

WITHIN HERD FACTORS ASSOCIATED WITH CLINICAL LAMENESS IN
DAIRY COWS IN THE MIDWESTERN UNITED STATES

WELLS, S.J., TRENT, A.M., MARSH, W.E., ROBINSON, R.A.¹

Bovine lameness has been increasingly reported as an economic detriment to the dairy industry (Lee et al., 1989; Weigler et al., 1990). Since lameness is a syndrome of varied disease entities, and presents itself under various housing and management conditions, it has been difficult to develop a full understanding of its multiple causation.

Properly designed and analyzed observational studies can be a valuable aid in the determination of components of sufficient cause of disease (Martin et al, 1987). Since dairy cows are typically grouped on farms, risk factors for disease should be separated into those measured on the group level (between herd factors) and those on the individual animal level (within herd factors). Evaluation of within herd risk factors for lameness in cows on commercial dairy farms necessitates control of herd effects (including housing, flooring, nutrition, and husbandry) and other confounding factors. The goal of this study was to study associations between clinical lameness in lactating cows and bodyweight, body condition score, claw angles, and the presence of limb lesions, controlling for herd, season, parity, and stage of lactation.

MATERIALS AND METHODS

An observational epidemiologic study investigating the relationships between clinical lameness and individual cow (within herd) factors was performed in 17 Minnesota and Wisconsin dairy herds. During two visits to each farm in the summer of 1989 and late winter of 1990, two investigators independently classified the ambulation of milking cows using a uniform scoring system.

A matched case-control study of clinically lame and nonlame cows was performed. A case (lame cow) was defined as a lactating cow found lame by either observer. Nonlame controls were selected at each visit for each case from the same herd and matched for parity and stage of lactation. Assessments of bodyweight, body condition, dorsal claw angles, and visible or palpable limb lesions were made in each case and control animal. Solar lesions were not evaluated.

¹ Department of Clinical and Population Sciences, College of Veterinary Medicine, University of Minnesota, St. Paul, MN 55108

Univariate analyses were performed using paired t-tests for quantitative variables and odds ratios with 95% confidence limits for categorical variables. To control for confounding and evaluate potential interactions among variables, the multivariate statistical technique of conditional logistic regression (SAS PROC LOGISTIC, SAS, 1990) was utilized. Independent variables in the regression model were the differences between case and control values for each quantitative variable (bodyweight, body condition score, dorsal claw angles) and binary variable (limb lesion presence or absence).

RESULTS

The prevalence of clinical lameness in lactating cows was 13.6% in summer and 16.7% in winter. Between observer reliability of the lameness evaluations showed good agreement with kappa coefficients of 0.60 at each season.

Data analyses demonstrated (Figure 1) that clinical lameness in lactating dairy cows was positively associated with reduced body condition score, increased bodyweight, reduced slope of rear lateral claw angle, the presence of nontarsal rear limb superficial swelling (i.e. stifle, tibia, metatarsus, or fetlock regions), abnormal hoof overgrowth, and lacerations.

REFERENCES

- Lee, L.A., Ferguson J.D., Galligan D.T., 1989. Effect of disease on days open assessed by survival analysis. *J. Dairy Sci.*, 72:1020-1026.
- Martin S.W., Meek A.H., Willeberg P., 1987. *Veterinary Epidemiology, Principles and Methods*. Iowa State University Press, Ames, Iowa, 343 pp.
- SAS Institute Inc., 1990. SAS Technical Report P-200, SAS/STAT Software: CALIS and LOGISTIC Procedures, Release 6.04. Cary, NC, 235 pp.
- Weigler B.J., Hird D.W., Sischo W.M., et al., 1990. Veterinary and nonveterinary costs of disease in 29 California dairies participating in the National Animal Health Monitoring System from 1988 to 1989. *J. Am. Vet. Med. Assoc.*, 196:1945-1949.

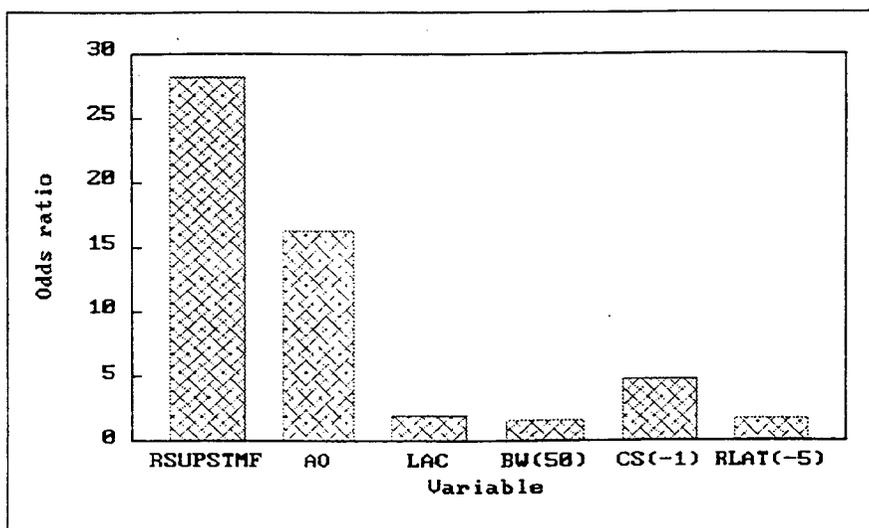


Figure 1. Odds ratios for clinical lameness in dairy cows controlling for herd, season, parity, stage of lactation, and other variables in regression model.

Variable:

- RSUPSTMF - nontarsal rear limb superficial swelling
- AO - abnormal hoof overgrowth
- LAC - laceration
- BW - bodyweight (50 kg. increase)
- CS - condition score (1 unit decrease)
- RLAT - rear lateral claw angle (5 degree decrease in slope)