Failure of Clinical Cure in Dairy Cows Diagnosed with Metritis is Associated with Reduced Reproductive and Productive Performance

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INTRODUCTION

- Nearly 20% fail to undergo clinical cure after treatment for metritis.
- Objectives were to evaluate the association between clinical cure failure in cows treated for metritis and reproductive and productive outcomes.
- We hypothesized that uterine health, reproduction, and production are impaired in cows that fail to undergo clinical cure for metritis after anti-microbial therapy compared with herdmates that achieved clinical cure.

MATERIALS AND METHODS

- Retrospective cohort study including data from three studies performed between 2012 and 2018 in five Florida dairies.
- Vaginal discharge (**VD**) was evaluated in Holstein cows from 2 to 12 DIM using the Metricheck device. Cows with watery, fetid, reddish-brownish discharge (VD = 5) were diagnosed with metritis (d 0). Cows with metritis were treated with ampicillin trihydrate, ceftiofur crystalline free-acid, or ceftiofur hydrochloride. Cows with metritis were paired with cows without metritis and fever based on calving date and parity.
- Clinical cure was evaluated on d 10 and defined as VD < 5.
- Rectal temperature (**RT**) was evaluated on d 0 and cows with RT ≥ 39.5°C were considered febrile.
- Groups: no metritis (**NoMT**; n = 1,194); metritis cured (**MTC**; n = 1,111) and metritis non-cured (**MTnoC**; n = 299).
- Purulent vaginal discharge (VD ≥ 3), cytological endometritis, and resumption of estrous cyclicity were evaluated (**Figure 1**).
- Data were analyzed using logistical regression (binary outcomes), Cox's proportional hazard and Kaplan-Meier regression models (time dependent outcomes), and ANOVA for repeated measures (continuous outcomes). Orthogonal contrasts were designed to assess the effects of metritis (**C1**: NoMet vs. MTC + MTnoC) and cure (**C2**: MTC vs. MTnoC). Multiple comparisons were adjusted using the Tukey-Kramer method.

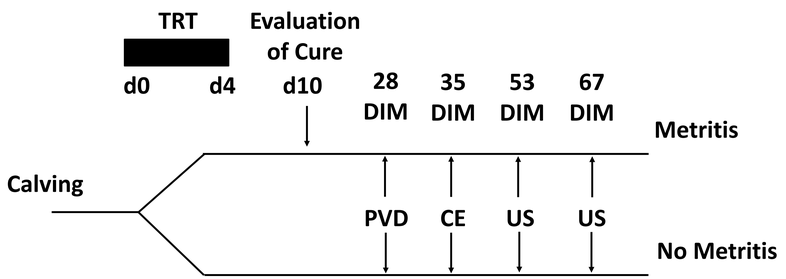

Figure 1. Diagram of study procedures. PVD = purulent vaginal discharge; CE = cytological endometritis; US = ultrasonographic evaluation of ovaries.

RESULTS

Table 1. Reproductive outcomes according to occurrence of metritis and failure of clinical cure.

Item	Group			P-value		
	NoMT	MTC	MTnoC	Group	C1	C2
	Adj. % (n)					
Purulent VD	38.1 (910)[a]	74.0 (894)[b]	91.7 (227)[c]	< 0.001	< 0.001	< 0.001
Cytological endometritis	36.4 (227)[a]	73.3 (397)[b]	91.4 (81)[c]	< 0.001	< 0.001	< 0.001
Estrous cyclicity	71.0 (486)[A]	71.0 (729)[A]	62.0 (174)[B]	0.07	0.14	0.03
Received at least one AI	92.6 (1,194)[a,A]	90.1 (1,111)[a,B]	83.2 (299)[b]	< 0.001	< 0.001	< 0.001
P/AI first insemination						
d 38	32.3 (1,067)	29.8 (978)	27.4 (238)	0.22	0.08	0.49
d 66	28.1 (1,065)	26.1 (978)	22.0 (238)	0.13	0.05	0.19
Pregnancy loss	11.5 (366)	11.1 (307)	18.4 (68)	0.23	0.29	0.10

[a,b] $P \leq 0.05$. [A,B] $P \leq 0.10$.

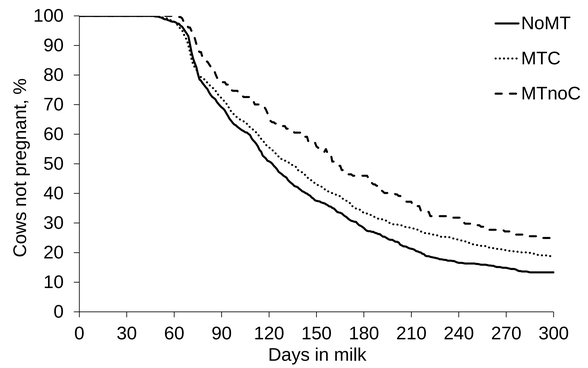

Figure 2. Survival curves for time to pregnancy by 300 DIM. Mean and median days to pregnancy: NoMT = 148.1 ± 2.4 and 123; MTC = 160.3 ± 2.8 and 134; MTnoC = 177.6 ± 5.5 and 163. Percentage of cows censored: NoMT = 25.4; MTC = 31.1; MTnoC = 43.5. Effect of metritis: $P < 0.001$; effect of clinical cure: $P < 0.001$.

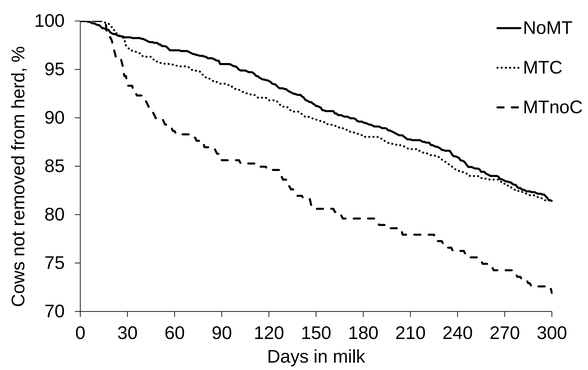

Figure 3. Survival curves for time to removal from herd by 300 DIM. Mean days to removal from herd: NoMT = 274.3 ± 1.9; MTC = 270.7 ± 2.2; MTnoC = 249.0 ± 5.5. Percentage of cows censored: NoMT = 81.4; MTC = 81.2; MtNoC = 71.9. Effect of metritis: $P < 0.001$; effect of clinical cure: $P < 0.001$.

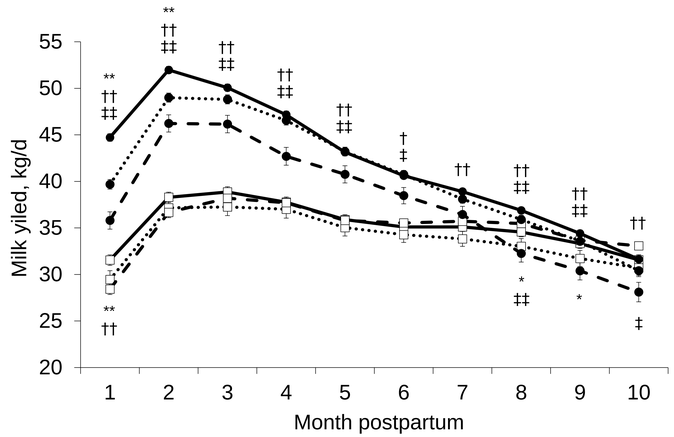

Figure 4. Milk production in the first 10 months postpartum for primiparous (□) and multiparous cows (●) according to metritis clinical cure group (NoMT = solid line; MTC = dotted line; MTnoC = dashed line). LSM for primiparous (NoMT = 35.2 ± 0.31; MTC = 33.9 ± 0.31; MTnoC = 35.0 ± 0.52 kg/d) and multiparous (NoMT = 42.0 ± 0.22; MTC = 40.6 ± 0.28; MTnoC = 37.7 ± 0.54 kg/d). $P \leq 0.05$ - **NoMT vs. MTC, ††NoMT vs. MTnoC, ‡‡MTC vs. MTnoC. $P \leq 0.10$ - *NoMT vs. MTC, †NoMT vs. MTnoC, ‡MTC vs. MTnoC).

Table 2. Risk factors associated with failure of clinical cure in cows diagnosed with metritis.

Risk factor	Cure failure, % (n)	AOR (95% CI)	*P*-value
Calving season			
Fall	13.4 (417)	Reference	0.08
Winter	22.5 (511)	1.59 (1.05-2.42)	
Spring	25.3 (316)	1.79 (1.07-2.99)	
Summer	28.9 (166)	2.06 (1.16-3.63)	
RFM			
No	17.6 (1,068)	Reference	< 0.001
Yes	32.5 (342)	2.14 (1.60-2.85)	
Fever on d 0			
No	17.9 (878)	Reference	< 0.001
Yes	26.7 (532)	1.69 (1.29-2.20)	

CONCLUSIONS

- Retained fetal membranes and occurrence of fever at diagnosis of metritis were associated with greater likelihood of clinical cure failure.
- Failure of clinical cure of metritis was associated with impaired uterine health, decreased resumption estrous cyclicity, reduced fertility, increased removal from herd, and reduced milk yield.

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