate with insemination at 16th hour post OvSynch treatment. Although, not the entire recommended window for insemination under OvSynch protocol as described by Pursley *et al.* (1998) had been investigated in this study, going by present finding, the 16th hour appears to be crucial for insemination in cows treated with OvSynch due to the observed high pregnancy rate/calving rate. It is concluded that the Draminski® swine estrous detector probe may be used to monitor vaginal mucus resistivity and thereby, determine the time of insemination in dairy cows.

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