" Zero mastitis " national program in France, herd practices associated with very low milk somatic cell scores

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SUMMARY

Herd annual milk somatic cell scores (SCS) were calculated as the average logarithm (base2) of individual milk somatic cell counts and used to classify and select herds at a national level according to breed and region. Herd practices associated with herd SCS were studied in 534 French bovine dairy herds representative of French breeding conditions (‘Zero Mastitis’ national program, ZM). 326 herds belonging to the French top 5 per cent regarding very low SCS and 208 herds having a SCS close to the median national score participated to the study. The herd practices linked with very low SCS herds concern housing for milking and dry cows, drying-off practices, pre calving calcium supplies, milking hygiene, prevention against udder infection, heifer udder surveillance and farmer’s attitudes.

INTRODUCTION

Economical and sanitary limits constraint French milk producers to reduce herd pathology, particularly udder diseases, at its minimum. As a consequence, both low milk somatic cell counts and low clinical mastitis incidence are permanent challenges in the dairy herds. Herd characteristics and management practices have been related to bulk tank somatic cell counts and/or mastitis incidence (Fabre et al, 1996; Barkema et al, 1998). As milk discarding is in use in French farms, bulk tank somatic cell counts do not reflect the ‘true’ milk leukocyte level. Moreover, individual somatic cell counts are more strongly correlated to milk neutrophils (the indicators of health status, leukocyte mobilisation and inflammation) than somatic cell counts from bulk tank milk are (Kelly et al, 2000). At a herd level, we used annual milk somatic cell scores as calculated by Rupp et al. (2000) to classify and select herds and highlight herd characteristics and practices linked to the very low milk somatic cell scores (SCS) in the middle-term (5 years).

MATERIAL AND METHODS

The ZM program was conducted in France from 1999 to 2001 in herds selected on the basis of their low or medium SCS. Herd milk somatic cell scores were calculated for the whole French dairy herds from individual monthly milk cell counts over the 36 months preceding the survey. A group of 328 herds belonging to the French top 5 per cent lowest SCS (SCS—group) for the main breeds was compared to a group of 206 herds with a SCS close to the median national score (SCSm group). The 534 herds were located in 48 departments and were representative of the French dairy herds considering breed and farm location. Data were collected using very precise questionnaires (950 questions, eight hour-interviews) and milking parlour visits conducted by specialized DHIA technicians in the farms. After manual and automatic validation, the whole data were stored in a multi table relational data base built on Access 2000. Statistical analysis was organised according to the following subjects : farm activities and management, herd size and breed, milk yield level, animal

characteristics, animal category housing, animal category nutrition, hygiene (cow, housing, milking), milking, mastitis preventive measures, drying-off, therapeutic measures, farmer's sociologic characteristics and attitudes, and surveyor's opinion about farmer's technical performance. Statistics were run on SAS 8.1. Each variable was individually investigated for its association with the herd's group using a univariate analysis. The $p<0.25$ variables were submitted to corresponding thematic backward multiple logistic regressions (n=11) to model the risk for a herd to belong to the very low somatic cell group of herds. The $p<0.10$ variables were the potential herd practices to the final logistic model. The $P<0.05$ odds-ratio of the synthetic final model characterised the significant practices for a herd to be classified in the very low (OR>=1) or in the medium group (OR<=1).

RESULTS

The respective mean SCS of the SCS— and SCS m groups of herds were 2.05 ± 0.26 and 3.13 ± 0.21 (all herds SCS = 2.47 ± 0.59). The corresponding milk somatic cell counts were estimated to 125 000 and 270 000 cells/ml respectively (all herds SCS near by 180 000 cell/ml). Table 1 summarizes the main characteristics of the studied herds.

Variable	All herds	SCS – group	SCSm group	*P*
Individual annual counts < 50 000 cells/ml (herd %)	44.0	54.1	28.3	***
Individual annual counts > 800 000 cells/ml (herd %)	4.6	2.8	7.5	***
Number of cows in the herds (mean ± s.d.)	40±14	41±15	46±16	**
Years with the same SCS (mean ± s.d.)	7.0±4.5	8.1±4.4	5.2±4.1	**
Primiparous (% dairy cows)	29.1	29.4	28.4	*
Annual quotas (10^3 L) (mean ± s.d.)	273±114	266±111	274±119	**
Herds by geographical area (herd %)				
North	12.2	12.3	12.1	
South	13.9	13.5	14.4	
West	19.8	20.2	19.2	
East	37.4	38.7	35.6	
Centre	16.7	15.3	18.7	
Breed (herd %)				
Holstein	65.6	63.5	69.2	
Montbéliarde	28.3	29.4	26.4	
Normande	5.1	6.1	3.4	

Table 1 :'Zero Mastitis National Program' in France : main characteristics of the studied herds

The variables of the final multivariate logistic model are presented in Table 2. Eleven practices appear positively associated with the very low SCS group.

Herd practices	Odds ratio	[95%CI]	*P*
Post milking : spraying	2.95	1.57-5.53	***
Udder disinfection before drying-off therapy	2.77	1.29-5.14	**
Few other activities on the farm	2.16	1.31-3.57	**
Herdsman : precise	2.22	1.36-3.62	**
Heifers on a humidity-protected pasture	1.88	1.14-3.11	**
Post milking concentrate supplied : cows fixed into head-gate	1.85	1.20-2.77	**
Alcohol mammary gland : disinfection at intramammary treatment	1.81	1.03-3.15	*
Precalving dietary calcium restriction	1.79	1.16-2.77	**
Heifers in a special area at calving	1.78	1.17-2.68	**
Systematic culling of cows with damaged trays	1.69	1.11-2.57	*
Heifers : not drinking water from a river at pasture	1.66	1.04-2.63	*
Checking udder of heifers for mastitis : less than 2 weeks before calving	0.36	[0.20-0.63]	***
Only dirty teats washed before milking	0.43	[0.22-0.84]	*
Dairy cows Housing : straw yard	0.44	[0.29-0.67]	***
No treatment when one lump at milking	0.53	[0.34-0.82]	**

Table 2 : Herd management practices positively (OR>1) or negatively (OR<1) associated in France with very low herd somatic cell scores at a national level.

DISCUSSION

The herd practices linked with the risk for a herd to belong to the French Top 5 regarding low milk annual score were reported for the first time in France, since the ZM program is the unique study which used 'true' SCS as an indicator of milk quality at a national level. The results confirm the positive role of efficient preventive measures against udder infection at crucial times of the lifespan of a dairy cow : end of gestation, with attention paid by farmers to heifers' mammary gland (Edinger et al, 2000) and non stressing first calving conditions (Bareille et al, 2000), post milking, with cows fed fixed into head gate at concentrate supply with no so possible lying (Peeler et al, 2000) and udder disinfection with alcohol at dry cow preventive therapy and at mastitis curative treatment (Peeler et al, 2000). Ante partum calcium restriction prevents parturient paresis and associated mastitis (Curtis et al, 1985). Culling cows with damaged teats prevents infections between cows (Rajala-Schultz & Gröhn, 1999). A good hygiene at milking is stressed by the use of spraying at post milking (avoiding udder contamination and which would not be aggressive for the mammary gland), and by positive farmer's attitudes towards milking (meticulous). Finally, the negative role of a straw yard housing for milking cows was confirmed (Fregonesi & Leaver, 2002)

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