



# Incidence and interrelation of some common hoof problems in a Southeast US dairy herd

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Abstract W247

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## Introduction

After mastitis and reproductive failure, lameness is likely the most important economic issue for dairy producers. Beyond the direct costs of treatment and culling, lost production, and reduced reproductive efficiency and udder health compound expenses.

The purpose of this study was to:

- Quantify the incidence of lameness causing hoof problems in a Southeast dairy herd.
- Describe the relationships between some hoof conditions.

## Data & Methods

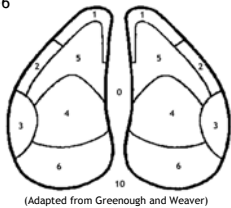
Data were collected on a large (>2100 cows) commercial dairy farm in Southern Georgia between May 2004 to April 2007. Housing was sand-bedded freestalls. Manure removal was by flush, automatic low-pressure misters were used for cooling, and most runway and food alley footing was rubber.

Lame cows were presented for treatment to hoof trimmers employed full-time on this farm and certified through the **Master HoofCare program** (University of Florida).



Defects observed by trimmers were recorded using the system recommended by the **American Association of Bovine Practitioners** and Included:

- WLD - whiteline disease by zones 1-3
- UL - ulcers by zones 4-6
- TS - thin soles
- INJ - Leg/foot injuries
- SP - Sole punctures



Hoof zone chart used by trimmers

(Adapted from Greenough and Weaver)

Data were analyzed by survival analysis techniques using PROC LIFETEST and PROC PHREG of SAS®.

## Incidence & distribution of defects

Hoof trimmers provided 3,333 records of defects for 1,578 cows during 1,992 lactations. Figure 1 shows the seasonal distribution of records for the first lactational occurrences of the most common defect categories.

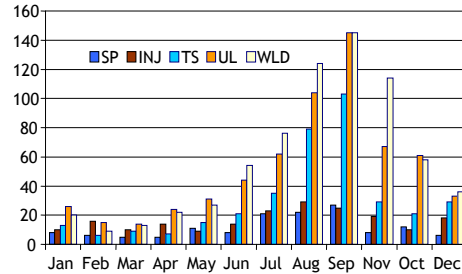


Figure 1. Distribution of records for SP, INJ, TS, UL, and WLD, May, 2004 through April, 2007, by month.

To avoid left censoring, additional analysis used records for 1,575 lactations started after April, 2004 (2,691 defects; 1,343 cows).

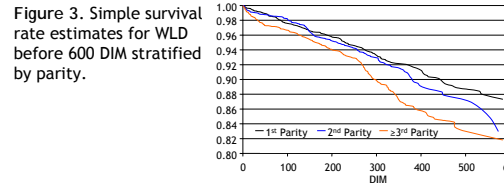
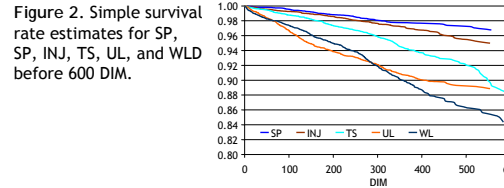
Lactational incidence risk, the proportion of cows expected to get a condition over the course of lactation, is commonly reported, but is less useful when conditions are seasonal and lactations vary greatly in length. Annualized incidence risks (IR) with seasonal adjustment (Table 1) were calculated for calvings from May, 2004 through April, 2006.

Table 1. Incidence risks, annualized based on days at risk and averaged over months of calving.

Hoof problem	IR
SP	2.4%
INJ	3.8%
TS	7.3%
UL	14.7%
WLD	15.7%

## Hazard ratios & survival estimates

Survival rates for SP, INJ, TS, UL, and WLD were estimated (Figure 2). For all hoof problems, survival rates were lower in later parities; Figure 3 shows WLD.



The final hazard models, summarized in Table 2, included season (i.e., time of event or censoring in 4 seasons), parity, age at calving (in months; AGE), and for TS, UL, and WLD, previous events (TS, UL, or WLD). Higher milk yield (first test after 70 DIM) was related to greater risk for defects in univariate analysis, but was dropped from the final models.

Table 2. Hazard ratios for season and previous defects.

Dependent Event	Hazard Ratio Definition	Hazard Ratio	Pr > Chi-Sq
SP	Winter / Summer	0.27	<0.0001
	INJ	0.43	<0.0001
	TS	0.11	<0.0001
	UL <sub>prev</sub> / no UL	1.75	<0.01
UL	WLD <sub>prev</sub> / no WLD	1.46	<0.05
	Winter / Summer	0.16	<0.0001
	TS <sub>prev</sub> / no TS	1.68	<0.01
	WLD	0.13	<0.0001
WLD	TS <sub>prev</sub> / no TS	1.52	<0.01
	UL <sub>prev</sub> / no UL	1.45	<0.01

Parity effects were confounded with AGE. One month in AGE increased risk of INJ, UL, and WLD by 1.5%, 2.3%, and 1.5%, respectively. When accounting for AGE, risks decreased slightly by parity, possibly due to the restorative effect of dry periods.

In this herd, TS and UL were predisposing for WLD (Figure 3) and TS was predisposing for UL (Figure 4). Relative risk appears to increase in extended lactations.

Figure 4. Survival rate estimates (across all seasons) for WLD before 600 DIM, for 2<sup>nd</sup> parity cows, age 37 mo at calving, with or without previous TS or UL.

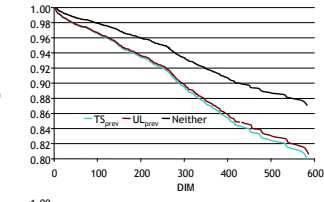
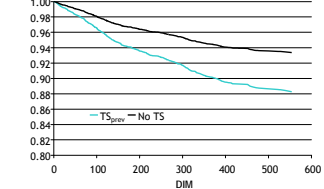


Figure 5. Survival rate estimates (across all seasons) for UL before 600 DIM, for 2<sup>nd</sup> lactation cows, age 37 mo at calving, with or without previous TS.



## Discussion

Wetness of the environment is likely an important contributor to all 5 conditions described. In hot climates, most moisture is from cooling systems intended to combat the effects of heat stress. When assessing the impact of cooling systems, the possible increase in lameness should be considered.

The economic impact of lameness may be underestimated. Further analysis of the lifetime effects of lameness on reproduction and production is planned.

## Conclusions

- Hoof problems may be more common during the summer in the Southeast United States.
- Thin soles were more common than in previous reports.
- Thin soles predisposed cows to sole ulcers and Whiteline disease.
- Susceptibility to hoof problems increases with age.