

A Study of the Economic Losses Due to Bovine Paratuberculosis in Two Herds Around Tehran

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Introduction

Paratuberculosis (Johne's disease) is a chronic, granulomatous enteritis and a contagious bacterial disease of the intestinal tract. Johne's disease is characterized by delayed onset and variable expression of clinical signs, including intermittent diarrhea, emaciation and sometimes submandibular edema.

Economic losses associated with Johne's disease relate to many factors, including decreased milk production and weight, increased susceptibility to other diseases, loss of genetic potential and export market and increased calving interval. Mastitis and infertility in infected cattle also are higher than in non-infected cattle but results are inconsistent. Total losses were estimated to exceed \$105 billion annually for the dairy industry in the United States.^{4,5}

Materials and Methods

The study included 363 Iranian Holstein cattle culled during five years (1989-1993) among two dairy herds because of paratuberculosis with such obvious clinical signs as continuous or intermittent diarrhea and emaciation. Diagnosis was confirmed by demonstration of clumps of acid-fast bacteria in smears of intestinal mucosa and feces stained with Ziehl-Neelsen stain.

The following subjects for each affected cow were studied: Milk yield of latest and previous lactation, weight and days open. For comparison, a paired control was chosen for each age category. Range of age in affected cows was two to seven years. The student t-test was carried out on data for statistical analysis.

Results

Results of some findings in this study are as follows: culling rates in two dairy herds were 3.1% and 4.75%, respectively. Decreased milk production in the latest (clinical) and previous (non-clinical) lactations

were 27.5% and 4.87%, respectively. Weight decrease was 24.91% ($P < 0.0005$) and days open increased 13.5 days in clinically affected cows, compared with control cows (Table 1).

Discussion & Conclusions

The decrease in milk production is prominent (27.5%) in clinically affected cows. This finding is in accordance with the study of Whitlock (1985). However, in sub-clinical cases the milk decrease is less severe (7.75%, 14.7% and 16%), as shown in the study of Buergelt (1978), Abbas (1983) and Benedictus (1987), respectively (Table 2). Milk decrease of previous lactation in our study (4.87%) was not in accordance with the above findings. Perhaps these findings related to time of sampling, since the intestinal lesions had a progressive nature in non-clinical cows and poor absorption of nutrients causes decreased milk production. Days open were not statistically significant. However, to be successful, separation of calves from their dams at birth and good hygiene are necessary in most countries for herd control of the disease combined with technical assistance from government authorities and culling the affected cows.

Mean economic loss for each clinically affected cow is estimated to be \$580 (U.S.). Since the Iranian Holstein cattle population is near 600,000, if 40% of these cows are in dairies and at least 3% will be affected and slaughtered, culling rate in a year is as follows: $600,000 \times 40\% = 240,000$ (dairy cattle); $240,000 \times 3\% = 7,200$ (dairy culls). The cost of related economic losses during a year is estimated as follows: $7,200 \times \$580 = \4.18 million.

References

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Table 1. Comparison of milk and weight decrease in cows with paratuberculosis and control cows in different parities in two dairy herds.

Parity	Milk production (305 days) at last lactation (control group)	Milk production (305 days) at last lactation (paratuberculosis group)	Difference	Milk decrease at last lactation (%)	Milk decrease at previous lactation (%)	Weight decrease (%)
First	8369.5/18,413(kg/lb)	5795/12,749(kg/lb)	2574.5/5664(kg/lb)	30.90	-	20.92
Second	6813.7/14,990(kg/lb)	5081.3/11,179(kg/lb)	1732.4/3811.3(kg/lb)	25.42	1.45	24.81
Third	9107.3/20,036(kg/lb)	7021.1/15,446.4(kg/lb)	2086.2/4589.6(kg/lb)	22.89	3.52	23.64
Fourth	8482.05/18,660.5(kg/lb)	6554.45/14,419.8(kg/lb)	1927.6/4240.7(kg/lb)	22.70	5.29	25.18
Fifth	9305.55/20,472.2(kg/lb)	6002.4/13,205.3(kg/lb)	3303.15/7267(kg/lb)	35.49	9.24	30
Average/decrease (%)	8416/18,515.2(kg/lb)	6091/13,400.2(kg/lb)	2325/5115(kg/lb)	27.5	4.87	24.91

Table 2. Research summaries concerning milk decrease in affected cows (paratuberculosis) at last lactation throughout the world

Researcher/ year state / country	<i>Buergelt (1978)</i> New York (USA)	Abbas (1983) <i>California (USA)</i>	<i>Whitlock (1985)</i> <i>Pennsylvania (USA)</i>	<i>Benedictus (1987)</i> Utrecht (Netherlands)	Nadalian (1996) <i>Tehran (Iran)</i>
Condition of cow under study	Non- clinical, fecal culture positive or histological positive	Non- clinical, fecal culture positive	Clinical, fecal culture and ileocecal lymph node positive	Non-clinical, serological positive or skin test and histological positive	Clinical, bacterioscopic mucosa and fecal positive
Lactation period	305 days (last lactation)	305 days (last lactation)	305 days (last lactation)	305 days (last lactation)	305 days (last lactation)
Milk average in infected cows	7215(kg) (15,873 lb)	4861 (kg) (10,694.2 lb)	4605 (kg) (10,131 lb)	5172 (kg) (11,378.4 lb)	6091 (kg) (13,400.2 lb)
Milk average in control cows	7821 (kg) (17,206.2 lb)	5627 (kg) (12,379.4 lb)	6150 (kg) (13,530 lb)	6119 (kg) (13,461.8 lb)	8416 (kg) (18,515.2 lb)
Difference Decrease (%)	606 (kg) (1,333.2 lb) 7.75%	836 (kg) (1,839.2 lb) 14.8%	1445 (kg) (3,179 lb) 23.5%	947 (kg) (2,083.4 lb) 15.5%	2325 (kg) (5,115 lb) 27.6%