



**ECONOMIC ANALYSIS OF CLINICAL MASTITIS IN CUDDALORE DISTRICT OF TAMIL NADU**

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**ARTICLE INFO**

**Article History:**

Received 04<sup>th</sup> May, 2018

Received in revised form 16<sup>th</sup>

June, 2018 Accepted 25<sup>th</sup> July, 2018

Published online 28<sup>th</sup> August, 2018

**Key words:**

Mastitis, Economic loss, Mastitis control, Animal Health Economics.

**ABSTRACT**

Mastitis is considered as one of the most costly disease affecting dairy cows. Many studies conducted previously to estimate the economic loss due to mastitis in India were based on the data collected from organized dairy farms having hundreds of animals where as India, the vast majority (over 80 percent) being kept in herds of 2 to 8. Hence this study has been planned to estimate the direct economic loss due to clinical mastitis based on the data collected from the herds having 2 to 8 animals in the randomly selected Cuddalore District of Tamil Nadu, during the months of April and May, 2016 and the data collected from the sample units related to the year 2015-2016. In total, 1000 farmers having dairy herd size of 2 to 8 were chosen. Among 1000 dairy farmers, 120 dairy farmers found to be experienced mastitis incidence during the study period indicating overall clinical mastitis incidence of 12 per cent. In the study area, acute form of mastitis is predominant (50.8 per cent) followed by chronic (25.8 per cent), sub-acute (22.5 per cent) and gangrenous (0.8 per cent) form. Incidence of clinical mastitis appears to have positive correlation with the daily average milk Clinical mastitis incidence appeared to be more in the cows in second lactation (54.1 per cent) as the milk production is generally higher.

Total direct economic loss due to acute mastitis, sub-acute mastitis, chronic mastitis and gangrenous mastitis were found to be Rs.1963.80, Rs. 2617.80, Rs. 4011.00 and Rs. 38685.60, respectively in which milk production loss constituted the bulk.. The weighted average total direct economic loss of all types of mastitis affected animals was found to be Rs. 3046.10 per clinical case and the extrapolation of results of this study to the entire Cuddalore district indicated that the total direct economic loss due clinical mastitis was Rs. 5.48 crores per annum.

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**INTRODUCTION**

Livestock in general and dairying in particular play a major role in the Indian rural economy. The importance of dairying in India hardly needs emphasizing as this sector is the major source of income for an estimated 27.6 million people (Subbarama Naidu, 2004). Mastitis is an inflammation of the mammary glands of dairy cows accompanied by physical, chemical, pathological and bacteriological changes in milk and glandular tissue (Hurley and Morrin, 1997). It is considered as one of the most costly disease affecting dairy cows. Reviews of past calculations of the economic losses of clinical mastitis (Schepers & Dijkhuizen, 1991; Halasa *et al.*, 2007) clearly show that mastitis has a great economic impact. The assessment of the economic worthiness of a control programme for mastitis has to be supported by a reliable evaluation of the economic losses caused by the disease and the knowledge of the costs of the implementation of that programme (Seegers *et al.*, 2003).

The losses are revenues not earned, while the control costs are real expenditures (McInerney *et al.*, 1992). Sometimes economic calculations use unrealistic estimates of production losses associated for mastitis and an over-estimated impact which can then lead to a wrong decision, seen from an economic point of view. In order to effectively measure the impact of a disease, one has to be able to identify the effects it has on the animal. This is not a simple task because disease effects (Ngategize and Kaneene, 1985): (a) are not always obvious and pronounced (b) are influenced by other factors such as management (e.g., nutrition and housing) and environment (c) have a temporal dimension which adds to the complexity of evaluating their impacts at different stages in time and (d) often manifest themselves in a complex with other diseases. Many studies conducted previously to estimate the economic loss due to mastitis in India were based on the data collected from organized dairy farms having hundreds of animals where as India has about three times as many 'dairy' animals as the USA, the vast majority (over 80 percent) being kept in herds of 2 to 8 animals (Hemme *et al.*, 2003). Hence this study has been planned to estimate the direct economic loss due to clinical mastitis based on the data collected from the herds having 2 to 8 animals

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**Table 1** Relationship between types of mastitis and important factors affecting mastitis

	Acute Mastitis	Sub-acute Mastitis	Chronic Mastitis	Gangrenous Mastitis	Total
Total number of clinical incidence	61 (50.8)	27 (22.5)	31 (25.8)	1 (0.8)	120 (100.0)
<b>Based on Daily Average Milk Production (lit/day)</b>					
a) Upto 4lits	5 (4.1)	10 (8.2)	-	-	15 (12.5)
b) 4.1 to 8 lits	15 (12.5)	5 (4.1)	15 (12.5)	-	35 (29.1)
c) 8.1 to 12 lits	30 (25.0)	12 (10.0)	16 (13.3)	1 (0.8)	59 (49.1)
d) more than 12.1 lits	11 (9.1)	-	-	-	11 (9.1)
<b>Based on Number of quarters affected</b>					
a) One	50 (41.6)	20 (16.6)	16 (13.3)	-	86 (71.6)
b) Two	10 (8.3)	7 (5.8)	15 (12.5)	-	32 (26.6)
c) Three	1(0.8)	-	-	-	1(0.8)
d) All	-	-	-	1 (0.8)	1 (0.8)
<b>Based on Breed</b>					
a) Cross breed	51 (42.5)	22 (18.3)	26 (21.6)	1 (0.8)	100 (83.3)
b) Desi	10 (8.3)	5 (4.1)	5 (4.1)	-	20 (16.6)
<b>Based on Lactation number</b>					
a) First	-	7 (5.8)	2 (1.6)	-	9 (7.5)
b) Second	40 (33.3)	15 (12.5)	10 (8.3)	-	65 (54.1)
c) Third	16 (13.3)	3 (2.5)	10 (8.3)	1 (0.8)	30 (25.0)
d) Fourth	5 (4.1)	2 (1.6)	5 (4.1)	-	12 (10.0)
e) Fifth	-	-	4 (3.3)	-	4 (3.3)

Figures in the parentheses indicate percentages to total.

**Table 2** Components of direct economic loss due to mastitis per clinical case (in rupees)

Economic losses	Acute Mastitis	Per-acute Mastitis	Chronic Mastitis	Gangrenous Mastitis
<b>A) Production losses</b>				
a) Yield loss	682.00	1017.00	1412.00	34300.00
b) Discarded milk	590.00	653.00	1037.00	817.00
Total Production Loss	1272.00	1670.00	2519.00	35117.00
<b>B) Veterinary expenses</b>				
a) Medicine	178.00	256.00	520.00	1241.00
b) Veterinary fees	282.00	457.00	813.00	1741.00
Total	460.00	713.00	1333.00	2982.00
<b>C) Disease control expense</b>				
a) Stall hygiene	119.20	121.10	137.00	332.00
b) Milking hygiene	112.60	113.70	122.00	254.60
Total	231.80	234.80	159.00	586.60
D) Total cost	1963.80	2617.80	4011.00	38685.60
Total weighted average loss			3046.10	

## METHODOLOGY

Cuddalore District of Tamil Nadu was randomly selected for the present study. Multistage random sampling technique was used to select the herds. The selected district comprised 13 blocks of which, two blocks, viz., Parangipettai and Virudhachalam were randomly selected. In the next stage, two villages from each selected block were chosen randomly. In total, 1000 farmers having dairy herd size of 2 to 8 were chosen again randomly from the selected blocks, 500 from each block. Among 1000 dairy farmers, 120 dairy farmers experienced mastitis incidence during the study period. The study was taken up during the months of April and May, 2016 and the data collected from the sample units related to the year 2015-2016. Relevant data were collected from the chosen respondents through personal interview using a pre-tested interview schedule. Cross checks were made to minimise the errors due to recall bias and also to ensure reliability of the information provided by the respondents.

For the present study, number of animals in the farm was operationalized as standard animal units (John Christy and Thirunavukkarasu, 2002). Visual observation and palpation of the mammary gland quarters and macroscopic examination of the milk were explained to all respondents of the study. The cases of clinical mastitis encountered were studied in detail, the following being recorded for each cow:

age, clinical state (acute, subacute, chronic and gangrenous). They were then classified as follows: Acute mastitis: Severe inflammation of the mammary gland without any marked systemic reaction. Subacute mastitis: Inflammation of the mammary gland with abnormalities in milk. Chronic mastitis: Inflammation of the mammary gland, with little change in milk where the gland was either enlarged or reduced in size (Shitandi *et al.*, 2004). Gangrenous mastitis: Characterized by swollen mammary gland, cold to the touch and bluish-black in color. The affected skin area peeled off, with oozing of serous fluid. Milk was bloody and watery. The costs categories recorded include: milk production losses, drugs, discarded milk, veterinarian, labour, milk quality, culling and occurrence of other diseases (Gill *et al.*, 1990; Schepers & Dijkhuizen, 1991; Halasa *et al.*, 2007). The association between types of mastitis and various factors affecting clinical mastitis were analysed by the conventional analysis in the form of averages and percentages.

## FINDINGS AND DISCUSSION

Out of 1000 dairy farmers contacted, 120 farmers experienced mastitis incidence during the study period indicating overall clinical mastitis incidence of 12 per cent which was in line with 13.01 per cent reported by Thirunavkkarasu (1996). However Taneja *et al.* (1989) and Jadhav (1995) found a higher incidence in crossbred cows (23.56 per cent). Improved

hygienic measures practiced might be a reason for the lower incidence in the study area. In the study area, acute form of mastitis is predominant (50 per cent) followed by chronic (25.8 per cent), sub-acute (22.5 per cent) and gangrenous (1.6 per cent) form.

Incidence of clinical mastitis appears to have positive correlation with the daily average milk as more than 59 per cent of the mastitis affected animals found to produce more than 8 liters per day and only 15 per cent of the mastitis affected animals produce less than 4 liters per day in the study area. Chi-square analysis indicated a significant association ( $P < 0.01$ ) between mastitis incidence and milk yield as in the studies of Bunsh *et al.* (1984) and Taneja *et al.* (1989). Among the mastitis affected animals, crossbred cows constitute 83.3 per cent while the remaining was desi in the study area. Clinical mastitis incidence appeared to be more in the cows in second lactation (54.1 per cent) as the milk production is generally higher.

A component of direct economic loss due to mastitis per clinical case in the study area is presented in the Table-2. Total direct economic loss due to acute mastitis, sub-acute mastitis, chronic mastitis and gangrenous mastitis were found to be Rs.1963.80, Rs. 2617.80, Rs. 4011.00 and Rs. 38685.60, respectively in which milk production loss constituted the bulk. The weighted average total direct economic loss of all types of mastitis affected animals was found to be Rs. 3046.10 per clinical case which concurred with the studies of Fetrow and Anderson (1987), Fetrow *et al.* (1991), Allore and Erb (1998) and Fetrow *et al.* (2000). The extrapolation of results of this study to the entire Cuddalore district indicated that the total direct economic loss due clinical mastitis was Rs. 5.48 crores per annum.

## CONCLUSION

The study has revealed that the dairy farmers lose a huge amount of money due to clinical mastitis. To prevent mastitis and the consequent huge economic losses in dairy farms, the following suggestions are made: Educating dairy farmers to make them aware of the importance of practicing proper milking hygiene, keeping the vacuum level in the milking unit between 275 and 300 mm of mercury with little fluctuation, dipping the teats after milking, dry cow treatments, culling of chronically infected cows, using backflush and giving proper treatment to the mastitis affected animals.

## Reference

- Allore, HG. & Erb, HN. 1998. Partial budget of the discounted annual benefit of mastitis control strategies. *Journal of Dairy Science*, 81: 2280–2292.
- Bunch, K.J., Heneghan, D.J.S., Hibbitt K.G. & Rowlands, G.J. 1984. Genetic influences of clinical mastitis and its relationship with milk yield, season and stage of lactation. *Livestock Production Science*, 11: 91-104.
- Fetrow, J. & Anderson, K. 1987. The economics of mastitis control. *Compendium on Continuing Education for the Practicing Veterinarian*, 9: 103–110.
- Fetrow, J., Mann, D., Butcher, K. & McDaniel, B. 1991. Production losses from mastitis: carryover from the previous lactation. *Journal of Dairy Science*, 74: 833
- Fetrow, J., Stewart, S., Eicker, S., Farnsworth, R. & Bey, R. 2000. Mastitis: an economic consideration. *National Mastitis Council Annual Meeting Proceedings, Atlanta, GA*, 11 February 2000, 3–47.
- Gill, R., Howard, W.H., Leslie, K.E. & Lissemore, K. 1990. Economics of mastitis control. *Journal of Dairy Science*, 73 : 3340–3348.
- Halasa, TH., Huijps, K., Osterås, O. & Hogeveen, H. 2007. Economic effects of bovine mastitis and mastitis management: A review. *Veterinary Quarterly*, 29: 18–31.
- Hemme, T., Garcia, O. & Saha, A. 2003. A Review of Milk Production in India with Particular Emphasis on Small-Scale Producers. (PPLPI Working Paper No. 2). *International Farm Comparison Network, FAO*. Retrieved July 01, 2009, from [www.fao.org/ag/againfo/programmes/en/pplpi/docarc/wp2.pdf](http://www.fao.org/ag/againfo/programmes/en/pplpi/docarc/wp2.pdf).
- Hurley, L. & Morrin, E. 1997. Introduction to Mastitis. In: Lactation by Hurley (Ed). University of Illinois, Urbana, USA.
- Jadhav, K.L., Tripathi, V.N. & Kale, M.M. 1995. Incidence and economics of mammary disorders in Holstein Sahiwal crossbred cows. *Indian Journal of Dairy Sciences*, 48(5): 382-385.
- John Christy, R. & Thirunavukkarasu, M. 2002. Socio-Economic Dimensions of Female Participation in Livestock Rearing: A Case Study in Tamil Nadu. *Indian Journal of Agricultural Economics*, 57: 99 -103.
- McInerney JP., Howe KS. & Schepers JA. 1992. A framework for the economic analysis of disease in farm livestock, *Preventive Veterinary Medicine*, 13: 137–154.
- Oliveira, P., Watts, J., Salmon, S. & Aarestrup, M. 2000. Antimicrobial Susceptibility of *Staphylococcus aureus* isolated from bovine mastitis in the Europe and the United States. *Dairy Science Journal* , 83:855-862.
- Schepers, JA. & Dijkhuizen, AA. 1991. The economics of mastitis and mastitis control in dairy cattle – a critical analysis of estimates published since 1970. *Preventive Veterinary Medicine*, 10: 213–224.
- SEEGERS, H., Christine Fourichon & François Beaudeau. 2003. Production effects related to mastitis and mastitis economics in dairy cattle herds. *Veterinary Research*, 34: 475–491
- Shitandi, A., Anakalo, G., Galgalo, T. & Mwangi, M. 2004. Prevalance of bovine mastitis amongst small holder dairy herds in Kenya Israel. *Journal of Veterinary Medicine*, 59 :1-2
- Subbarama Naidu, A. & Kondaiah, N. 2004. Livestock production and post production systems – Need for a pragmatic approach. *Indian Journal of Agricultural Marketing*, 18: 91-105.
- Taneja, U.K., Dwivedi, V.K., Saxena, M.M., Nivsarkar, A.E. & Nautiyal, L.P. 1989. Incidence of mastitis and production losses in crossbreds. *Indian Journal of Animal Science*, 59(10): 1346 - 1348
- Thirunavukkarasu, M. 1996 Economic analysis of Mastitis in Dairy Farms, *Ph.D. Thesis, Tamil Nadu Veterinary and Animal Sciences University*.

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