EFFECT OF MAMMARY HEALTH ON COMPOSITION AND CLOTTING PROPERTIES IN BUFFALO MILK

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INTRODUCTION

In buffalo udder infection leads to even greater economic losses than in cows, due to reduction in milk yield and quality and mozzarella cheese production consistently are affected. According to Piccinini et al. (2006) significant changes of whey component of buffalo milk are observed when SCC are higher than 400,000/ml. About other milk constituents few data are available (Tripaldi et al., 2003). In the present study the changes in concentration of main constituents and cheesemaking properties of buffalo milk in relation to mammary health status were investigated.

MATERIALS AND METHODS

The study was performed at the CRA-PCM in Rome (centre of Italy) on 30 lactating Mediterranean buffaloes. Duplicate (one week apart) milk samples were taken from each animal. The milk yield records and samples on evening milking were carried out.
Each test measured the milk yield and the composition of the sampled milk was analysed as follows (ASPA, 1995): fat, protein and lactose content (Milkoscan FT-120, Foss, Denmark); somatic cell count (SCC) (Somacount 150, Bentley, USA) and clotting properties (Lactodynamograph, Maspres, Italy). N-Acetyl-β-glucosaminidase (NAGase) was assessed on whey by the procedure described by Piccinini et al. (2006). To evaluate the relationship between SCC and other milk components,three classes were defined (low: ≤200,000 cells/ml; medium: 200-400,000 cells/ml; high: >400,000 cells/ml). The same approach was applied to NAGase, classifying them in three levels (low: ≤50 units; medium: 50-100 units; high: >100 units).

RESULTS AND CONCLUSIONS

Table 1 reports the changes in milk yield and components at the different levels of SCC considered. Milk yield and lactose content decreased sensitively when SCC and NAGase passed from first two to third class. The reduction of milk yield connected whit higher levels of SCC and NAGase is expected as a consequence of the infection of the mammary gland (Eberhart et al., 1987). Milk yield decreasing in higher SCC buffalo milk was observed by Tripaldi et al. (2003). Fat, protein and casein content increased in higher SCC and NAG classes. These results are most likely related to the reduction in the volume of milk. High level of SCC and NAG was associated with an increase of pH, R and K20 and a decrease of A30 values, that is to say that increased the time to clot and to firm curd and decreased the curd firmness measured at 30 min after rennet addition.

Table 1 Least square mean values (± SEM) for the various milk characteristics considered by the three classes of SCC

Parameter	Units	Level of SCC*		
		Low	Medium	High
Milk yield	Kg	3.84±0.20 ^{a}	4.35±0.37 ^{a}	2.68±0.24 ^{b}
Lactose	%	4.69±0.05 ^{a}	4.63±0.09 ^{a}	4.29±0.06 ^{b}
Fat	%	8.83±0.32 ^{a}	8.85±0.60 $^{a\,b}$	10.25±0.39 ^{b}
Protein	%	4.81±0.08 $^{a\,b}$	4.59±0.15 ^{a}	4.99±0.10 ^{b}
Casein	%	3.97±0.08 ^{a}	3.83±0.15 ^{a}	4.20±0.10 ^{a}
SH	°SH/50 ml	5.04±0.14 ^{ab}	5.26±0.26 ^{a}	4.66±0.17 ^{b}
pH	Units	6.71±0.01 ^{a}	6.66±0.03 ^{a}	6.81±0.02 ^{b}
R	min	20.06±1.47 ^{a}	21.25±2.75 ^{a}	30.73±1.86 ^{b}
K20	min	1.75±0.28 ^{a}	1.81±0.51 $^{a\,b}$	2.72±0.36 ^{b}
A30	mm	41.60±3.07 ^{a}	39.65±5.61 ^{a}	38.27±4.65 ^{a}
A2R	mm	52.89±1.29 ^{a}	54.26±2.33 ^{a}	53.36±2.00 ^{a}

*** columns with different superscript, are statistically different**

Tripaldi et al. (2003) found the same trend on buffalo milk for pH, R, K20 and A30. Getting to our results it is noteworthy that A2R values, measuring curd firmness at two times the clotting time, were similar in different classes of SCC and NAG and that the disadvantage could be represented by an higher cheese-making time.
In conclusion if SCC exceed 400,000/ml and NAG was higher than 100 units milk yield considerably diminishes and the clotting ability shows just a time lengthening to reach the ideal firmness of curd.

Table 2 Least square mean values (± SEM) for the various milk characteristics considered by the three classes of NAG

Parameter	Units	Level of NAG*		
		Low	Medium	High
Milk yield	Kg	4.31±0.19 ^{a}	3.54±0.25 ^{b}	2.19±0.22 ^{c}
Lactose	%	4.77±0.06 ^{a}	4.64±0.08 ^{a}	4.26±0.07 ^{b}
Fat	%	8.32±0.38 ^{a}	9.11±0.48 ^{a}	11.10±0.43 ^{b}
Protein	%	4.65±0.09 ^{a}	4.98±0.11 ^{b}	5.11±0.10 ^{b}
Casein	%	3.89±0.09 ^{a}	4.07±0.11 $^{a\,b}$	4.25±0.10 ^{b}
SH	°SH/50 ml	4.97±0.14 ^{a}	5.41±0.18 ^{b}	4.66±0.16 ^{a}
pH	Units	6.69±0.01 ^{a}	6.67±0.02 ^{a}	6.83±0.02 ^{b}
R	min	19.25±1.69 ^{a}	22.28±2.12 ^{a}	31.32±1.92 ^{b}
K20	mm	1.78±0.30 ^{a}	1.95±0.38 ^{a}	2.60±0.34 ^{a}
A30	min	43.25±2.91 ^{a}	42.95±3.75 ^{a}	28.72±3.72 ^{b}
A2R	mm	51.13±1.54 ^{a}	54.68±1.94 ^{a}	55.12±2.03 ^{a}

* columns with different superscript, are statistically different

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