

of both PVD and CYT ( $p < 0.01$ ) reflected in an increase of median days open (PVD: 158 (130 to 204); No-PVD: 118 (106 to 128); CYT: 159 (129 to 184); No-CYT: 110 (95 to 124)).

Cephapirin treatment was associated with a significant improvement of FSCR in cows with PVD (PVD-CEPH:  $40\% \pm 5$ , PVD-CONT:  $24\% \pm 4$ ;  $P = 0.01$ ), but not with CYT (CYT-CEPH:  $33\% \pm 6$ ; CYT-CONT:  $23\% \pm 5$ ;  $P = 0.07$ ). The treatment improved the pregnancy risk for PVD cows with a hazard ratios of 1.64 (1.18 to 2.29;  $p < 0.01$ ) for PVD (referent= CONT) and median days open were reduced (PVD-CEPH: 120 (94 to 134)).

## Significance

In conclusion, the results of the present study suggested that PVD diagnosed by vaginoscopy and CYT by cytobrush around 34 DIM were associated with a significant reduced risk of conception at first service and an increase median days open. Also, the results suggested that CEPH improved reproductive performance in PVD cows but not in cows with CYT.

# Using chitosan microparticles to prevent metritis in lactating dairy cows

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## Introduction

Metritis, an acute inflammatory disease of multiple layers of the uterine lining with systemic implications, affects 20 to 40% of the postpartum dairy cows and has marked welfare, health, production, reproduction, and economic consequences to the individual animal and the herd. In cows with risk factors such as dystocia, delivery of twin calves, retained placenta (RP) or still-birth the incidence ranges from 50 to 70%. Traditionally, antibiotics have been used to prevent or treat uterine disease. Ceftiofur hydrochloride is 1 of the 3 approved antibiotics for systemic administration for treatment of metritis in dairy cows, and it is the antibiotic of choice because it does not incur a milk withhold. The Food and Drug Administration, based on the risk to public health, and as an attempt to limit the use of third generation cephalosporins, banned the use of this class of drugs for disease prevention in food animals. Chitosan microparticles (CM) is a polysaccharide derived from chitin found in the exoskeleton of crustaceans, and at a concentration of 0.2%, was found to be as effective as ceftiofur hydrochloride at reducing intrauterine *E. coli*. The main aim of this study was to investigate whether CM could be used as an alternative to traditional antibiotics for the prevention of metritis in dairy cows.

## Materials and Methods

101 Holstein cows with the above mentioned reproductive risk factors were randomly assigned to 1 of

2 treatments 24 hours postpartum:

- CM (n = 51): intrauterine (iu) infusion of 8 g of CM dissolved in 40 mL of sterile water for 5 days
- Control (n = 50): iu infusion of 40 mL of sterile saline solution for 5 days.

Rectal temperature was recorded daily from 1 to 5 DIM and at 4, 7, 10, and 14 days-in-milk (DIM). Metritis was evaluated at 4, 7, 10, and 14 DIM, and was characterized by the presence of fetid watery vaginal discharge. Clinical endometritis (CE) was evaluated at 21 and  $28 \pm 2$  DIM, and was characterized by purulent discharge at 21 DIM and by mucopurulent discharge at 28 DIM. Milk yield was recorded daily for the first 30 DIM. Blood samples were collected at 1, 4, 7, 10, and 14 DIM and were assayed for NEFA and BHBA. Dichotomous outcomes were analyzed by logistic regression using the LOGISTIC procedure of SAS and continuous outcomes were analyzed by ANOVA for repeated measures using the MIXED procedure of SAS. Models included the effects of treatment, parity, specific risk factor, body condition score at enrollment, and interaction between treatment and other covariates. The effect of time and interaction between treatment and time was also included in repeated measures analyses. Differences with  $P < 0.05$  were considered significant and  $0.05 < P \leq 0.10$  was considered a tendency.

## Results

Treatment with CM resulted in a tendency for decreased incidence of metritis up to 7 DIM compared

with Control (45.1 vs 64.0%;  $P = 0.056$ ); however, there was no effect of CM treatment on metritis incidence at 4 (11.8 vs 18.0%;  $P = 0.46$ ), 10 (60.8 vs 72.0%;  $P = 0.23$ ), or 14 DIM (62.8 vs 72.0%;  $P = 0.32$ ). There was also no effect of CM treatment on the prevalence of endometritis at 21 (54.9 vs 60.0%;  $P = 0.61$ ) or 28 (56.3 vs 55.3%;  $P = 0.52$ ) DIM.

There was no effect of treatment or interaction between treatment and time on mean rectal temperature, BHBA concentrations, or milk yield; however, there was an interaction between treatment and time on NEFA concentrations in which NEFA concentrations were

lower for CM compared with Controls at 10 DIM (464.2 vs 639.5  $\mu\text{mol/L}$ ;  $P = 0.03$ ).

### Significance

Treatment with CM resulted in decreased incidence of metritis at 7 DIM and decreased concentrations of NEFA at 10 DIM; therefore, treatment with CM has the potential to improve uterine health and energy status in dairy cows. Nonetheless, treatment dose or treatment regimen still needs improvement, as differences in metritis incidence could not be maintained beyond 7 DIM.

## Using Y chromosome fragment testing to identify potentially sub-fertile beef heifers

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### Introduction

Selecting and developing fertile replacement heifers is essential for reproductive efficiency in beef herds. Fertile heifers that reach puberty and conceive early and calve early in their first calving season are generally more productive and have increased longevity compared to heifers that calve late in their first calving season. Costs of developing heifers through their first breeding season are substantial due to nutritional requirements for growth and maintenance. Recent literature has suggested new genetic technologies that may allow producers to select replacements based on genetic soundness. Genetic testing identified the presence of Y chromosome fragments in pools of infertile cows (McDaneld, Kuehn et al, 2012). Tests such as this could provide cow-calf producers with a convenient and economical tool to select replacement heifers before development costs are incurred. This study investigated the presence of Y chromosome fragments in 3 heifer development programs in Georgia. The goal of this study was to determine the presence of the Y chromosome anomaly in this population of replacement heifers.

### Materials and Methods

Heifers were weighed and reproductive tract score and pelvis area was determined prior to estrus synchronization. Heifers were synchronized with a 14 day progesterone CIDR-prostaglandin (PG) protocol and timed AI (TAI) at 66 hours after PGF administration. Bulls were placed with the heifers 7 days after TAI for 58

days. Heifers were pregnancy checked with ultrasound 35 days after bulls were removed. Blood samples were taken from heifers in 3 development programs in Tifton (n = 196), Calhoun (n = 164), and Forsyth (n = 96), Georgia. Blood was collected from the jugular vein in the neck using 6 ml EDTA vacu-tubes. The blood was then put on ice and shipped to Clay Center, Nebraska where it was analyzed for the Y chromosome anomaly. Regions of the Y chromosome identified as being present in infertile females were tested by QRT-PCR. Six SNP (Y\_SNP\_1 – Y\_SNP\_6) identified by a Bovine HD bead chip assay were evaluated in the populations of cattle. Primers for PCR (Y\_SNP\_1 – Y\_SNP\_6) were designed with Primer3 from flanking sequence provided by Illumina (McDaneld, Kuehn et al, 2012). A set of sex determination primers designed to sex embryos (BOV\_Y) were also evaluated along with a control set of primers from the (GAPDH) gene to assess DNA quality and quantity (McDaneld, Kuehn et al, 2012).

### Results

Overall pregnancy rate was 82.2%. Of the 456 animals tested for the Y chromosome fragment anomaly, 1 (0.2%) heifer, which was previously identified as a freemartin, tested positive.

### Significance

We concluded that in this group of heifers, testing for Y associated genetic material did not aid in identifying potentially subfertile heifers.