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RESEARCH PAPER

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Mineral status of normal and subclinical mastitic milk of cross-bred cow

A.R. BHOYAR, C.V. SHENDE, N.A. NALAWADE AND M.S. SALUNKHE

ABSTRACT

The study were conducted in the year 2005-2006 with an objective to observe the effect of subclicical mastitis disease on composition of minerals in milk selecting twelve subclinical mastitic cows from Dairy Farm, College of Agriculture, Nagpur, Cattle Breeding Farm, Nagpur Veterinary College, Nagpur and Veterinary Polyclinic, Nagpur. The milk samples were tested by modified California Mastitis Test (MCMT) and Draminiski Electronic Mastitis detector. The fore (first few strips of milk) milk samples were collected and calcium, magnesium, chloride, phosphorus, potassium and sodium were estimated on the basis of data collected. The minerals *i.e.* calcium, magnesium, phosphorus and potassium contents of subclinical mastitic milk decreased however, sodium and chloride contents of subclinical mastitic milk found to be increased.

KEY WORDS : Mastitis, Composition of minerals, Cross bred cow

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INTRODUCTION

Animal Husbandry, in our country is closely interwoven with agriculture and plays an important role in rural economy mostly in terms of milk and milk products and draft power. Milk plays a pivotal role in stabilizing agarion economy of the country, because it has become and integral part of the human diet. India of late, ranks the first producer of milk in the world as a sequel to the recent developments in dairy science.

Milk is the normal physiological secretion of udder. It is a biological fluid containing a large number of different constituents (Davies *et al.*, 1983; Kennelly, 1996). Sound health of the udder is therefore of most importance in production of milk, safe and suitable for human consumption. Ill health of the udder reduces the quality and quantity of milk which can pose potential zoonotic problems to the consumers and incure substantial economic losses to the herd owners.

Mastitis is not only responsible for great economic losses to the dairy industry but also acts as one of the biggest obstacles in achieving the 'White Revolution'. In mastitis, the economic losses are due to reduced milk production, poor quality, cost of veterinary services and drugs, shortened productive life of animal and finally its replacement cost. The term mastitis refers to inflammation of the mammary gland regardless of the cause. The most important changes in the milk include discoloration, the presence of clots and the presence of large numbers of leucocytes.

The quality of milk is mostly affected by subclinical mastitis. Milk composition depends on the level of its constituents which also vary significantly with alteration in physiological conditions of udder. Obviously, the constituents of milk alone can not gain reliable insights into the mechanism of milk synthesis unless its most accurate threshold level is established to distinguish the composition of normal milk from abnormal one.

MATERIALS AND METHODS

Selection of animals:

For studying the mineral status of normal and subclinical mastitic milk of cross-bred cow, twelve subclinical mastitic cows were selected from Dairy Farm,

Correspondence to:
A.R. BHOYAR, Department of Animal Husbandry and Dairy Science, College of Agriculture, BARAMATI (M.S.) INDIA

Authors' affiliations:
C.V. SHENDE, Department of Plant Pathology, College of Agriculture, BARAMATI (M.S.) INDIA

N.A. NALAWADE, Department of Animal Husbandry and Dairy Science, College of Agriculture, BARAMATI (M.S.) INDIA

M.S. SALUNKHE, College of Agriculture, Nigadi, SATARA (M.S.) INDIA

College of Agriculture, Nagpur, Cattle Breeding Farm, Nagpur Veterinary College, Nagpur and Veterinary Polyclinic Nagpur on the basis of examination of udder and grading of modified California Mastitis Test (MCMT) as per method of Schalm and Noorlandure (1957) and Draminiski Electronic Mastitis Detector.

Method of collection of milk samples:

Milk sample from all four quarters were collected separately. Prior to the collection, udder of the animal was thoroughly washed with water and made disinfected.

Analysis of milk samples :

The individual milk samples were tested for the following aspects:

Determination of calcium and magnesium :

Calcium and magnesium concentration in milk were estimated according to 'Wet Digestion Method' as described by Roy and Sen (1994).

Chloride per cent :

Chloride percentage of milk was estimated according to 'Mohr's method' as described by Roy and Sen (1994).

Phosphorus per cent :

Phosphorus percentage of milk was determined by 'Colorimetric method' as described by Roy and Sen (1994).

Determination sodium and potassium :

Sodium and potassium in milk was determined according to 'Flame Photometer' as per technique described by Roy and Sen (1994).

Statistical analysis :

Tabular analyses of collected data were used to accomplish the objectives of study. A 'Student T' test was used to test the significance between normal milk and subclinical mastitis of crossbred cows described by Scnedecor and Cochran (1968).

● RESULTS AND DISCUSSION ●

The experimental findings as influenced by different parameters are discussed below.

Composition of milk :

Calcium:

The average calcium concentration of normal milk of 12 samples was 122.96 ± 3.21 mg/100 ml and in SCM milk was 74.21 ± 1.37 mg/100ml. The reduction of calcium concentration in SCM milk was by 48.75 mg/100 ml. An average calcium concentration of SCM milk was significantly decreased. The present investigation corroborates with the findings of Kisza *et al*. (1964) and Schalm *et al.* (1971) who also reported lower calcium concentration in SCM milk than normal milk. Bogin and Ziv (1973) noted that reduction in calcium in mastitis condition can be from 120 to 40 mg/100 ml.

The decreased concentration of milk of calcium in SCM milk attributes to the decreased permeability of infected gland which ultimately hampers the calcium secretion.

Magnesium:

The average calcium concentration of normal milk of 12 samples was 12.44 ± 0.56mg/100 ml and of SCM milk was 9.06 ± 0.75 mg/100ml.The average magnesium concentration of SCM milk showed a decreasing trend with a significant difference.

Kisza *et al*. (1964) and Schalm *et al.* (1971) observed that milk of cow with mastitis was lower in magnesium concentration. Bogin and Ziv (1973) observed the reduction in magnesium in mastitic condition. These results are in agreement with the present study.

The reduction in magnesium concentration is due to progressive changes observed from endotoxin infused glands which results in decreased permeability of the gland and alveolar wall (Bogin and Ziv, 1973).

Chloride:

The average concentration of chloride in normal milk

Table 1 : Average biochemical composition of normal and subclinical mastitic milk

Properties	Normal milk	SCM milk	Conclusion
Calcium (mg/100 ml)	122.96 ± 3.21	74.21 ± 1.37*	Decrease
Magnesium (mg/100 ml)	12.44 ± 0.56	9.06 ± 0.75*	Decrease
Chloride (%)	0.129 ± 0.001	0.183 ± 0.004*	Increase
Phosphorus (%)	42.88 ± 1.56	31.05 ± 1.79*	Decrease
Sodium(mg/100 ml)	61.57 ± 1.21	96.76 ± 5.43*	Increase
Potassium (mg/100 ml)	142.62 ± 0.92	123.48 ± 6.46*	Decrease

* indicates significance of value at P=0.01

was 0.129 ± 0.001 per cent and in SCM milk, it was 0.183 ± 0.004 per cent. The concentration of chloride was increased in SCM milk. It was increased by 0.054 per cent in SCM milk than normal milk. The average chloride content showed significantly an increasing trend. Mohamed *et al*. (1998) and Gawai *et al*. (2002) reported that there was increase in chloride concentration of SCM milk which is in agreement of the present results.

Increase in chloride is due to chloride entered milk from the blood as a result of altered permeability and increased osmotic pressure.

Phosphorus:

The average phosphorus percentage with the standard error in normal milk and SCM milk was 42.88 ± 1.56 per cent and 31.05 ± 1.79 per cent, respectively. It was reduced by 11.83 per cent in SCM milk than normal milk. The average phosphorus per cent showed significantly decreasing trend in SCM milk.

Decrease in phosphorous concentration was also observed by Kisza *et al*. (1964) and Schalm *et al*. (1971) which is in agreement of present study. Similar observation were also recorded by Bogin and Ziv (1973) and Rao (1990).

The decrease in phosphorus level of SCM milk may be attributed to decreased permeability of the alveolar wall and gland which is due to infection to the gland.

Sodium:

The average sodium concentration of normal milk and SCM milk with the standard error was 61.57 ± 1.21 mg/100 ml and 96.76 ± 5.43 mg/100 ml, respectively .It is revealed that the concentration of sodium increased by 35.19 mg /100 ml in SCM milk.

The average sodium concentration of SCM milk showed an increasing trend with a significant difference. Kitchen (1981) reported the increase in sodium concentration in mastitic milk than normal which is in agreement of the present study. Similar results were also observed by Chaudhary *et al*. (1995) and Singh *et al*. (1998).

Sodium concentration increase in SCM milk might be due to altered permeability of the gland to various blood component.

Potassium:

The average potassium content with the standard error of normal milk and SCM milk was 142.62 ± 0.92 mg/100 ml and 123.48 ± 6.46 mg/100 ml, respectively. The potassium content was reduced by 19.14 mg/100 ml than normal milk.

The average potassium content of SCM milk showed decreasing trend with significant difference.

Kisza *et al*. (1964), Tapernoux *et al*. (1967) and Kitchen (1981) noted the level of potassium concentration was lower in mastitic cow milk which is in agreement with the present investigation. Similar results were also observed by Chaudhary *et al*. (1995), Singh *et al*. (1998) and Gawai *et al*. (2002).

This reduction in potassium concentration in SCM milk is due to suppression of the normal secretory activity of the mammary gland as reported by Oshima *et al*. (1974).

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