

day 1 CS and day 4 MK lipid profiles in PRMD resistant and susceptible cows, and to determine if lipids in this CS and/or MK secreted after the transition period can be used as biomarkers to predict risk for development of PRMD.

### Materials and Methods

A prospective study was conducted with randomly chosen, age, lactation, parity matched (primiparous (n=101), multiparous (n=108)) Holstein cows (Brigham Creek Dairy, Elberta, UT). Colostrum (CS, 0 to 12 h postpartum) and milk (MK, day 4 postpartum) were obtained and health records maintained. Samples were submerged in crushed ice, flash frozen with liquid nitrogen, and stored at -80 C until analysis. Samples were thawed, centrifuged to isolate the lipid fraction, extracted with chloroform:isopropanol (2:1.25), the bottom organic phase removed and diluted 500x with chloroform:methanol:isopropanol (2:1:1.25) with 15mM ammonium acetate. Archeol 6nM was used as an external standard. Lipidomic analyses of CS and MK from matched PRMD resistant and susceptible cows were performed with 6230 time-of-flight mass spectrometry (MS) via electrospray ionization to detect + and - charged lipids. Student t-test identified significant lipid molecular weights in CS and MK. Lipids significant to health score (HSC) ranking: 0 (healthy) or 1 (PRMD treated/culled/died within 60 DIM) were determined via step-wise discriminant analysis. PROC GLM, independent variable HSC, determined if CS or MK measures were different for PRMD cows ( $p < 0.05$  for all tests). LIPID MAPS, QSTAR Pulsar I quadrupole orthogonal time-of-flight MS through an IonSpray Source, 6530 accurate-mass quadrupole/time-of-flight MS and MS/MS fragmentation were used for lipid identification.

### Results

Differences existed between lipid profiles in CS and MK from cows that remained healthy (n=22) or later developed PRMD (n=20). Lipidomic analyses of 42 CS and 36 MK samples revealed 3 lipids in CS that were significant predictors of PRMD risk with 90% sensitivity, 88% specificity, a positive (PV+) predictive value for PRMD of 87% and negative result (PV-) of 92%, and 2 lipids in MK with 89% sensitivity, 90% specificity, PV+ of 89%, and PV- of 90%. Lipid biomarkers classified as diacylglycerols and triacylglycerols were found to be significant predictors of PRMD HSC and were identified in CS: 1) C37H62O4, 2) C35H68O5+NH4, and C55H98O6+H, and MK: 1) C39H76O5+NH4, 2) **C57H108O6**. The presence or absence of each lipid had an estimated effect on HSC. A positive number raised the health score, predicting increased risk for metabolic disease (cow was at increased risk for PRMD), while a negative number lowered it (cow was likely to remain healthy).

### Significance

Beginning lactation colostrum and milk lipidomics in periparturient cows may provide biomarkers indicative of resistance or susceptibility to PRMD. Testing for the presence of specific lipids in these substrates may be a management tool that can be used during the peripartum period to provide an economical method to identify cows resistant or susceptible to PRMDs, for retention, breeding, early treatment intervention, or culling decisions to increase profit margins.

## Practitioner survey: can a new obstetrical instrument really make the difference?

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### Introduction

Dystocia in cattle affects up to 50% of primiparous and 30% of adult cows<sup>1</sup>. Obstetrics are crucial in order to reduce stillbirth rates. GYNstick<sup>2,3,4</sup>, a new tool for treating dystocia, has been available for practitioners for almost 3 years. Nearly 400 vets in Germany and Austria are currently working with this obstetrical instrument in their daily practice, and approximately 2000 vets are using it worldwide. A survey was

conducted among 49 German and 5 Austrian practitioners to obtain feedback about their experience with this instrument and their recommendations for its use.

### Materials and Methods

Fifty-four veterinarians responded to an online questionnaire initiated by the Faculty for Veterinary Medicine of the University of Giessen. Veterinarians were chosen based



on their practical experience with this new instrument for at least 1 year. The data analysis (SPSS Version 22; IBM) compared the veterinarians' experiences by gender, age, and frequency of dystocia interventions.

## Results

The majority ( $n=30$ , 56.6%) of the respondents were female veterinarians. Mean year of graduation was 2003 (female = 2007; male = 1990). The age of the practitioners was evenly distributed (51 % under 40 years; 45 % are older). Seventy-three percent of females and 22% of males were less than 40 years of age. Most of the practitioners (64%) stated that GYNstick was recommended to them by another colleague. Twenty-six percent were informed by advertising and 20% by scientific literature. Females recommended the tool more often than males (70% vs. 57%,  $p=0.23$ ;  $\chi^2$  test). The geometrical mean of dystocia cases per week was 1.52 (female, 1.44 vs male, 1.63;  $p=0.206$ ; t-test). For 83% of the responders, the correction of a twisted uterus was the most frequent indication for using the instrument. This was independent of sex ( $p=0.46$ ,  $\chi^2$  test). Correction of malpositionings was the second most frequent indication (65%). Females used the GYNstick more frequently for malpositioned calves than males ( $p=0.04$ ,  $\chi^2$  test). The third most common indication was displaced extremities (69%). Lastly, 95% of users reported the avoidance of fetotomy as the 4th most important indication for using the GYNstick. The numbers of dystocia/week did not influence these results. Most veterinarians (92.5 %) thought that the instrument reduced the duration of dystocia, without differences between males and females ( $p=0.9$ ,  $\chi^2$ -). **Forty-three percent of respondents estimated a 30% time reduction. Forty-four percent estimated a 30-**

**50% time reduction.** The perceived reduction in duration of dystocia was independent of sex ( $p=0.9$ ,  $\chi^2$  test). Sixty-five percent of the vets felt that the instrument did not impact the number of live calves born. For the remaining veterinarians, 24% thought that number of calves born alive was 30% greater after implementing this tool. Nine percent of veterinarians estimated an increase in live calves of 50% (no gender differences;  $p=0.1$ ,  $\chi^2$ -), while 84% of the practitioners were convinced that the instrument is a more effective life-saver than traditional obstetrical instruments. Forty-five percent of the practitioners replied that up to 30% and more stillborns can be avoided by using the tool. The numbers of dystocias/week do not influence these results. "Making life easier" is a very important aspect for practitioners. All users were convinced that it is less exhausting to use in comparison to other tools or manual interventions. In addition, 21% said that muscle efforts are reduced by 50 to 80%. Interestingly, this outcome was not impacted by sex of the veterinarian ( $p=0.1$ ;  $\chi^2$ -). All respondents replied that they would recommend (81% full agreement, 19%, recommend if asked) the tool to their colleagues. Interestingly, females recommended it more often than male veterinarians (96% vs 70%;  $p=0.01$ ,  $\chi^2$ -).

## Significance

A new obstetrical instrument, the GYNstick, was well accepted among veterinary practitioners in Germany and Austria. Most users were female and graduated in the last 14 years. All respondents would recommend it to their colleagues. Veterinarians should consider using this tool to reduce the physical impact of difficult calvings on themselves as well as newborn calves.

# Utilization of muscle tissue in periparturient dairy cattle as assessed by ultrasonographic measurement of muscle thickness and plasma creatinine concentration

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## Introduction

High producing dairy cattle experience a state of negative energy balance in early lactation. Dairy cattle address this metabolic challenge by increasing the rate of fat and protein mobilization. Previous studies have emphasized the

rate of fat mobilization and consequently the rate of protein mobilization has not been fully investigated. The primary objective of this study was therefore to characterize the change in muscle mass during early lactation using ultrasonography and plasma creatinine concentration (creatinine).