Veterinary visits to dairy farms with somatic cell counts and bacterial loads above the agreed legal parameters

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Summary

The EU Directives 92/46 and 92/47 (D.P.R. 54/97 under national legislation) fix the agreed levels of somatic cell counts and total bacterial counts allowed in milk. Over a one year period, a total of 165 farms which did not comply with one or more such legal requirements were visited and monitored. This was in order to check and, where necessary, correct the hygienic and sanitary management of the farm.

A comparison of the bulk tank milk somatic cell count (BTMSCC) before and after the veterinary visit, shows improvements in all the farms which were tested.

In a relatively short time, visited dairy farms with a somatic cell content between 401.000 and 500.000 cells/ml managed to comply with the parameters set down by law, achieving a mean of 304.000 cells/ml.

However, those farms with a somatic cell counts between 501.000 and 800.000 cells/ml required further technical action. In fact, despite considerable improvements (mean somatic cell count decreasing from 638.000 cells/ml to 403.000 cells/ml), it was not possible to meet the required levels so rapidly. On these farms, a second veterinary visit was needed as well as more specific milk sampling for bacteriological assay and therapeutic guidelines in order to meet the specified requirements.

Key words: dairy farms, bulk tank somatic cell counts, veterinary visits

Introduction

Current sanitary law regarding milk and dairy products has definitively fixed qualitative and hygienic parameters which preserve product quality and public health. Italian law D.P.R. 54/97, which includes EU directives 92/46 and 92/47 guidelines, has forced Italian farmers to work within the stated parameters regarding somatic cells (< 400.000 cells/ml) and total bacterial count (< 100.000 CFU/ml). The veterinary technical interventions have a significant impact both on management issues and on hygienic measures which must be applied in order to rapidly meet the legal thresholds.

Materials and methods

Design of the study

785 farms of an international food company were involved in a "Milk Quality Project" organised by our Institute and the company itself. 230 of these farms did not comply with some of the legal parameters; 165 of them, representing 9757 cows, were visited one or more times for a total of 218 veterinary visits. During these visits, were made checks on the management characteristics, the hygiene of the milking routine, the general level of sanitation and the health of the herd. When problems were pinpointed, was given technical guidelines to the farmer help and solve milk quality problems. Technical guidelines involved different aspects such as herd management, milking routine and hygiene, including particular sanitary measures to allow the farms to meet legal parameters. On 35 sites where a single visit was not sufficient to resolve milk quality problems (according to the farm notes), these farms were visited for a second time during which a mastitis control programme was introduced which included a screening of milk samples for cyto-bacteriological analysis. On these farms we sampled around 30% of the cows and in particular, 50% of the cows which were close to the dry period, 30% of the cows 10-15 days following calving and 20% of cows which had mammary problems.

Samples

Milk samples were taken according to FIL-IDF (1981), and National Mastitis Council (1987) guidelines. After teat disinfection with paper towels moistened with a chlorexidine solution (Alfa Blue, Alfa Laval Agri, Italy), we discarded the first 4-5 milk throws, in order to eliminate contaminated milk and to check the udder secretion for mastitis. Afterwords approximately 10 ml of milk was collected in a sterile plastic tube, refrigerated and have been taken to the laboratory as quickly as possible for cytobacteriological analysis.

Microbiological assay

Ten µl of each milk sample were spread onto the surface of 5% bovine blood agar plates. A udder was defined infected when a contagious pathogen or environmental pathogens (Streptococci other than *S.agalactiae* or Staphylococci other than *Staph.aureus*) were found in pure culture or >1000 CFU/ml. In all other cases the samples were considered uninfected. The strains isolated were classified using standard microbiological procedures from the API System (Bio Merieux Italy, Rome). Pathogen strains isolated from milk samples were checked for antibiotic sensitivity using the Kirby Bauer test in order to plan a specific therapeutic programme.

Somatic cell count

Somatic cell count was performed by Somacount (Bentley Instruments, USA).

Mastitis control program

When contagious pathogens were isolated following upon a previous screening milk sampling, we applied a mastitis control programme which included a single quarter sampling of all cows in lactation and, after bacteriological analysis, separation of infected cows which were milked after healthy cows. After separation the control programme continued with control of the cows 7 and 14 days after calving and with targeted dry therapy of all cows at drying off and lactating therapy of infected cows only during first 60 days of lactation and all mastitis clinical cases. When environmental pathogens were isolated from the screening milk samples, different measures, mainly based on environmental hygiene improvements, were applied. We also recommended that the farmers should always check the foremilk and udder for mastitis before milking, apply (Smith K.L. et al., 1985) teat disinfection post-milking and targeted antibiotics treatments of all cows at drying off and during lactation on mastitis clinical cases.

Results

Bulk tank milk somatic cell coun (BTMSCC)

Table n.1 shows BTMSCC of total farms (geometric means and monthly sample) involved in this study, before and after our visits.

Table 1: Comparison between geometric mean and monthly sample of BTMSCC of total farms
Tablica 1: Usporedba između srednje geometrijskih i mjesečnih uzoraka BTMSCC-a kod ukupnog broja farmi

Farms Farme	Total Cows Ukupno Krave	Total veterinary visit Ukupno veterinarske posjete	Geom.mean before visit (cell/ml) Srednja geometrijska vrijednost prije posjete (stanica/mL)	Geom.mean after 1 year (cell/ml) Srednja geometrijska vrijednost nakon 1 godine (stanica/mL)	Monthly sample before visit (cell/ml) Mjesečni uzorak prije posjete (stanica/mL)	Monthly sample after 1 year (cell/ml) Mjesečni uzorak nakon 1 godine (stanica/mL)
165	**9757**	**218**	**572.000**	**444.000**	**645.000**	**408.000**

The following tables (2, 3, 4,5) show data from different classes of farms divided on the basis of BTMSCC value.

Table 2: BTMSCC of farms with occasional problems before and after veterinary visits
Tablica 2: BTMSCC kod farmi s povremenim problemima prije i poslije veterinarske posjete

Farms Farme	Cows num. (on avg.) Krave	Geom.mean before visit (cell/ml) Srednja geometrijska vrijednost prije posjete (stanica/mL)	Geom.mean after 1 year (cell/ml) Srednja geometrijska vrijednost nakon 1 godine (stanica/mL)	Monthly sample before visit (cell/ml) Mjesečni uzorak prije posjete (stanica/mL)	Monthly sample after 1 year (cell/ml) Mjesečni uzorak nakon 1 godine (stanica/mL)
22	**86**	**394.000**	**310.000**	**295.000**	**300.000**

Table 3: BTMSCC of farms with cells between 401.000 and 500.000 cell/ml before and after veterinary visits
Tablica 3: BTMSCC kod farmi s vrijednošću BTMSCC od 401.000 do 500.000 stanica/mL prije i poslije veterinarske posjete

Farms Farme	Cows num. (on avg.) Krave	Geom.mean before visit (cell/ml) Srednja geometrijska vrijednost prije posjete (stanica/mL)	Geom.mean after 1 year (cell/ml) Srednja geometrijska vrijednost nakon 1 godine (stanica/mL)	Monthly sample before visit (cell/ml) Mjesečni uzorak prije posjete (stanica/mL)	Monthly sample after 1 year (cell/ml) Mjesečni uzorak Nakon 1 godine (stanica/mL)
26	**74**	**451.000**	**337.000**	**450.000**	**304.000**

Table 4: BTMSCC of farms with cells between 501.000 and 800.000 cell/ml before and after veterinary visits
Tablica 4: BTMSCC kod farmi s vrijednošću BTMSCC od 501.000 do 800.000 stanica ml prije i poslije veterinarske posjete

Farms Farme	Cows num (on avg.) Krave	Geom.mean before visit (cell/ml) Srednja geometrijska vrijednost poslije posjete (stanica/mL)	Geom.mean after 1 year (cell/ml) Srednja geometrijska vrijednost nakon 1 godine (stanica/mL)	Monthly sample before visit (cell/ml) Mjesečni uzorak prije posjete (stanica/mL)	Monthly sample after 1 year (cell/ml) Mjesečni uzorak nakon 1 godine (stanica/mL)
74	**51**	**590.000**	**445.000**	**638.000**	**403.000**

Table 5: BTMSCC of farms with cells between 801.000 and 1.600.000 cell/ml before and after veterinary visits
Tablica 5: BTMSCC kod farmi s vrijednošću BTMSCC od 801.000 do 1,600.000 stanica/ml prije i poslije veterinarske posjete

Farms Farma	Cows num. (on avg.) Krave	Geom.mean before visit (cell/ml) Srednja geometrijska vrijednost prije posjete (stanica/mL)	Geom.mean after 1 year (cell/ml) Srednja geometrijska vrijednost nakon 1 godine (stanica/mL)	Monthly sample before visit (cell/ml) Mjesečni uzorak prije posjete (stanica/mL)	Monthly sample after 1 year (cell/ml) Mjesečni uzorak nakon 1 godine (stanica/mL)
43	**50**	**718.000**	**586.000**	**960.000**	**532.000**

Combined data from all of the visited farms show a considerable decrease in BTMSCC both in geometric mean and in monthly samples 1 year following our first visit. However, many still did not achieved the legal requirements. On farms with occasional problems (1 monthly sample above 400.000 cell/ml occasionaly), our intervention has resulted in a consistent decrease in overall BTMSCC on geometric mean values (394.000 vs 295.000). Farms with less serious problems (BTMSCC from 401.000 to 500.000 cell/ml) have resolved their problems achieving values under legal threshold both in geometric means and in monthly samples 1 year after our intervention. Classes of farms with greater problems (BTMSCC from 501.000 to 800.000 and from 801.000 to 1.600.000 cell/ml) could not achieved legal threshold values within one year of our visit despite a remarkable decrease in BTMSCC.

Bacteriological assay

Figure n. 1 shows the distribution of bacteriological assays made in 35 significant farms which needed further investigation to resolve milk problems.

Distribution of bacteriological analysis from milk samples shows that more than half of the cows sampled are bacteriologically negative (53%), while the positive samples are more due to environmental pathogens (29%) than contagious pathogens (18%).

Figure n. 2 and n. 3 follows BTMSCC levels on farm code n. 2H 1149 and farm code n. 2H 0045. Farm 2H 1149 was a 140 milking cows free stall with bunks for dairy cows and permanent straw bedding for cows during dry period. Cows were milked in a 6+6 double herringbone milking parlour. Bacteriological and antibiotic tests analysis showed as predominant infection, *Staph.aureus* and wrong antibiotic therapy. Farm 2H 0045 was a 50 milking cows tied stall with straw bedding. Cows were milked by a pipeline milking machi-

ne with 4 clusters. Bacteriological analysis detected *S.agalactiae* infections.

Figure 1: Distribution of bacteriological analysis of milk samples from 35 farms
Slika 1: Raspodjela bakteriološke analize uzoraka mlijeka na 35 farmi

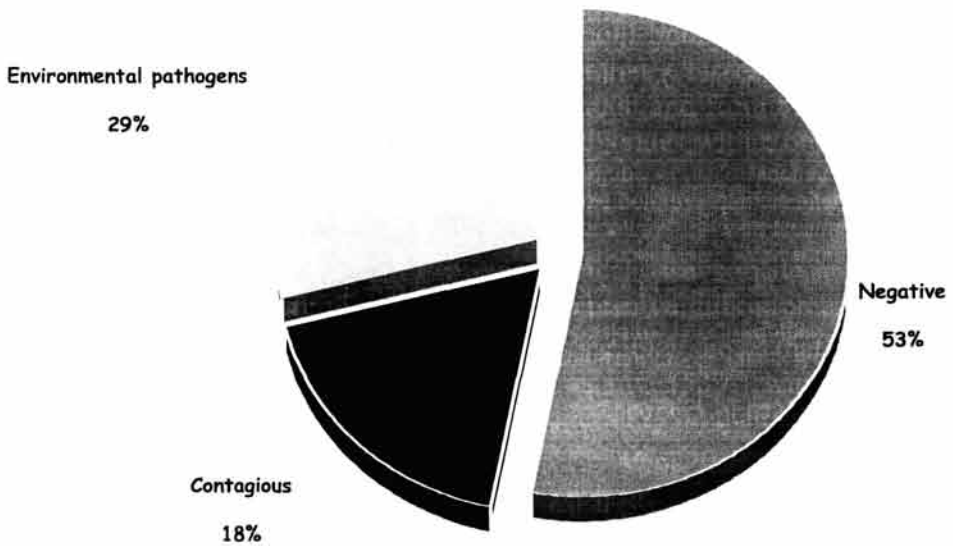


Figure 2: BTMSCC of farm 2H 1149 before (•) and after (♦) mastitis control program for Staph.aureus infections
Slika 2: BTMSCC kod farme 2H 1149 prije (•) i nakon (♦) mastitis kontrole pri infekciji Staph. aureus

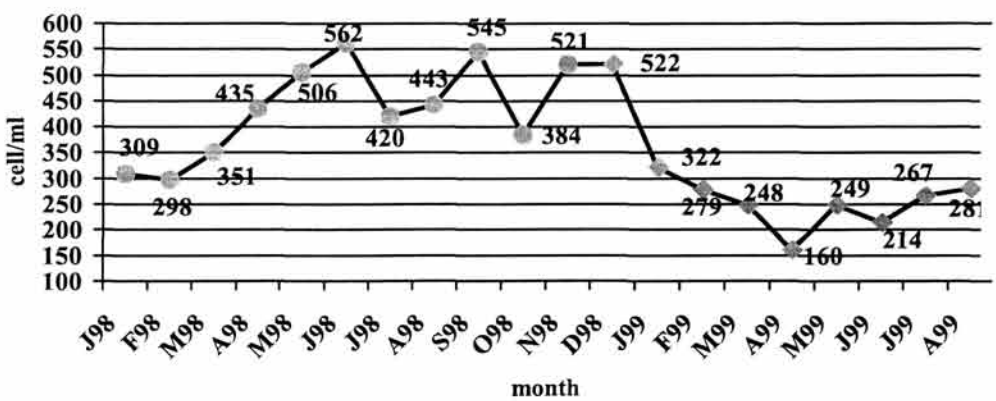


Figure 3: BTMSCC of farm 2H 0045 before (•) and after (♦) mastitis control program for S.agalactiae infections
Slika 3: BTMSCC kod farme 2H 0045 prije (•) i nakon (♦) mastitis kontrole pri infekciji S. agalactiae

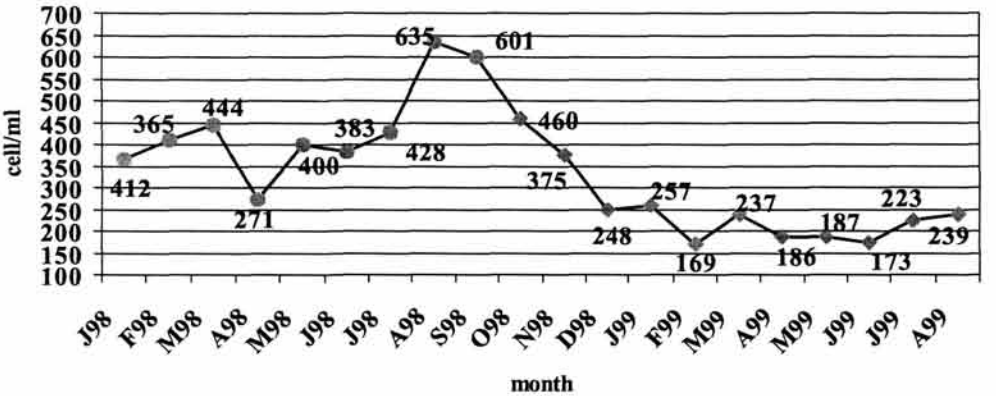


Figure nn. 4 and 5 follow BTMSCC levels on farms code n. 3H 1062 and 3H 0879. Farm 3H 1062 was a 72 milking cows free stall with bunks with straw and sawdust bedding and cows were milked in a 5+5 double herringbone milking parlour. Farm 3H 0879 was a 110 milking cows free stall with bunks with straw bedding and cows were milked in a 5+5 double herringbone milking parlour. Both farms showed environmental udder infections as following upon milk samples bacteriological analysis.

Figure 4: BTMSCC of farm 3H 1062 before (•) and after (♦) mastitis control program for environmental infections
Slika 4: BTMSCC kod farme 3H 1062 prije (•) i nakon (♦) kontrole mastitisa, uzrokovanog infekcijom iz okoliša

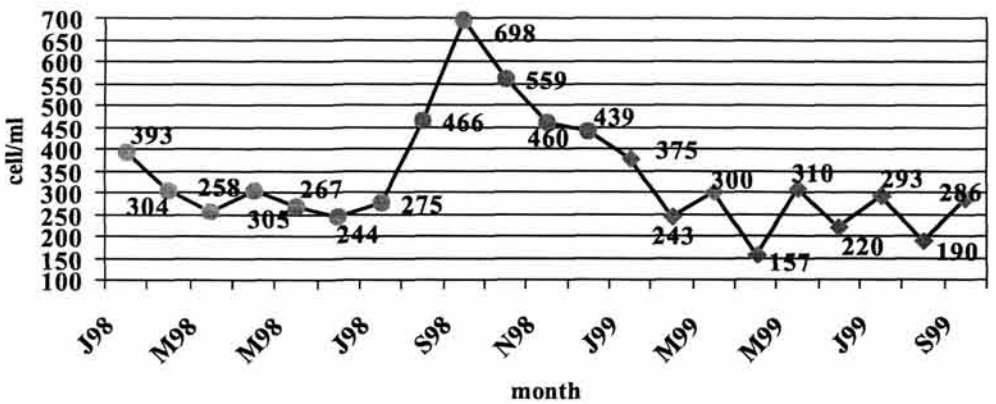
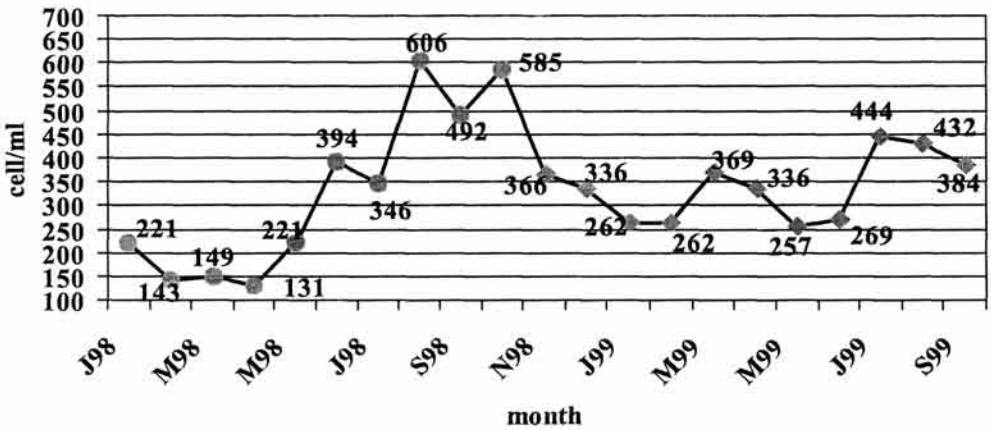


Figure 5: BTMSCC of farm 3H 0879 before (•) and after (♦) mastitis control program for environmental infections

Slika 5: BTMSCC kod farme 3H 0879 prije (•) i nakon (♦) kontrole mastitisa, uzrokovanog infekcijom iz okoliša



Discussion

The data show that small to medium sized farms with an average number of the cows have more problems (from 501.000 to 1.600.000 cell/ml) compared to large ones. These farms are characterised with tethered cows and old stalls with family and traditional management. The farms which showes a decrease in BTMSCC but still have not reached legal threshold values, further investigation is required to resolve their problems completely (Campiotti M., 1996.). We think that further improvement in environmental hygiene associated with periodic milk analysis and culling of chronic cows is necessary to achieve legal milk parameters (Hutton C.T. et al., 1990.). However our first intervention has resulted in a undeniable improvement in milk parameters. Our best results were obtained on farms with occasional problems or BTMSCC from 401.000 to 500.000 cell/ml. These farms were generally middle-large free stalls with bulks and a few management problems, where often our technical visit was sufficient to allow them to achieve legal milk parameters. When technical intervention was not enough to resolve the problems a mastitis control programme was applied in order to check the prevalence of infections and antibiotics activity on the herd. The problems were often observed in dry period and lactation therapy through bacteriological assay detection. Changes in therapy, advance drying off of some cows with problems, and the culling of some chronic or old cows allowed legal parameters to be achieved in a relatively short time.

Conclusion

Data confirm the important role of veterinarians in technical management intervention in dairy farms to maintain hygienic milk production (Barkema H.W. et al., 1998.). The best results are achieved in modern free stalls with bulks, milking parlour and drastic drying off where milk problems are solved in a relatively short period of time (approximately 3-4 months). With correct management of herds and overall hygienic measures applied (Philpot N. W. 1978 and 1978a), it should be possible to make a good quality milk with a positive effect on farm income and relatively low costs.

VETERINARSKI OBILAZAK MLIJEČNIH FARMI S POVEĆANIM BROJEM SOMATSKIH STANICA I BAKTERIJA IZNAD ZAKONOM DOZVOLJENIH VRIJEDNOSTI

Sažetak

Smjernicama 92/46. i 92/47. (D.P.R. 54/97). Europska unija je utvrdila maksimalno dozvoljene vrijednosti ukupnog broja bakterija i somatskih stanica u mlijeku. Unutar godine dana posjećeno je 165 farmi koje nisu zadovoljavale svim uvjetima.

Posjet je obavljen s ciljem da se snimi postojeća situacija, i, ukoliko je neophodno, da se provedu adekvatne korekcije u higijenskom i sanitarnom vođenju farmi.

Usporedbom broja somatskih stanica (BTMSCC) u dobavnim tankovima za mlijeko, prije i poslije veterinarske posjete, uočena su poboljšanja na svim ispitanim farmama.

Ispitane mliječne farme s brojem somatskih stanica između 401.000 i 500.000 stanica/mL u relativno kratkom vremenu uspjele su smanjiti taj broj na prosječnih 304.000 stanica/mL, što udovoljava propisanim vrijednostima.

Međutim, na farmama s brojem somatskih stanica između 501.000 i 800.000 stanica/mL potrebno je provesti dodatne tehničke mjere. Usprkos značajnom poboljšanju (prosječni broj somatskih stanica smanjene je sa 638.000 stanica/mL na 403.000 stanica/mL), nisu dobivene vrijednosti unutar zakonski propisanih. Ovim farmama bio je potreban dodatni veterinarski posjet kao i specifično bakteriološko ispitivanje te terapeutski naputci s ciljem da se postigne usaglašenost sa specifičnim zahtjevima.

Ključne riječi: mliječne farme, veterinarski obilazak, somatske stanice

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