J. Dairy Sci. 88:1909–1916

Expert Assessment Study of Milking and Hygiene Practices Characterizing Very Low Somatic Cell Score Herds in France

M. Chassagne,[1] J. Barnouin,[1] and M. Le Guenic[2]
[1]Animal Epidemiology Research Unit, Institut National de la Recherche Agronomique (INRA)
63122 Saint Genès Champanelle, France
[2]Etablissement Départemental de l'Elevage, BP 77, 56002 Vannes Cedex, France

ABSTRACT

French dairy herds were selected on a national basis through the "Zero Mastitis Objective" Program (ZMP) to display hygiene and milking practices characterizing very low somatic cell score (SCS) herds. The herds selected were stratified in 2 groups. The first group (LOW) included 187 herds within the first 5 percentiles of herds regarding mean SCS for the 36 mo preceding ZMP (36-mo SCS). The second group (MED) included 117 herds within the 50 to 55th percentile of herds regarding 36-mo SCS. Mean milk SCS was 3.09 in the MED herds vs. 1.99 in the LOW herds, which corresponded to 265,000 and 135,000 cells/mL respectively. Moreover, LOW and MED herds did not change from one SCS category to another during ZMP. Potentially explanatory variables, collected by formally trained dairy management experts through observations from attendance at milking and farm visits, were analyzed using multistep logistic regression models. According to final model and expert observations, the probability for a herd to belong to the LOW group was maximized when: 1) winter cleanliness of dry cow shed was good; 2) use of teat spraying was carried out; and 3) California Mastitis Tests were performed at milking. Moreover, the herd probability of belonging to the MED group was maximized when: 1) air admission at teat cup attachment was observed during milking; 2) winter cleanliness of dry cow shed was poor; and 3) the milker spent time during milking to feed calves. Finally, the study highlighted milking and hygiene variables and attitudes appearing as key practices to control herd SCS through precise and safe milking and more attention paid to individual animals and cleanliness of dry cow shed.

(**Key words:** somatic cell score, expert assessment, dairy management, milking hygiene)

Abbreviation key: 36-mo SCS = arithmetic mean of all monthly cow SCS values determined in a herd during the 36 mo preceding the study, **CMT** = California Mastitis Test, **LOW** = very low SCS herds, **MED** = medium SCS herds, **ZMP** = Zero Mastitis Objective Program.

INTRODUCTION

Managerial and financial abilities of the dairy herdsman are key points for profitability and survivability of a dairy farm (Young and Walters, 2002). Farmers' attitudes and personal characteristics, interests, and tactics, as well as a lot of subjective technical choices constitute different facets to weigh up to highlight good management practices and motivate the producer to change hygiene routines.

Comparing management practices of high quality herds to medium or poor quality herds is a new way to highlight dairy farming procedures associated with a high degree of control of clinical and subclinical udder infections (Hutton et al., 1990; Barkema et al., 1998). Several strategies were used to describe management and hygiene variables discriminating between groups of herds experiencing different milk SCC levels. The most frequently used strategy concerns interviews with herdsmen to collect herd practices from questionnaires (Barkema et al., 1998; Barnouin et al., 2004) or milking management scoring instruments (Goodger et al., 1993). Such a method enables the collection of relevant and reliable answers, insofar as the interview 1) concerns herds with a stable dairy management including stable milking and housing systems and; 2) is conducted through clear and accurate questions covering all aspects of procedures, decisions, and attitudes playing a potential role in udder infection. Obviously, the interviews are not able to identify management defects.

Measuring specific indicators of udder conformation (Slettbakk et al., 1995), animal welfare (Rennie et al., 2003), bedding hygiene and indoor climate (Faye and Barnouin, 1985; Ward et al., 2002), psychological traits of the farmer (Young and Walters, 2002; Rennie et al., 2003), and milking machine performance can be useful

Received September 21, 2004.
Accepted January 4, 2005.
Corresponding author: Michelle Chassagne; e-mail: chassa@clermont.inra.fr.

additional information collected from farmer interviews. However, such indicators do not apply to all dairy management key-points, are not representative, and can be time and money consuming. Consequently, they cannot be always performed in field epidemiological studies including a large number of herds.

To study a herd milk SCS problem, much specialized and detailed knowledge is necessary to evaluate and compare milking practices; such expertise generally lacks in first-line dairy farm advisors (Hogeveen et al., 1995). Consequently, assessment of management practices by trained dairy management experts could help, in addition to questionnaires and indicators, to illustrate those practices and attitudes (of herdsmen) that characterize a high degree of control of herd SCC. Nevertheless, as few people are formally trained to evaluate milking and hygiene practices (Goodger et al., 1988), the number of available experts appears to be a limiting factor regarding the generalization of dairy management expertise.

The present work was performed in French dairy farms selected on a national basis through the "Zero Mastitis Objective" program (**ZMP**). Expert observations based on management knowledge (longitudinal assessment) and unexpected attendance at milking (transversal assessment) were analyzed to underline hygiene practices and milker's attitudes discriminating between very low SCS herds during at least 5 yr (i.e., "going beyond the objective concerning herd SCS control") and medium SCS herds during at least 5 yr (i.e., "reaching the current objective concerning herd SCS control").

MATERIALS AND METHODS

General Program

Data resulted from ZMP, a national mastitis control program carried out in France from February 1999 to July 2001 (Barnouin et al., 2004). The ZMP objectives were to display, through several complementary studies conducted at herd and cow levels, dairy management and treatment practices characterizing farms with a high degree of udder health control. The ZMP herds (n = 586) were enrolled according to the following criteria: 1) included in the national DHI database; 2) located in the departments (i.e., counties; n = 48) in which DHI volunteered to collaborate with ZMP; 3) at least 20 cows; 4) at least 90% of the cows belonging to the same breed (Holstein, Montbéliarde, or Normande); 5) no vaccination against mastitis; and 6) no significant change in the breeding system throughout ZMP. The enrolled herds were sampled according to previous 36-mo history of SCS (**36-mo SCS**), because SCS [SCS = $\log_2$(SCC/100.000) + 3]) is a criterion not biased by milk discarding. Two herd samples were set up and stratified by region and breed as key SCC variation factors. The very low SCS group (**LOW**) included herds belonging to the first 5 percentiles of herds regarding 36-mo SCS. The LOW Montbéliarde herds had scores ≤1.99, LOW Holstein herds had scores ≤2.38, and LOW Normande herds had scores ≤2.76. The medium SCS group (**MED**) included herds belonging to the 50 to 55 percentiles of herds regarding 36-mo SCS. The MED herds had 36-mo SCS greater than but close to the median breed value (i.e., 2.78 for Montbéliarde herds, 3.22 for Holstein herds, and 3.32 for Normande herds). Moreover, LOW and MED herds did not change from one SCS category to another during the 30-mo study period. In each department, the herds were chosen in the ratio of 3 LOW to 2 MED, because a ZMP objective (independent of the present study) was to describe herd practices linked to clinical mastitis risk. In each department, the number of surveyed farms depended on the number of herds that each local DHI could survey.

Herd Selection

The study concerned all the ZMP herds in which an expert assessment of milking and hygiene practices could be carried out. Consequently, the herds that left ZMP (n = 32) for various reasons (bovine spongiform encephalopathy occurrence, DHI resignation, lack of time) or in which the expert assessment could not be performed because a trained expert was not available (n = 240) were not selected. Finally, 304 herds (187 LOW and 117 MED) were considered for statistical analysis, representing 57.4 and 56.2% of the ZMP total numbers of enrolled very low and medium SCS herds, respectively.

Data Collection

Ninety-two trained experts appointed by DHI collected information from February to July 2001 in LOW and MED selected herds during unexpected farm visits including expert attendance at one milking to observe milking practices and teat and udder lesions of the milked cows. A trained expert was a dairy farm advisor who 1) had an elaborate knowledge of the management practices of the surveyed herds; and 2) followed a formal training process in milking and dairy management audit including a specialist course during which milking audits were conducted to standardize expert scoring practices. The original ZMP expert procedure did not include any farmer interviews. Expert assessment data consisted of explanatory SCS variables that were validated by the consensus of a working group and pilot interviews of farmers outside ZMP. The expert assess-