

EPIDEMIOLOGIC STRATEGIES FOR STUDY OF A NEWLY-EMERGING DISEASE : PAPILLOMATOUS DIGITAL DERMATITIS IN DAIRY CATTLE

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Nous avons constitué une équipe multidisciplinaire (épidémiologistes, microbiologiste, anatomopathologiste et cliniciens) pour étudier une maladie nouvellement apparue (dermatite digitale papillomateuse, PDD) en Californie. Une enquête adressée par courrier aux éleveurs laitiers de Californie a montré que PDD avait été observée dans approximativement trois quarts des élevages laitiers dans le sud et l'ouest de la Californie. Il y a eu des cas sporadiques dans les années 1980, puis une explosion dramatique commençant au début des années 1990. Les résultats d'enquêtes équivalentes sur le reste des Etats-Unis et le Chili sont comparables. A l'échelle de l'élevage, les élevages cas ont été définis en fonction d'une forte prévalence de la maladie et les élevages témoins étaient ceux présentant une faible prévalence. Ceci s'est avéré utile pour étudier les facteurs de risque de l'expression (ou détection) de la maladie, et non les facteurs d'introduction dans l'élevage. Des études de cohorte sont en cours à l'échelle de la vache dans trois élevages et suggèrent que près de 10% des vaches sont affectées chroniquement tandis que 50% ne sont pas affectées.

INTRODUCTION

Papillomatous digital dermatitis (PDD, digital dermatitis, footwarts) is a newly-emerging and apparently infectious disease of dairy cattle. In the early 1990's the disease anecdotally reached epidemic proportions in southern California, and was of such concern that the dairy industry held special meetings to discuss it. In response to these concerns a multidisciplinary team (epidemiologists, microbiologist, pathologist, clinicians) was formed in 1993 to study the disease and offer suggestions for treatment, prevention and control. The team's efforts were funded by the dairy industry itself (Milk Advisory Board) and by the Center for Food Animal Health, School of Veterinary Medicine, University of California, Davis. The objective of this paper is to present an overview of the team's methodology, findings and current work in the context of epidemiologic approaches to an emerging disease.

DISEASE DESCRIPTION

Rumors about the origin, location, amount and spread of PDD in California abounded, but little reliable information was available. Our first activity was to describe the disease by means of a survey mailed to managers of California dairies (Rodriguez-Lainz et al., 1996a). Managers' reports indicated that the disease was widespread and common -- it had been observed on approximately three-quarters of dairies in southern and central California. On affected dairies a mean of over 10% of cows was affected. The epidemic curve showed sporadic cases in the 1980's, with a dramatic upsurge beginning in the early '90s. Many hypotheses were advanced regarding the origin of PDD in California and its emergence as an epidemic disease during this period, ranging from importation of heifers from the midwest of the US, changing feed elements (trace minerals, antibiotics), and even genetic-phenotypic changes in the Holstein breed. Subsequent surveys in the United States (Wells et al., 1997) and Chile (Rodriguez-Lainz et al., 1996b) showed remarkably similar epidemic curves. These results, especially those from Chile, cast doubt on the previously mentioned hypotheses of the origin of the California PDD epidemic, because cattle importation into Chile is restricted due to foot and mouth disease regulations, feeding practices are different in Chile, and many Chilean dairy cattle have different genetic backgrounds than California dairy cattle.

HERD-LEVEL RISK FACTORS

At the farm level, we first attempted a case-control study to identify risk factors for PDD, but were unable to locate enough control farms because almost all farms we investigated were affected. We therefore defined case farms to be high prevalence (> 5% cows affected) farms and control farms to be low prevalence farms. This was useful because only risk factors for expression (or detection) of the disease were identified, not its introduction onto farms. Case farms were about 20 times more likely to have muddier corrals than control farms, and were nearly 5 times more likely to have purchased heifers (Rodriguez-Lainz et al., 1996c). The importance of other potential risk factors, e.g. conditions favoring abrasion of feet, were not demonstrated. These results were useful not only as practical recommendations to prevent PDD, but also for ongoing laboratory studies. Until this time, attempts by our team to transmit the disease -- using crude lesion homogenate on moist, abraded skin -- had been unsuccessful. However, after analysis of field data suggested the importance of moisture, in subsequent laboratory experiments more emphasis was placed on moisture and less on abrasion, and PDD transmission was achieved for the first time (Read and Walker, 1996).

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INDIVIDUAL ANIMAL RISK FACTORS

In ongoing studies on 3 dairies in southern California, over 4,000 cattle have been followed for up to 15 months in a prospective study. All cows in milk were examined for PDD lesions twice monthly. Preliminary results indicate that over half never developed lesions, while approximately 10% were chronically affected. Culling strategies may be modified as a result of this information.

REFERENCES

- Read D., Walker R., 1996. Experimental transmission of papillomatous digital dermatitis (footwarts) in cattle. In: Proceedings of 77th Annual Meeting of Conference of Research Workers in Animal Diseases (abstract), Chicago, IL, No. 37.
- Rodriguez-Lainz A., Hird D., Walker R., Read D., 1996a. Papillomatous digital dermatitis in 458 dairies. *J Am Vet Med Assoc* 209(8), 1464-1467.
- Rodriguez-Lainz A., Melendez-Retamal P., Hird D., 1996b. Prevalence of papillomatous digital dermatitis in dairy herds in Chile. In: Proceedings of 77th Annual Meeting of Conference of Research Workers in Animal Diseases (abstract), Chicago, IL, No. 46.
- Rodriguez-Lainz A., Hird D., Carpenter T., Read D., 1996c. Case-control study of papillomatous digital dermatitis in southern California dairy farms. *Preventive Veterinary Medicine* 28, 117-131.
- Wells S., Garber L., Wagner B., Hill G., 1997. Digital dermatitis on U.S. dairy operations. National Animal Health Monitoring System Dairy '96 report. US Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services. Centers for Epidemiology and Animal Health, Fort Collins, Colorado, USA.