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AFFECT OF MILKING CONDITIONS ON HYGIENIC QUALITY OF RAW MILK IN JABALPUR DISTRICT

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Abstract

In Jabalpur, dairy production with high merit cows (Holstein and cross breed) has been intensively encouraged since the seventies, because of an important demand for milk, and noticeable change in nutritional habits (Hajji et al 1992). An increase in the annual milk production has been observe, due to the numerous government incentives provided to stockmen: artificial insemination, concentrates use, forages irrigation (MADR 2003). However, dairy production systems in Jabalpur, remain dominated by extensive farms (Sraïri 2004), and weak extension of good farming practices. On the other hand, the milk quality is still evaluated. This lack of updated data on milk hygienic quality in Jabalpur may be harmful to the whole sector in comparison with other countries In fact, these considerations on raw milk hygienic quality and the questions they raise for the farmers and for the safety of the consumers are nowadays frequently investigated in other emerging dairy nations such as Iran or Malaysia (Ehsani et al 2004; Chye et al 2004). Recent preliminary studies conducted on that topic show that milk hygienic quality is highly variable from farm to farm (Sraïri et al 2005). It can be assumed that this variability is linked to milking and rearing conditions in farms as shown in other contexts (Michel et al 2001; Tourette et al 2002).

The present study aims to determine raw milk hygienic quality at farm level , through the assessment of counts of total microbial flora (Aerobic Plate Count), faecal contamination flora (total and faecal coliforms) and Staphylococci. The other objective of this study is to evaluate the relationship of milk hygienic quality with milking condition.

Key-words: Aerobic plate count, coliforms, hygienic quality, milking conditions, milk hygiene, raw milk.

Introduction

Material and methods

A single sample of bulk milk representing the whole milk produced was collected. This survey was performed in order to determine within each farm, the cattle production practices, the hygiene conditions, the feeding strategies, and above all, the milking practices. The following aspects which might affect the hygienic quality of milk were particularly studied:

- average milk yield per cow in the day of milk sampling;
- cattle housing conditions;
- type of milking (manual vs. mechanical);
- hygienic conditions of milking (udder cleaning, use of detergent, teat dipping …);

Milk samples were collected immediately after milking. pH and temperature of milk samples were directly measured at farms using a pH-meter and thermometer (WTW inolab), respectively. For the microbiological analysis of milk, 100 ml samples were aseptically collected in sterilized glass flasks of 250ml capacity using an alcohol flamed scoop.

The aerobic plate count was determined by pour plating appropriate dilutions of the milk samples using Plate Count Agar (Biokar Diagnostics, Beauvais, France) as the medium. Plates were incubated at 32°C for 48h prior to counting colonies as outlined in the International Dairy Federation reference method (IDF 1987).

The total coliform count was determined as described in the IDF reference method (IDF 1974). Growth and appearance on Violet Red Bile Agar (VRBA, Biokar Diagnostics, Beauvais, France) after an incubation period of 24h at 35°C were used for a presumptive count, and growth and gas production in 2% Brilliant Green Broth (Difco, Detroit, MI, USA) were used as the confirmatory test for coliforms. Simultaneously, the faecal coliform count was obtained on VRBA plates incubated for 24h at 44°C, confirming typical colonies from these VRBA plates with growth and gas production in E.C. Broth (Difco, Detroit, MI, USA) over 24h at 44°C.

For the determination of the staphylococci count, appropriate dilutions of the milk samples were surface spread on predried

Baird-Parker Agar (Biokar Diagnostics, Beauvais, France) medium and the plates were incubated at 35°C for 48h. Typical black colonies on this medium were counted.

Results

Data obtained from the survey showed a wide variability in daily milk productivity per cow with a range of 2 to 21 kg and a mean value of 8.5 ± 4.2 kg of milk. The average number of cows per herd was 3.6 ± 8.9 and varied from 1 to 56 cows. The genetic composition of herds was dominated by Holstein breeds and their crosses with local strains, as they represent 89% of total cows.

Farms infrastructures were also very variable. Most of farms had a concrete soil in the barn, but only half of them had concrete coverage in housing accommodations.

The milking operation is generally conducted in the housing barn, as only one farm has a milking parlour. Milking is essentially manual (98% of the cases) and it is performed only once a day in nearly 80% of the investigated farms. In fact, a great majority of these prefer to leave the relative small quantities of the afternoon milk to the calves, because it is not worthy to deliver it to milk collection centres.

Milking is carried out, generally, in dark and poor ventilated barns. About 70% of the farmers let the cows suckle the calf before milking them, as they think that these would not be milked easily without this practice. The equipments used to milk the cows are in plastic matter and very few farms have adopted aluminium vessels. ands and recipient cleaning before milking is quite systematic (87%), although it is generally done without any detergent using only water.

Data presented in Table 1, show that the 109 samples of raw milk collected had an average aerobic plate count (APC) of 42.4 x 10^6 colony forming unit (cfu)/ml. This figure was very svariable as standard deviation was 5-times the average value. The cleanest milk sample had a minimum APC value of 1.3 x 10^4 cfu/ml and the most contaminated sample had a maximum APC value of 1.5 x 10^9 cfu/ml.

Table 1. Raw milk hygienic parameters in the collected samples

Parameters	Minimum	Means	Maximum
pH	6.33	6.84	7.02
Aerobic Plate Count, cfu/ml	1.3 x 10^4	42.4 x 10^6	1.5 x 10^9
Total coliforms, cfu/ml	<30	4.1 x 10^5	20.8 x 10^6
Faecal coliforms, cfu/ml	<30	80	2 035

With regard to total coliforms count, the same variability was observed. The average value in the collected raw milk samples was 4.1 x 10^5 cfu/ml with a minimum value of less than 30 cfu/ml and a maximum value of 20.8 x 10^6 cfu/ml. The same trend was noticed for the faecal coliforms with a mean value of 80.3 cfu/ml.

Of the20 samples of raw milk examined, 11 were exempt from any detectable staphylococci. The average count of staphylococci had a value of 246 cfu/ml.

Based on these results, 3 classes of milk hygienic quality were then identified by the use of cluster analysis. Within these classes, only contaminations of milk by faecal coliforms.

Table 2. The three classes of milk hygienic quality defined and their characteristics

	Aerobic Plate, cfu/ml	Total coliforms, cfu/ml	Faecal coliforms, cfu/ml
Class number 1	1.3 x 10^6	1.6 x 10^4	11
Class number 2	1.2 x 10^6	06 x 10^4	09
Class number 3	1.4 x 10^6	4.0 x 10^3	09

Milk hygienic class 1 which included 64 milk samples, had high counts of faecal coliforms (117cfu/ml in average) . Finally, the third class (15 samples) was characterized by the absence of detectable faecal coliforms and by low counts of staphylococci(123 cfu/ml in average).

Results showed the dichotomy between farms with an average daily milk yield per cow superior to 10 kg and relatively clean milking practices and farms with more extensive dairy production Milking profile 1, represented in 45 farms, is characterized by a unique milking per day, a systematic presence of the calf and irregular hands washing and udder cleaning. It has the lowest milk intensification level (6.8 ± 3.3 kg of milk per cow per day) and practice, exclusively, a manual milking ;

Milking profile 2, represented in 12 farms, is characterized by one to two milking per day with the presence of calf and with a systematic hands washing and udder cleaning. It represents an intermediary level of milk intensification (9.2 ± 4.0 kg of milk per cow per day) .

Milking profile 3, represented in 25 farms, with systematic two milking per day without the calf and with systematic cleaning of hands and udder. This profile represents the highest level of dairy intensification (11.8 ± 5.1 kg of milk per cow per day). It includes the two farms which practice mechanical .

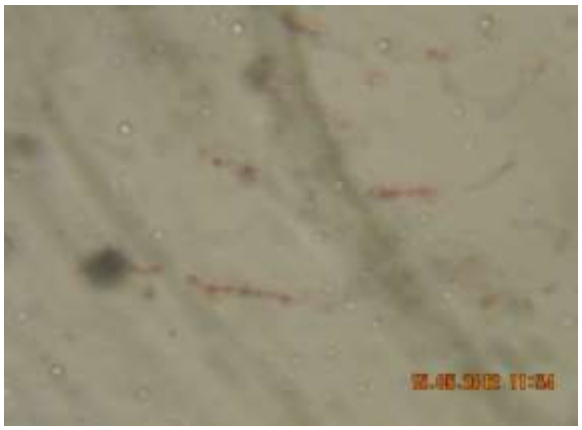

Fig1- S.aurius in milk

Fig2 - Colonies of coliform in VBRA

Discussion

The results obtained during this work on the hygienic quality of raw milk indicate that the current situation is critical and needs real improvement. In effect, a great majority of milk samples had very high levels of contamination with total microorganisms and total coliforms, which may reach 100 fold the international standards. Similar findings have been reported in previous studies dealing with milk hygienic quality in the same region (Ounine et al 2004; Sraïri et al 2005). This shows that, in general, milk samples collected are of very bad hygienic quality. These raw milks should be rejected and the dairy industry would refuse to use them with regard to the EU regulation (Journal Officiel des Communautés Européennes 1992).

On another hand, the values found in this study for the milk hygienic quality are quite similar to those reported by Hamama and El Mouktafi (1990) who worked on a similar topic .

Another significant result of this study is the characterization of the type of relationship between milk hygienic quality and milking practices. Moreover, it seems that this relationship is only valid for specific criteria linked to the environmental hygiene (faecal coliforms) and to the sanitary status of the udder (staphylococci)

Our results suggest that using a suckler calf before milking the cows might decrease both faecal coliforms and staphylococci contaminations in milk. This is in agreement with previous research findings which emphasize on the role of suckling to eliminate foremilk from the udder, which is generally the most contaminated in bacteria (Nielsen et al 2005).

It thus explains the inefficiency of hands and udder washing on improving milk hygienic quality.

Globally, our results are consistent with those found in different dairying contexts around the world. Such differences in milk microbiological quality due to the impact of suckling while milking mammals have also been reported in a camel traditional dairy system .

Conclusion

- This study confirms the broad variety in the hygienic quality of cows' raw milk collected from dairy farms in jabalpur. Globally, it also emphasizes on the poor hygienic quality of milkData clearly indicate that milk hygienic quality,

under current conditions in Jabalpur is not linked to the number of cows per farm, but it is affected by milking practices, especially calf suckling. This relationship between milk hygienic quality and the presence of a suckler calf is particularly obvious for faecal coliforms.

• All together, these results show that urgent measures are needed to ensure safe milk at farm level, by the promotion of good hygiene practices. These would preferably focus on efficient cleaning of vessels, hands, udder and the whole building facilities with Measures to decrease milk presumptive pathogens such as staphylococci should consider the problem of persistence of suckling practice.

• However, to avoid the failure of these promoting measures, a simultaneous step would be to implement a system of milk payment linked to its hygienic quality.

References

[1] Amhouri F, Saïdi B, Hamama A et Zahar M 1998 Qualité microbiologique du lait cru. Cas de la région d'Errachidia. Actes Institut Agronomique et Vétérinaire (Maroc). 18, 31-35.

[2] Bouslikhane M 1998 Tropical theileriosis (Theileria annulata) in Morocco: epidemiological and economic investigation. Unpublished Ph D. thesis. The University of Reading. UK. 209p.

[3] Hajji N, Jaïdi L et Zouaoui M 1992 Prix et concurrence au Maroc : impact de la libéralisation des prix sur la concurrence (Douze études sectorielles). Editions Najah El Jadida : Casablanca, 425 p.

[4] Hamama A et El Mouktafi M 1990 Étude de la qualité hygiénique du lait cru produit au Maroc. Maghreb Vétérinaire 5, 17-20.

[5] IDF (International Dairy Federation) 1974 Milk bacteria count. International Dairy Federation Standards 73/74. Brussels 1974, p. 7.

[6] IDF (International Dairy Federation) 1987 Milk coliforms count. International Dairy Federation Standards 14/87. Brussels, p. 9.

[7] Journal Officiel des Communautés Européennes 1992 Directive 92/46/CEE du conseil du 16 juin, Bruxelles, L268/17.

[8] MADR (Ministère de l'Agriculture du Développement Rural) 2003 Statistiques de la situation de l'élevage et de l'agriculture au Maroc. Direction de l'Élevage. Rabat, Maroc. 53p.

[9] Michel V, Hauwuy A et Chamba J F 2001 La flore microbienne de laits crus de vache : diversité et influence des conditions de production. Lait 81, 575-592. http://www.edpsciences.org/articles/lait/pdf/2001/05/01-michel.pdf?access=ok

[10] Sraïri M T et Faye B 2004 Pratiques d'élevage de bovins laitiers considérées à l'aune du discours technique : quelques exemples à partir du Maroc. Ethnozootechnie 74, 47-58

[11] Sraïri M T, Hasni Alaoui I, Hamama A et Faye B 2005 Relations entre pratiques d'élevage et qualité globale du lait de vache en étables suburbaines au Maroc. Revue de Médecine vétérinaire 156, 155-162.