

Some Factors Influencing Intra-mammary Infection and Udder Health in Jersey Crossbred Cows

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Abstract—Recently, intra-mammary infection is a great threat affecting the dairy sector all over world. Udder health disorders cause profound economic loss and have a major influence on dairy cow's welfare and productivity. Therefore, it is very essential to study factors influencing IMI and udder health in Jersey crossbred cows. Present study was conducted at two adapted villages (Muratipur, Chandamari) of ERS, NDRI, Kalyani, Nadia dist, WB. A total of 29 lactating Jersey crossbred cows were examined repeatedly for udder shape and teat-end shape and teat length and teat diameter were measured using vernier calliper scale. Fortnightly milk sampling was done for 4 months of duration and subjected to somatic cell count (SCC). The data on SCC were transformed into log scale and analyzed. The udder health status may be affected by some factors viz: teat length and teat diameter, teat end shape, quality of udder, udder texture, udder morphology, shape of udder, use of water, hygiene of milker, housing and ventilation, machine milking, technique of milking, hand milking, management of sub-clinical mastitis, vitamins and minerals, herd replacement etc. The results of teat measurements showed a large variation a mean of 54.74 ± 0.55 mm. The average teat diameter was 25.41 ± 0.19 mm. The \log_{10} SCC (cells / ml) were significantly ($P < 0.01$) higher in pendulous shaped udder (6.11 ± 0.89) as compared to regular shaped udder (3.78 ± 0.64). There was a significant ($P < 0.01$) effect of udder shape and teat end on SCC level. A higher level of mean SCC was found in flat teat end shape. A correlation was found between SCC and teat length as well as teat diameter. The udder teats are the first line of defence against intra-mammary infection. Present study revealed that flat and inverted teat end shape may be a risk factor for intra-mammary infection as we found highest SCC level for flat teat end followed by inverted and least for pointed teat end. The probability of mastitis occurring varies considerably between different teat shape, sizes and morphology of the teat-end. Milker's hygiene plays a significant role in udder health management as well as in quality milk production. The unhygienic condition due to housing and ventilation are very susceptible to udder health problems at the time of drying-off, and during and after calving. Improper milking may cause retention of more residual milk, which may lead to complications like decline in subsequent milk production and development of mastitis. Regular rations deficient in vitamin E or A and the selenium (se) trace element may cause an increased incidence of mastitis. The study can be concluded that pendulous udder, flat and inverted teat-end very long and thick teat were more susceptible to intra-mammary infection in Jersey crossbred cows and all these factors must be considered accordingly

while purchasing as well as selecting dairy animals for future milk production. A good udder health helps dairy farmers to save costs, achieve more in terms of milk production, quality and profitability.

1. INTRODUCTION

The dairy farmer and dairy processing industry must constantly strive for products that are excellent in quality and flavour. Good udder health of the dairy cow plays an important role in achieving this goal. Only healthy cows with healthy udders can produce guaranteed pathogen and residue-free milk and thus ensure the food safety for the consumer. Milk obtained from clean and healthy cows is considered as quality milk.

2. FACTORS AFFECTING UDDER HEALTH:

The cows should be free any unhygienic condition like mud, manure and dust. Filthy udders and teats are the main source of milk contamination. Visible dirt should be kept out of the milk by thoroughly cleaning the udder and teats before milking. In general, the health of the udder is affected by following factors.

3. TEAT LENGTH AND TEAT DIAMETER:

A total of 29 lactating jersey crossbred cows were evaluated repeatedly for udder shape (pendulous/regular) and teat-end shape (flat/inverted/pointed) by visual examination, while teat length and teat diameter were measured using vernier calliper scale from two adapted villages (Muratipur, Chandamari) of ERS, NDRI, Kalyani, Nadia dist, WB. Fortnightly milk sampling was done for 4 months of duration and subjected to somatic cell count (SCC). The data on SCC were transformed into log scale and analyzed and suitable statistical test (Snedecor and Cochran, 1994) was applied. The results of teat measurements showed variation in teat length from 39.0 mm to 89.0 mm with a mean of 54.74 ± 0.55 mm. The average teat diameter was 25.41 ± 0.19 mm, ranging from 19.0 mm to 34.0 mm. Correlation analysis showed positive correlation between

SCC and teat length as well as teat diameter. The level of somatic cell count was higher for pendulous shaped udder in comparison of regular shaped udder. Analysis of data revealed that Log_{10} SCC (cells / ml) were significantly ($P < 0.01$) higher in pendulous shaped udder (6.11 ± 0.89) as compared to regular shaped udder (3.78 ± 0.64). Ahlawat et al (2008) reported a significant effect of udder morphology and stated that cows with pendulous udder had the highest risk of mastitis and higher SCC.

4. SOMATIC CELL COUNT AND TEAT END SHAPE:

As per observation of present study, animal may have three type of teat end like normal, flat and inverted teat end. Animals having normal teat end shape having better impact on quality and quantity milk production than having flat or inverted teat end shape. There was a significant ($p < 0.01$) effect of udder shape and teat-end on SCC level. A higher level of mean SCC was found in flat teat end shape. A correlation was found between SCC and teat length as well as teat diameter. The udder teats are the first line of defence against intra-mammary infection. Present study revealed that flat and inverted teat end shape may be a risk factor for intra-mammary infection as we found highest SCC level for flat teat end followed by inverted and least for pointed teat end. The probability of mastitis occurring varies considerably between different teat shape, sizes, and morphology of the teat-end. Singh et al (2014) found that occurrences of subclinical mastitis was highest in cows with long and thick teats.

5. UDDER MORPHOLOGY:

According to udder morphology, animals can be classified into three categories: animals having normal, slight hardness and slightly inflamed udder. Animals having normal udder will be soft and pliable, no abnormality in udder or in milk (no blockage in the milk channel, no blood in milk, no surface wound, etc) and well collapsed after milking. In case of slight hardness udder there will be tenderness in the udder hampering of the normal flow of milk and appearance of lumps, flakes or clots in first few drops of milk taken from the infected quarter and there will be drop in milk production. Animals with slightly inflamed udder will leads to swelling of udder painful, hot, redness and less active. The udder shape, udder health and teat end shape of dairy animals have impact on quality and quantity of milk production.

6. QUALITY OF UDDER:

The productive capacity of an udder is determined by its shape, size and its capacity to handle numerous calving. The most desirable udder is one that provides sufficient levels of milk from the smallest amount of mammary tissues. An ideal udder is firmly attached, symmetrical and of moderate length. The fore udder should be of moderate length and strongly attached. Extra long fore udders are bulky and frequently break away from the body wall. The rear udder should be

attached to the body with moderate width and show a strong median suspensory attachment.

7. UDDER TEXTURE:

The udder texture should be soft and pliable free from congestion and hardness. The quarters should be evenly balanced with medium sized teats placed squarely under each quarter. A side view of the udder should be show a level udder flow without quartering.

8. SHAPE OF UDDER:

The shape of udder of a dairy animal can be either regular or pendulous in nature. Animals having udder shape i.e., proportional udder (strongly attached & level floor) with regular teats is beneficial for clean milk production as compared to the animals having pendulous udder with improper cleanliness. Improper milking methods as well as change in milking time may affect the udder shape. Udder infection may damage the median suspensory ligament, which lead to change the shape of the udder from regular to pendulous type udder. Animals with pendulous udders usually have higher somatic cell count and a more frequent mastitis occurrence.

9. USE OF WATER:

It is important that the dairy farmer is assured of water that is safe for human and animal consumption. The water which contains impurities may hamper effective cleaning. Similarly, bacteria in the water could affect overall herd health including udder health. The clean potable water is the backbone of the entire dairy farm hygiene programme.

10. HYGIENE OF MILKER:

Proper handling and knowledge of milker about machine milking is required for preventing the udder injuries during milking operation. Filthy clothes and dirty hands of milkers during milking are unacceptable. The hands of the milker may transfer udder pathogens amongst cows. The milking herd together with the milking machine system, can only be as good as the milker handling them. Good training and motivation of the milker are essential for clean milk production. Milker's hygiene plays a significant role in udder health management as well as in quality milk production. The milker should wash his hand thoroughly with soap and clean water before milking. Persons with injury, skin and infectious diseases should not handle the milk.

11. HOUSING AND VENTILATION:

The unhygienic condition of cow is very susceptible to udder health problems at the time of drying-off, and during and after calving. The dairy cow lives in a very vulnerable environment in which specific and non-specific udder infection causing microbes can survive and, in many cases, proliferate. Proper

housing with sufficient ventilation and cleanliness is required for good udder health as well as cow health. It should be emphasized that farm cleanliness is of utmost importance in maintaining a low incidence of udder contamination.

12. MACHINE MILKING:

The milking machine may affect the development of mastitis and thus affect the cow's udder health. The faulty and inexperienced handling of milking machine during the milking process may contribute to increased somatic cell counts and udder infections (Bhakat et al, 2017).

13. TECHNIQUE OF MILKING:

The technique of milking should be performed quietly, gently and quickly till the entire milk is siphoned out from the udder. Good milking practices are required for maintaining the cow's udder health in any herd. Milking is the key operation in dairy farming. It requires skill, patience and experience. The effective level of oxytocin lasts for only 5-7 minutes. Thus, the milking operation has to be completed rapidly to remove the maximum milk from the udder during the period when oxytocin is causing contraction of the myo-epithelial cells.

14. HAND MILKING:

Full hand method of milking is scientifically recommended. In this method, the teats are being held firmly in the palms of the milker and pressed with gentle force to squeeze the milk into the pail. Stripping may be injurious to the teats, hence it should be avoided. However, stripping may be done when the teats are too small to hold or there is a need for complete milking. It is mandatory to perform always complete milking, so that, milk can be properly evacuated from the udder. Improper milking may cause retention of more residual milk, which may lead to complications like decline in subsequent milk production and development of mastitis etc.

15. MANAGEMENT OF SUB-CLINICAL MASTITIS:

The sub-clinical mastitis causes severe retardation of milk by causing permanent damage to the mammary gland. Mastitis is caused by various types of micro organisms. These micro organisms gain entry to the mammary gland through the orifice of the teat and cause damage to the gland. If cases of mastitis are not promptly attended, there may be development of fibrosis in mammary tissues. The immediate source of infection is unhygienic environment (cattle shed and its surroundings), dirty udder or the dirty hands of the milkman. Hence, the milking place should be properly cleaned before milking operation. All the milch animals should be washed thoroughly with clean water. The udder should be cleaned properly and then wiped with a clean cloth soaked in an antiseptic lotion (potassium permanganate at 1 % solution). It not only guards the mammary gland against infection, but also stimulates the glands and accelerates the let down process.

Before milking, it is important to examine one or two streams of milk from each quarter on a plate to test any abnormality. In case of mastitis, granules of milk are seen on the plate. The infected animal should be immediately attended to prevent the disease. After completion of milking, the teats are to be dipped into the teat dip containing bactericidal solution with the aim to minimize the chances of infection.

16. VITAMINS AND MINERALS:

It may sometimes have an effect on the cow's udder health. Selenium as well as vitamin E are needed for a proper udder immune function. Rations deficient in vitamin E or A and the selenium (se) trace element may cause an increased incidence of mastitis, owing to reduction of the natural defences of the udder. Selenium is an essential tissue nutrient required by all body tissues including the udder. Therefore, enough care should be taken to ensure that the rations are properly supplemented with minerals, especially selenium, and vitamins. Rations with an imbalanced roughage / consequently play a part in causing metabolic disorders, such as milk fever, ketosis and rumen acidosis. The stress caused by these imbalanced rations, especially during the beginning of lactation when milk production is at its highest level, make cows more susceptible to udder health problems

17. HERD REPLACEMENT:

After purchasing new animals, the analysis of milk samples should be done, prior to admitting these cows to your milking herd. Sometimes these animals were culled by the previous owner for having an udder health history. If these animals are carriers of subclinical mastitis, they may easily transfer udder pathogens to healthy cows. The most attention should be paid to purchase of milking dairy replacement stock from unknown sources.

18. CONCLUSION:

While most risk factor associated with management and the environment are addressed by introducing good management and hygiene measures, selecting dairy cows, which are less susceptible to mastitis is also a control measure worthy of consideration. The udder of a cow is an extremely important physiological asset which influences the economy, production and labour efficiency of farm because cows with healthy udders have higher milk production. Thus good udder health helps dairy farmers to save costs, achieve more in terms of milk production, quality and profitability. It can be concluded from the present study that the pendulous udder, flat and inverted teat-end, very long and thick teat were more susceptible to intra-mammary infection in jersey crossbred cows. Therefore, these conformation traits must be considered accordingly while selection dairy animals for future milk production and purchasing of dairy animal in milking stage.

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