



Survey on mortality rate of young stock on dairy farms of the Province of Padova

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ABSTRACT

The present study aimed at investigating preliminarily the mortality rate in 2012 of replacement calves and heifers in 95 dairy farms in the Province of Padova. Data regarding total number of cows and replacement stock reared were gathered from the APA Breeders' Association records while data on number of dead replacement animals were collected from insurance records. Results showed that the median value of the overall mortality rate of replacement cattle <24 months was 3.3% (0–6.7%, first - third quartile) with a maximum of 28.6%. Considering the age categories, mortality of 0–12 months old replacement cattle was higher than that of 13 - 24 months old. The median of mortality for cattle <12 months was 4.9% (0–11.8%, first - third quartile), with a maximum of 72.1% in one farm. The median value of mortality for the older age category (13–24 months) was of 0% (0–1.6%, first - third quartile) with a maximum value of 25%. This seems a positive outcome, however, the high variability arisen from this survey points out serious problems in some farms. Moreover, despite results pointed out a higher risk of mortality at the early stage of cattle life, a considerable number of farms showed mortality rates exceeding 10% for the heifers between 13 and 24 months of age. Mortality rates at a late stage indicate a serious situation in these farms which leads also to relevant economic losses. In conclusion, it is suggested to investigate on predisposing risk factors at different ages in order to develop and apply specific actions to overcome such problems.

(Keywords: calf, replacement dairy cattle, mortality)

INTRODUCTION

Italian intensive dairy farms are generally characterized by a good management for lactating cows, but little attention is paid to calves and heifers with a negative effect on their welfare. Since the farm's profit depends on the incomes from milk, the improvement in cows welfare conditions have a direct and tangible economic return. Replacement heifers start to generate profit only after the first calving, so the economic losses related to poor management of these animals until that moment are rarely quantified. Due to a culling rate of around 30%, assessed for the Italian Holstein cows, at least half of the animals raised on each dairy farm is represented by young stock and replacement costs can, therefore, reach 15–25% of the total cost for milk production (Mourits *et al.*, 1999). Factors that can affect the replacement rearing costs are culling rate, age at the first calving, mortality and age at death of young stock. Among these

factors, the mortality of young stock is very often underestimated by farmers. A recent study by Mee (2013) reported that farmers can underestimate the incidence of calf diseases by up to 40%, and loss rates till 50% and found a very low correlation ($r = 0.01$) between actual and perceived mortality rates. Farmers often don't apply the recommendations that they receive from veterinarians and technicians, mostly because they don't perceive the problem and they still consider calves as by-product of milk production and not as "the cow of the future". The result is that despite the modernization of intensive dairy farms, young stock losses are still rising in many European countries (Mee, 2013). The present study investigated the mortality rate of replacement calves and heifers in 95 dairy farms in the Province of Padova with the aim to lay the groundwork for future investigations on the main critical points from birth to first calving which can cause losses of young stock.

MATERIAL AND METHODS

Ninety-five Italian Holstein dairy farms belonging to the Provincial Breeders Association (APA) and located in the Province of Padova were considered in the study. All selected farms subscribed an insurance which refunds farmers for the loss of the animal and its carcass disposal costs. For each farm, data referred to year 2012 were gathered by investigating the APA and the insurance records. Data related to total number of cows and number of young stock considering the category from 0 to 12 months and from 13 to 24 months were gathered from the APA records. Number of animals dead in each of the four age categories: 0–2, 3–6, 7–12, and 13–24 months were collected from the insurance records.

Data processing and statistical analysis

Overall replacement mortality of cattle < 24 months of age was calculated as a ratio between number of dead animals and total number of alive young cattle (0–24 months). Mortality rates were calculated using the same approach also for the two age categories (from 0 to 12 and from 13 to 24 months).

The percentage of animals dead in each age category (0–2, 3–6, 7–12, 13–24 months) was calculated over the total number of young animals dead in order to highlight potential risks due to age.

All data were first submitted to descriptive statistics to assess location parameters. Mortality rates were the independent variables whereas farm size (≤ 50 , 51–100, > 100 dairy cows reared) was the dependent variable.

RESULTS AND DISCUSSION

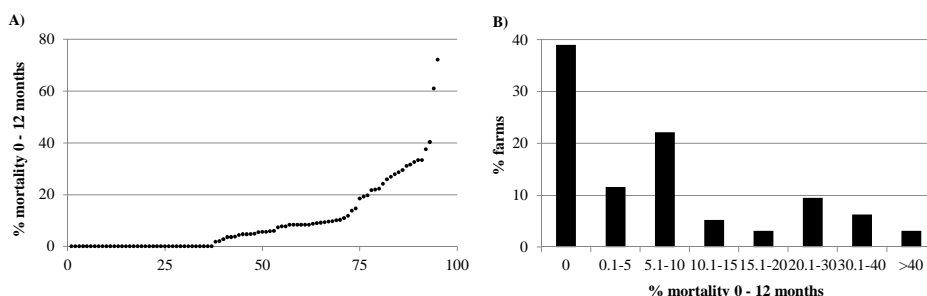
The farms included in the study showed a wide range of herd size from a minimum of 15 to a maximum of 523 cows. The average number of cows reared in 2012 was 92.6 ± 78.7 (\pm SD). The class of small size (≤ 50 cows) included 26 farms, 39 farms were medium (51–100), and 30 farms were large (> 100 cows).

Overall mortality rate of replacement cattle <24 months was not normally distributed and the median value was 3.3% (0–6.7%, first - third quartile). This seems a positive outcome considering that the Dairy Calf and Heifers Association Gold Standards (*DCHA Gold Standards*, 2013) suggests that the cumulative mortality rate should not exceed 10% for calves and heifers from one day of life to the first calving. However, the high

variability arisen from this survey points out serious problems in some farms. The loss rates are even more alarming if considering the single age categories (*Figures 1 and 2*). Distribution of mortality of the younger age category (0–12 months) in the 95 farms showed a median of 4.9% (0–11.8%, first - third quartile), with a maximum of 72.1% in one farm (*Figure 1A*). Twenty-seven percent of the farms (*Figure 1B*) had a mortality rate higher than the threshold value of acceptability (*DCHA Gold Standards, 2013*), and in these farms in particular, predisposing risk factors should be investigated and specific actions should taken in order to overcome such problems.

Figure 1

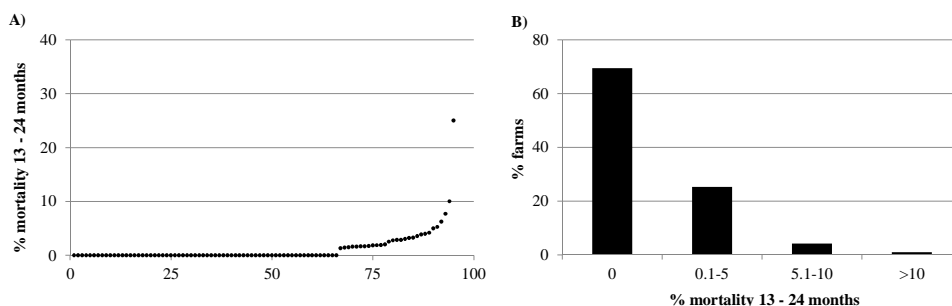
Mortality of replacement cattle between 0 and 12 months: distribution of mortality rates of the 95 farms (A) and distribution of farms according to classes of mortality (B)



As expected from a previous study (*Svensson et al., 2006*), the mortality rate was lower for the older age category (13–24 months), with a median value of 0% (0–1.6%, first - third quartile), and a maximum value of 25% (*Figure 2A*). However, over 70% of farms had mortality rates above the 0.5% threshold value acceptable for replacement cattle older than 12 months until freshening (*DCHA Gold Standards, 2013*).

Figure 2

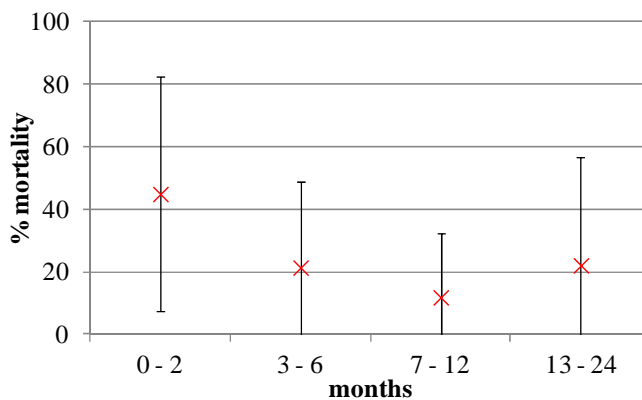
Mortality of replacement cattle between 13 and 24 months: distribution of mortality rates of the 95 farms (A) and distribution of farms according to classes of mortality (B)



Analysing into more details the percentage of animals dead in each of the four age categories (0–2, 3–6, 7–12 and 13–24 months) among the dead replacement cattle, it must be pointed out that the higher mortality rate was observed for calves between 0 and 2 months (*Figure 3*). This finding is in accordance with the results of previous studies carried out on replacement cattle either in the USA (*Wells et al., 1996; Sivula et al., 1996*), in Sweden (*Svensson et al., 2006*) and in Italy (*Colnago et al., 2007*). A plausible explanation to the higher mortality of calves in the first months of life is their susceptibility to diseases, especially enteric and respiratory, due to a poorly competent immune system (*Sivula et al., 1996; Wells et al., 1996*). Moreover, the stressful conditions such as calves' separation from the dam, and changes in housing (individual vs. group) and diet (weaning) might act as important predisposing factors to disease outbreak and consequently to mortality (*Wells et al., 1996; Stull and Reynolds, 2008; Zucali et al., 2013*). In accordance with results by *Svensson et al. (2006)*, mortality in the current study tended to decrease progressively from the third month to a year of life and to increase again after this age interval (*Figure 3*). In the current study, indeed, the average mortality rate reached 22% for 13–24 months old heifers. Causes of mortality for this age category could not be the same of those acting at an early stage but should be identified among housing facilities or management. Trauma as consequence of overcrowding, hierarchy establishment and inappropriate flooring, and peripartum disorders are main predisposing factors for mortality at this age (*Bøe and Færevik, 2003; Svensson et al., 2006; Dorigo et al., 2009*).

Figure 3

Distribution of mortality (average percentage±SD) at different ages over the total number of replacement cattle dead in the 95 farms



Regardless of farm size that did not affect mortality rates ($P>0.05$) and age category in which mortality occurs, the high variability among farms, makes it necessary to differentiate good and bad performing farms. In order to identify the best and the worst situation, farms were distributed on the basis of the mortality rates of the two age categories (0–12 and 13–24 months) within the mortality thresholds defined by the *DCHA Gold Standards (2013)*. Twenty-six farms (27.4%) could be considered the best since they had mortality rates lower than 1% for all young cattle (*Table 1*). Thirty-four farms (35.9%) could be considered as well performing since they fell in the acceptable

range of mortality below 10% for the calves (0–12 months) and below 1% for the heifers (13–24 months). None of the farms had mortality rates over 10% for both age categories indicative of the worst possible situation. However, a considerable percentage of farms (28.4%) showed low or acceptable rates of mortality for the age category between 0 and 12 months, but mortality rates exceeding 10% for the heifers between 13 and 24 months of age. Such mortality rates at a late stage indicate a serious situation in these farms which leads to relevant economic losses. The latter are proportional to the age at death due to the incurred rearing costs and the acquisition of new replacement heifers (Campiotti, 2012). Regardless of the age category in which mortality occurs, the loss of replacement cattle is not only an economic problem but also a health problem, since the introduction of new heifers by external dairy farms increase the risk of introducing new diseases.

Table 1

Distribution of the dairy farms (%) on the basis of replacement cattle mortality rates of the two age categories (0 - 12 and 13 -24 months) within the mortality thresholds defined by the DCHA Gold Standards (2013)

		Mortality 0–12 months			
		<1%	1–5%	5.1–10%	>10%
Mortality 13–24 months	<1%	27.4	7.4	1.1	1.1
	1–5%	6.3	6.3		
	5.1–10%	15.8	4.2	2.1	
	>10%	18.9	7.4	2.1	

CONCLUSIONS

The results of this preliminary investigation indicated that management of young cattle is still a critical point in a large number of dairy farms considering the high variability of the mortality rates. Although results pointed out a higher risk of mortality at the early stage of cattle life, a considerable number of farms showed mortality rates exceeding 10% for the heifers between 13 and 24 months of age. Mortality rates at a late stage indicate a particularly serious situation in these farms which leads also to relevant economic losses.

In conclusion, it is suggested to investigate on predisposing risk factors at different ages in order to develop and apply specific actions to overcome such problems.

ACKNOWLEDGEMENTS

The Authors wish to thank Dr. Barbara Contiero for her statistical support.

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