AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Agricultural Economics Research Review
Vol. 23 January-June 2010 pp 77-81

Quantifying Economic Losses due to Milk Fever in Dairy Farms

M. Thirunavukkarasu*, G. Kathiravan, A. Kalaikannan and W. Jebarani
Department of Animal Husbandry Statistics and Computer Applications,
Madras Veterinary College, Chennai – 600 007, Tamil Nadu

Abstract

Milk fever, a metabolic disease, affects dairy animals usually within one or two days after calving, resulting in a huge reduction in milk production and thus becomes economically most important. This study, conducted in five milkshed districts of Tamil Nadu, has estimated the economic losses arising from milk fever, based on the data collected from a random sample of 557 milk fever affected bovines (516 cows and 41 she buffaloes) during 2005-08. For assessing economic losses caused by milk fever, cost of medicines, veterinarian's fee, cost of additional labour utilized, loss due to reduction in milk output, cost of animals dead and culled have been considered. The prevalence of milk fever has been found 13.67 per cent in cows and 11.99 per cent in buffaloes across the study districts. The total loss has been found as Rs 1,068 per affected cow and Rs 665 per buffalo. Taking into account the observed prevalence of milk fever, the population of milch cows and buffaloes and the per animal loss due to milk fever has been estimated to be of Rs 40.62 crore in the state, which is a substantial damage to the dairy farming community. Some suggestions for prevention and management of milk fever have been given in the study.

Introduction

With the continuing intensification and commercialization of livestock production systems, the economic implications of animal diseases are becoming increasingly important at both farm and national levels, as diseases represent avoidable waste of scarce resources. These problems seriously reduce the production potentials of animals, especially crossbreds, as they stand more susceptible to diseases, hardships and contingencies peculiar to the Indian climate. However, there is little evidence available on how much the farmers and the nation lose as a result of animal diseases. A deeper insight into the animal diseases will help provide a better view of the overall economic losses and the extent to which these losses could be avoided. Quantification of losses due to diseases in the livestock sector would adequately support the decision-making process in optimizing animal health management. There are some studies in India, which were directed at quantifying economic losses due to animal diseases (Singh *et al.*, 1987; Chauhan *et al.*, 1994; Singh and Singh, 1994; Kumar *et al.*, 2004; Thirunavukkarasu and Prabaharan, 1999; Thirunavukkarasu and Kathiravan, 2007; Ganeshkumar *et al*., 2008).

Milk fever is a metabolic disease occurring in dairy animals during the periparturient (meaning around the parturient) period. The reproductive capability of the animal, a major concern in its economic value in dairy farming, is frequently related to periparturient events, as undesirable health related events during this period might result in tremendous economic losses to farmers. By the end of gestation in dairy animals, the foetal calf and the associated placenta make huge demands for energy, protein and minerals. Further, increasing production of milk after calving places an enormous demand for glucose and minerals at a time when feed intake would not have reached its peak (RCI, 2000), leading to draining of glucose and calcium from the blood and leaving the milch animal's metabolism under severe stress, as she transitions to lactation (Bethard and Smith, 1998).

* Author for correspondence,
Email: drthiruarasu@yahoo.com

Milk fever, caused by draining a greater amount of calcium from blood to ensure rapid synthesis of milk in the udder, affects dairy animals usually within one or two days after calving. Hypocalcaemia develops when the serum calcium drops below 7.5 mg per dL from the normal 8 - 10 mg per dL and milk fever sets in when it further drops to below 6.5 mg per dL. If calcium therapy is not instituted, affected cows progress to the more severe stage, wherein cows are unable to stand. Later, cows lose consciousness progressively to the point of coma. If untreated even at this stage, cows may survive only a few hours. Thus, milk fever management is economically most important, as it results in not only reduction in milk production, but also loss of animals. The timing of occurrence of milk fever is such that it occurs at the most productive period of a lactating animal. Hence, this study was carried out to estimate the economic losses arising from milk fever (otherwise called as hypocalcaemia) in Tamil Nadu.

Materials and Methods

The study was conducted in five milkshed districts of the state of Tamil Nadu, viz. Coimbatore, Erode, Madurai, Vellore and Villupuram. A random sample of 557 milk fever affected bovines (516 cows and 41 she buffaloes), spread across all the five districts, was chosen for data collection. The data were collected using the pretested interview schedule during the period from August 2005 to June 2008. For assessing the economic losses caused by milk fever, cost of treatment, veterinarian's fee, value of additional labour utilized, value of reduced milk output, values of animals dead and cull values of animals sold out were all taken into consideration.

Results and Discussion

Prevalence of Milk Fever in Study Area

The study has revealed that of the total 3774 cows, 516 (13.67%) were affected by milk fever (Table 1). And of 342 buffaloes, 41 (11.99%) suffered with milk fever. Horst (1986) has also reported occurrence of milk fever at the rate of 5 to 10 per cent in the USA.

Economic Losses due to Milk Fever

Economic losses due to milk fever occur due to (i) expenditure on treatment of disease-affected animals, and (ii) reduction in quantity of milk.

Expenditure on Treatment of Affected Animals

This included the cost of medicines, veterinarian's fee, wages on additional labour for taking them to veterinary centres and for looking after them and cost of feed supplements to bring the ailing animals back to their original milk yield. Table 2 presents the economic losses incurred by the farmers on treating the milk fever affected animals. It could be seen that the farmers lost Rs 618 / cow affected by milk fever. The expenditure was maximum on medicine, Rs 304 (49.2%), followed by veterinarians fee, Rs 206 (33.3%) and feed supplements given to the ailing cows, Rs 108 (17.5%). The loss due to treatment of milk fever affected buffaloes was slightly less at Rs 488 per affected animal. The trend in expenditure was same as in cows. Kossaibati and Esslemont (1997) have estimated the cost of treatment for a mild case of milk fever as £ 50, severe case as £ 154 and for a fatal case as £ 2112 in England.

Table 1. Prevalence of milk fever in different districts of Tamil Nadu

District	No. of female bovines observed		No. of animals affected		Prevalence of disease (%)	
	Cattle	Buffalo	Cattle	Buffalo	Cattle	Buffalo
Coimbatore	914	74	98	9	10.72	12.16
Erode	1005	116	102	15	10.15	12.93
Madurai	674	68	99	9	14.69	13.24
Vellore	561	62	102	8	18.18	12.90
Villupuram	620	22	115	-	18.55	-
Overall	3774	342	516[#]	41[##]	13.67[a]	11.99[a]

Notes: [#] Prevalence of milk fever in cattle is associated with districts ($\chi^2 = 40.05^{**}$; $P < 0.01$)

[##] Prevalence of milk fever in buffalo is not associated with districts ($\chi^2 = 0.04^{NS}$; $P > 0.05$)

[a] Prevalence of milk fever is not associated with species ($z = 0.87^{NS}$; $P > 0.05$)

Table 2. Estimated economic losses due to treatment of animals affected by milk fever

(in Rs per affected animal)

Treatment	Cattle	Buffalo
Cost of medicine	304 (49.2)	273 (55.9)
Veterinarian's fee (incl. additional labour charges)	206 (33.3)	140 (28.7)
Feed supplements	108 (17.5)	75 (15.4)
Total	618 (100.0)	488 (100.0)

Note: Figures within the parentheses indicate percentages to total.

Economic Loss due to Reduced Milk Yield

The average milk loss per affected cow was 36.42 litres during the period of illness (Table 3). The quantum of milk loss per affected exotic pure / crossbred cow was large (38.30 litres). In monetary terms, the loss was estimated to be of Rs 346 per affected cow. The loss of milk in buffaloes affected with milk fever was less (15.43 litres) compared to cows, it amounted to Rs 177 per affected animal.

Kossaibati and Esslemont (1997) have reported the economic loss due to milk fever in Holstein cows as 200 litres per animal, costing £ 40, for a mild case and 500 litres per animal, costing £ 100, for a severe case of milk fever. Rajala-Schultz *et al*. (1999) have studied the effect of milk fever on milk yield in Finnish Ayrshire cows and have observed that the milk loss varied between 1.1 kg/day and 2.9 kg/day. They have also reported a significant reduction of milk in ketosis-affected Finnish Ayrshire cows.

Economic Losses due to Mortality and Culling of Milk Fever-affected Animals

In general, the mortality of milk fever affected animals is rare. It may be due to the fact that animals can be successfully treated with calcium injections for milk fever. Occasionally, some of the animals do not regain their earlier milk yield. However, the decline in productivity of the affected animals usually calls for the need to cull them, as their rearing/management becomes uneconomical. It was found that only two of the affected cows (value = Rs 13,700 each) and two of the calves (value = Rs 400 each) of the affected cows died. Thus, the total loss due to mortality was calculated as Rs 28,200. The number of animals that were to be culled because of milk fever was only four, which implied a loss of Rs 26,000 to the farmers. No mortality and culling were observed in buffaloes. Hence, the total loss due to mortality and culling of cows and calves was observed to be of Rs 54,200 and Rs 6,600 due to milk fever during the study period.

Total Economic Losses due to Milk Fever

The total economic losses due to milk fever are presented in Table 4. The average loss per animal due to the treatment of milk fever was higher at Rs 618 for a cow than for a buffalo, Rs 488, the average loss being Rs 608. The average loss due to reduction in milk yield per affected animal was also higher for a cow (Rs 346) than a buffalo (Rs 177). The average loss due to mortality and culling was Rs 105 per affected cow and there was no loss due to buffaloes. Thus, the total loss was of Rs 1,069 per cow and Rs 666 per buffalo affected with milk fever. More than half (57.80%) of the total loss was on treatment of the affected cows and around 3/4th (73.34%) of the total loss was on treatment of buffaloes. It needs to be emphasized that treating milk fever affected animals was the first priority of the farmers, since the delay in treatment could further reduce milk yield or even lead to loss of animal. The loss due to milk yield contributed 32.37 per cent and 26.66 per cent to the total loss in cows and buffaloes, respectively.

Table 3. Estimated economic losses due to reduction in milk yield in animals affected with milk fever

Particulars	Cattle			Buffalo		
	Exotic pure / Crossbred	Native pure / ND	Overall	Murrah / Graded	Native pure / ND	Overall
Average quantity of milk lost per animal (in litres)	38.30	7.36	36.42	18.43	4.65	15.43
Value of milk lost per animal (in Rs)	364	70	346	212	53	177

Table 4. Estimated total economic losses due to milk fever per affected animal

Species	Affected animals (No.)	Economic loss (Rs)			
		Treatment cost	Milk reduction	Mortality and culling	Total
Cattle	516	618	346	105	1068
		(57.8)	(32.3)	(9.8)	(100.0)
Buffalo	41	488	177	-	665
		(73.3)	(26.6)		(100.0)
Overall	557	608	334	97	1039
		(58.5)	(32.1)	(9.4)	(100.0)

Note: Figures within the parentheses indicate percentages to total.

Table 5. Projection of economic loss due to milk fever in Tamil Nadu

Particulars	Cattle	Buffalo
Observed rate of incidence in the sample (%)	13.7	12.0
No. of milch animals in the state (as per 2004 Census)	24,96,761	5,18,392
No. of milch animals expected to be affected in the state population	3,41,307	62,155
Estimated economic loss per affected animal (Rs)	1068	665
Extrapolated total economic loss (in crore Rs)	36.5 (89.8)	4.1 (10.2)
	40.6 (100.0)	

Note: Figures within the parentheses indicate percentages to total.

The loss due to milk fever has been estimated to be of $ 334, based on the cost of treating clinical cases and production losses (Guard, 1996). Using data from 23,416 Finnish Ayrshire cows affected by milk fever, Rajala–Schultz *et al*. (1999) have reported that reduction in the milk yield of cows affected by milk fever ranged from 1.1 kg / day to 2.9 kg /day, depending on parity and the time taken for diagnosis. The economic loss was estimated at $ 334 per occurrence, which included the cost of treatment and loss in milk production. Milk losses were estimated to be 142 kg in cows of parity 3 or more in a study on Israeli Holstein cows that calved between June 2002 and December 2003 (Bar and Ezra, 2005). Hutjens (2003) has reported that the average loss due to milk fever per animal was of $ 334, due to the loss of 1100 lb of milk and 5 days of extra days open. He also observed that 8 per cent of the affected animals died and 12 per cent of them were culled.

Projection of Economic Loss due to Milk Fever in Tamil Nadu

Based on the observed prevalence of milk fever in cows and buffaloes as 13.67 per cent and 11.99 per cent, respectively, the number of milch cows and milch buffaloes that may be affected was found by extrapolation as 3.41 lakh cows and 62.16 thousand buffaloes (Table 5). Again, taking into account the economic loss as of Rs 1,068 per cow and Rs 665 per buffaloe, the total loss was worked out to be of Rs 36.48 crore in cows and of Rs 4.14 crore in buffaloes, together working out to be of Rs 40.62 crore in the state. The huge loss (89.81%) occurring in cows stresses on the point that cows need special attention when it comes to prevention of milk fever in dairy farms.

Conclusions

The study has revealed that the dairy farmers of the state lose a huge amount of money due to a preventable metabolic disease — milk fever, just by not opting the desired plan of animal nutrition. To prevent milk fever and the consequent huge economic losses in dairy farms, the following suggestions are made:

- Education of dairy farmers to make them aware of the importance of nutritional management of

their animals, especially during prepartum and peripartum periods should be the major initiative for preventing milk fever.

- Prophylactic treatment of susceptible cows at calving, with either subcutaneous calcium on the day of calving or oral calcium gels at calving and 12 hr later, would help reduce milk fever.
- Since high potassium diets usually induce milk fever, pre-calving potassium levels should be kept as low as possible. As dry fodder contains more potassium, feeding of dairy animals with higher amount of dry fodder should be discouraged to prevent milk fever. Inclusion of silage and succulent / green fodder as a major portion of the dry cow's diet is essential, as it has lower potassium content.

Acknowledgement

The authors thank the Indian Council of Agricultural Research, New Delhi, for providing funding support to the research scheme, 'An Economic Evaluation of Metabolic Diseases in Bovines', from the final report of which, this paper was drawn. They are also thankful to the anonymous referee for providing helpful suggestions.

References

Bar, D. and Ezra, E. (2005) Effects of common calving diseases on milk production in high-yielding dairy cows. *Israel Journal of Veterinary Medicine*, **60**(4) (http://www.isruma.org/article/60_4_2.htm; accessed on 05.06.08).

Bethard, G. and Smith, J. F. (1998) *Controlling Milk Fever and Hypocalcaemia in Dairy Cattle: Use of Dietary Cation-Anion Difference (DCAD) in Formulating Dry Cow Rations*, Technical report 31, Agricultural Experiment Station, Cooperative Extension Service, College of Agriculture and Home Economics, New Mexico State University, p 1.

Chauhan, S. K., Sharma, R. K. and Gupta, M. (1994) Economic losses due to diseases and constraints for dairy development in Kangra district of Himachal Pradesh. *Indian Journal of Animal Sciences*, **64**(1): 61-65.

Ganeshkumar, B., Joshi, P. K., Datta, K. K. and Singh, S. B. (2008) Economic losses due to Avian Flu in Manipur, *Agricultural Economics Research Review*, **21**(1): 37-47.

Guard, C. (1996) Fresh cow problems are costly: Culling hurts the most, *Proceedings of Annual Conference on Veterinary Diseases*, Cornell University, Ithaca, NY, 100 p.

Horst, R. L. (1986) Regulation of calcium and phosphorous homeostasis in dairy cows. *Journal of Dairy Science*, **69**: 604.

Hutjens, M. (2003) *An Alternative to Metabolic Disorders: Looking at Hypocalcaemia*, Dairy Decision Column, University of Illinois, Urbana, 18 Feb.

Kossaibati, M.A. and Esslemont, R.J. (1997) The costs of production diseases in dairy herds in England. *The Veterinary Journal*, **154**: 41-51.

Kumar, S., Vihan, V. S. and Deoghare, P. R. (2003) Economic implication of diseases in goats in India with reference to implementation of a health plan calendar. *Agricultural Economics Research Review*, **47**: 159-164.

Rajala–Schultz, P. J., Gröhn, Y. T. and McCulloch, C. E. (1999) Effects of milk fever, ketosis and lameness on milk yield in dairy cows. *Journal of Dairy Science*, **82** (2): 288-294.

RCI [Rural Chemical Industries (Aust) Pvt. Ltd.] (2000) *Management of Per-parturient Dairy Cows during the Transitional Period*, A review of published literature, Mascot NSW 2020, Australia.

Singh, P., Sisodia, B.V.S. and Kunzru, O. N. (1987) An economic analysis of livestock disease losses. *Indian Veterinary Journal*, **64**(3): 227-230.

Singh, P.J. and Singh, P. B. (1994) A study of economic losses due to mastitis in India. *Indian Journal of Dairy Science*, **47**(4): 265-272.

Thirunavukkarasu, M. and Prabaharan, R. (1999) Impact of mastitis on dairy farms – An economic analysis. *Cheiron*, **28**(6): 188-194.

Thirunavukkarasu, M. and Kathiravan, G. (2007) Monetary losses due to reproductive failures in FMD affected bovines. *Indian Journal of Dairy Science*, **60**(5): 364-368.