Original Research Article

Analysis of Economic Losses due to Mastitis in Cattle of Uttar Pradesh, India

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A B S T R A C T

The paper presents the economic losses due to mastitis in different commissionaires of Eastern Uttar Pradesh. Mastitis in its different forms is expected to cause a total loss to the tune of INR 1311.767 crores in Uttar Pradesh. The expected loss caused by clinical mastitis amounts to INR 479.25 crores [(INR 354.3659 for crores indigenous cow and INR 124.8841 crores for cross bred cows)]. Sub clinical mastitis is silently causing a loss of INR 832.517 crores (INR 565.061 crores for indigenous cow and INR 267.456 crores for cross bred cows). Maximum losses due to subclinical mastitis are recorded from Lucknow commissionary (INR 108.158 crores) with the share of indigenous and crossbred cow by INR 71.272 crores and INR 36.886 crores respectively. Total losses due to clinical mastitis are recorded to be maximum amounting to the tune of INR 4.43 crores from Varanasi commissionary. Lack of knowledge on the development of disease and methods to prevent the infection is a common cause of disease propagation. There is a need to conduct awareness drives in villages regarding package of good practices to prevent mastitis.

Introduction

Mastitis is one of the most commonly encountered problems of milch animals draining heavy amount from dairy owner's pocket (Schroeder, 2012; Winter and Fehlings, 2013; Kvapilík, 2014). Mastitis as per the present scenario has symbolized itself as a most challenging disease in high yielding dairy animals in India next only to FMD (Foot and Mouth Disease) (Varshney and Mukherjee, 2002). But as per reports of its

occurrence in dairy animals, it places itself at first position with its prevalence reported in more than 90% of high yielding cows (Sharma *et al.,* 2003). Jingar *et al*., 2017 were of the view that the losses due to mastitis are not only economic but issues like animal health and welfare, quality of milk, antibiotic usage and the image of the dairy sector are also important reasons to focus on mastitis control programme. McInerney *et al.,* 1992 categorized losses due to bovine mastitis into two main categories: Production losses and control-related expenditures. In clinical mastitis there is a reduction of about 50% in milk yield and a cow requires on an average 5-6 days for complete recovery. Jingar *et al.,* 2017 were of the view that the average days under treatment were maximum in 1st parity (14.28) and minimum in 3rd parity (8.63). The total treatment cost was more (P<0.05) in 4th parity (Rs. 470.52) and less in 2nd parity (Rs. 250.00). The fibrosis rate of quarter was maximum in 5th parity resulting in higher loss of animal value. The parity wise result indicated highest loss in milk yield/day and the production loss in third parity (5.40 kg and INR 1020.24) than in first parity (4.45kg and INR 754.80).

Bangar *et al.,* (2016) conducted meta-analysis using data records of 17873 crossbred cows and 7737 udder quarters from total of 17 published studies and found that the pooled estimates of clinical mastitis in crossbred cows under cow-basis and quarter-basis was 16.08% (95% CI 11.69, 21.72) and 11.71% (95% CI 6.60, 19.94), respectively. Bangar *et al.,* (2015) estimated the pooled prevalence of subclinical mastitis to the tune of 46.35 % (95 % CI 39.38; 53.46) on cow-basis using 6344 cows from 25 studies. Meta-analysis for quarter-wise prevalence of subclinical mastitis was carried out using 18,721 udder quarters of dairy cows from 23 studies, and the pooled estimate of prevalence of subclinical mastitis on quarter-basis was found to be 23.25 % (95

% CI 18.15; 29.27). The reduction in milk yield caused by sub clinical mastitis ranges from 5 to 25 %. Single time treatment cost on an average Rs 135-200 and doses need to be administered at frequent intervals. The animals which become non productive as a sequel to mastitis are normally discarded and to make up the loss in milk yield, replacement with other animal is usually discarded and to make up the loss in milk yield, replacement with other animal is usually made. In doing so the owner initially losses the money amounting few thousands (on an average) and again spends to buy another productive animal. In India the annual losses due to clinical mastitis had earlier been reported to the tune of Rs 52.9 crores (Dhanda and Sethi, 1962); Rs 1607.2 crores (Singh and Singh, 1994); Rs 987.60 crores (Dua 2001). Its hidden form, subclincal mastitis, causes loss upto Rs 2646 crores (Dua, 2001) and 2129.72 crores (Sirohi and Sirohi, 2001). The extent of losses suffered by dairy farmers of Uttar Pradesh is not available so far. The paper therefore presents the financial losses due to mastitis in Uttar Pradesh.

Materials and Methods

The mastitis economic framework was carried out in accordance with previously described methods [Halasa *et al*., 2007; Petrovski *et al.,* 2006; Kvapilík and Burdych (2014) and Aghamohammadi *et al.,* (2018)]. The economic losses due to mastitis have been calculated under separate categories of subclinical and clinical mastitis. The losses have been calculated as per method described by Dua (2001). The data regarding the population of indigenous and cross bred cattle was obtained from the Uttar Pradesh Animal Husbandry Gadget 2004. Veterinary services, time, consultation fees, losses from discarded milk, assessment of drug and treatment costs were quantified in accordance with previously described methods [Petrovski *et al.,* 2006;

Kvapilík and Burdych (2014) and Aghamohammadi *et al.,* (2018)]. As per the reports available, average production losses due to clinical mastitis was taken as 50% in comparison to 25% in sub clinical mastitis.

Average price of milk was considered Rs 15 per litre and average duration of mastitis and number of days the milk is discarded was presumed to be 5 days and 3 days respectively. The indigenous cow is priced at Rs 5000/animal in comparison to Rs 10,000/crossbred cow. With each affected quarter 25% price is considered to be lost. In country where cow is being worshiped, only 1% cows are believed to be culled because of mastitis. Following formula was used to establish the total economic loss

Losses due to sub- clinical mastitis

Total milk production losses can be calculated as follows

Average lactation yield (lts)= A

Average production loss (%)= B

Average milk price (Rs)= C

Milk loss per animal per lactation

Quantity = axb (lts)= D

Value= axbxc(Rs)= E

Average incidence (%)= F

Milch animal population (millions)= G

Number of animals affected (million)= Fx G = H

Milk production losses

Quantity (Million tonnes)= D x H

Value (Million Rs)= E x G

Losses due to clinical mastitis

Loss due to reduced milk production

Reduced milk production per animal= Average milk losses due to clinical mastitis (%) x Average daily milk yield of animal x Average price of milk x Average duration of mastitis affection

Cost of milk discarded due to clinical mastitis per animal (Rs)= 0.50 x Average daily milk yield of animal x average price of milk x Number of days milk is discarded

Loss due to replacement of mastitic animal = Average price of lactating animal - price received for culled animal

Replacement value of new animal = Average price of lactating animal + loss incurred in culling a mastitic animal

Number of animals culled due to mastitis = percent culling rate (1%) x milch animal population

Total loss due to culling mastitic animal along with their replacement = replacement value of new animal (D) x no. of animals culled due to mastitis (E)

Total losses incurred on one animal= A + B + vets fee + cost of treatment

Total loss due to clinical mastitis = [G x number of animals affected] + F

Results and Discussion

The present study was conducted to calculate the economic losses due to mastitis in cattle of Uttar Pradesh. Mastitis in its different forms is expected to cause a total loss to the tune of

INR 1311.767 crores in Uttar Pradesh (Table 1). The expected loss caused by clinical mastitis amounts to INR 479.25 crores {(INR 354.3659 for crores indigenous cow and INR 124.8841 crores for cross bred cows)}.

Sub clinical mastitis is silently causing a loss of INR 832.517 crores ((INR 565.061 crores for indigenous cow and INR 267.456 crores for cross bred cows)). Maximum losses due to subclinical mastitis is recorded from Lucknow commissionary (INR 108.158 crores) with the share of indigenous and crossbred cow by INR 71.272 crores and INR 36.886 crores respectively. Total losses due to clinical mastitis are recorded to be maximum amounting to the tune of INR 4.43 crores from Varanasi commissionary. Losses in crossbred cow were recorded to be maximum in Varansi whereas Lucknow reported highest losses in indigenous cattle. Lack of awareness regarding different causes of disease, improper treatment and prevention techniques can be the cause of such a high impact of this disease.

The results in the present findings commemorate with the earlier works of different scientists in India and abroad who also reported heavy economic losses due to clinical and subclinical mastitis. Sinha *et al*., (2014) estimated the overall losses to the extent of INR1390 per lactation, in which around 49% was due to reduction of milk production alone followed by veterinary expenses which accounted for 37% of the total loss. Bardhan (2013) had reported average loss due to mastitis per animal per month to be INR 3206.55, INR 2119.67 and INR1708.89 in optimistic scenario and INR3549.59, INR 2448.03 and INR 1934.78 in pessimistic scenario in case of CB cows, indigenous cows and buffaloes, respectively. Singh *et al.,* (2014) reported that total economic loss was INR 5, 210 in ND cattle, INR 36, 795 in CB cattle and INR 24, 175 in buffalo during their study period of 1 year. They also reported that economic loss per animal per lactation was INR 868, INR 1314 and INR 1272 in case of ND cattle, CB cattle and buffaloes, respectively. Sasidhar *et al.,* (2002) had reported from an organized dairy farm in Hyderabad a loss of INR 326 per infected cow due to mastitis. Thirunavukkarasu and Prabaharan (1999) had reported that total loss in affected crossbred cows and buffaloes were INR 536.25 and INR 404.73 per lactation, respectively. Rathod *et al.,* 2017 reported the economic losses due to subclinical form of mastitis in the range of INR 21,677/- to INR 88,340/- for one lactation period depending on the condition of the animal. Das *et al.,* (2018) reported a total economic loss of Rs. 7824/- in one month per cow. Such variations in results of different studies might be attributed to variation in milk price in different regions, different amount of milk production from different species and breeds of animals as well as variation in ago-climatic conditions.

In Egyptian dairy farms Azooa *et al.,* (2020), revealed the economic losses due to subclinical mastitis and clinical mastitis revealed to the tune of 21,933,258.60 LE (1 Egyptian pound=4.66 Indian rupee) and 1,196,871.4 LE for 80 CM cases respectively. Based on literature data and their own calculations Kvapilik (2015) concluded that the economic loss per one case of mastitis occurrence was estimated at 9000 CzC (1 Czech Koruna=3.37indian rupee).

Table.1 Losses due to subclinical and clinical losses (in Rs Crores)

Commissionary	Loss due to subclinical mastitis (Rs crores)		Loss due to clinical mastitis (Rs crores)	
	Indigenous cows	Crossbred cows	Indigenous cows	Crossbred cows
Meerut	16.858	20.517	11.980	9.4011
Saharanpur	16.905	20.880	11.997	9.5532
Mooradabad	24.645	11.524	17.1585	5.3080
Bareilly	34.386	6.601	23.8557	3.0797
Agra	33.928	11.032	24.0329	5.0807
Lucknow	71.272	36.886	16.4957	16.7878
Ayodhya	40.128	28.789	27.0558	12.9412
Devipatan	36.339	17.164	24.4732	7.7225
Prayagraj	39.345	16.197	26.4871	7.4448
Kanpur	33.899	12.617	22.8639	5.6956
Jhansi	36.261	0.493	24.4942	1.7805
Chitrakoot	38.201	0.431	25.8928	1.5550
Gorakhpur	17.843	21.423	12.3693	9.8181
Basti	18.483	8.317	12.9355	3.7532
Varanasi	46.516	27.826	31.5275	12.7792
Mirzapur	28.890	7.408	19.3218	3.3848
Azamgarh	31.162	19.351	21.4250	8.7987
Total	565.061	267.456	354.3659	124.8841
	832.517		479.25	
Total loss				1311.767

These losses can be effectively reduced by adopting proper prevention and control measures like strict sanitation at the time of milking, maintaining proper hygienic condition in the shed, avoiding the animals to sit immediately after calving thereby preventing the contact of microbes to vulnerable udder, teat dipping and provision for standing of animals after milking (approx 10 min), boosting udder immunity by supplementing different antioxidants like Vitamin E, C, selenium zinc copper and various herbs to strengthen the local immunity.

Above all, the affected animals should be immediately provided medical care and such animals should be segregated from the rest.

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