

Short Paper

Reasons for culling of Holstein dairy cows in Neishaboor area in northeastern Iran

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Summary

This study was designed to determine the culling rates of 23 Holstein dairy herds (with an average size of 180 cows per herd) in Neyshabur area in northeastern Iran over a period of three years from 2001 to 2003. The average annual culling rate was 13.1%, (98.5% involuntary and 1.5% voluntary). Of the total disposals (1612 cows), 53.48% were culled by the end of five years of age. Poor fertility was the most important reason for culling (34.9% of disposals), followed by digestive disorders (12.6%), alimentary problems (10.85%), mastitis (9.6%) and lameness (8.3%). More detailed epidemiological studies are needed to plan and implement healthcare programs. These programs targeted toward diseases that lead to culling would be prerequisite for a profitable farming.

Key words: Culling, Holstein, Dairy cow, Iran

Introduction

One advantage of the retrospective screening of disease occurrences in a farm is to prioritize different disorders and allow farmers and veterinarians to design preventive measures which consequently may lead to the avoidance of economic losses associated with diseases (Thrusfield, 2005). This process is especially important where animal rearing and production are key economic activities. Livestock diseases are major constraint on profitable farming since many of them result into culling. Culling could be voluntary (when the farmer has complete freedom of choice over the removal of a cow from the herd; for example, due to low milk production or old age), or involuntary (when there is no choice but it is necessary to remove the animal from the herd; for the reasons such as infertility or infectious diseases) (Gröhn *et al.*, 1998). Voluntary culling usually leads to increased profits while involuntary culling

causes economic losses. It is well documented that optimum herd profitability is attained by increasing the number of animals culled for voluntary reasons and reducing the number of involuntary animal culls. The survey presented here was designed to investigate retrospectively the culling rates and underlying causes in 23 dairy herds in Neyshabur area in northeastern Iran.

Materials and Methods

Records for a period of three years (2001 to 2003) were collected from 23 commercial Holstein dairy herds (1612 culled cows) in Neyshabur area. Overall, 12302 cow-year were included in this study. These 23 herds were selected because of their complete records among 100 herds in the area.

Since culling rate within each herd might vary considerably from one year to another due to many variables affecting the dairy industry (government or management

policies, prices of culls, etc), a representative value for the average culling rate can not be obtained from the records for a single year. Therefore we decided to calculate the annual average culling rate during a period of three years from 2001 to 2003. The reasons for the disposal of animals were old age, low milk yield, conformation, infertility, calving difficulty, mastitis, lung problems, other infections, lameness, metabolic disorder, digestive disorder, alimentary problems, other noninfectious diseases, injury, recumbency, other udder problems and unknown reasons (Table 1). Descriptive statistics were calculated using SPSS software (version 10).

Results

The average size of the dairy herds in this study was 180 cows (34 to 934 cows per herd) and the average culling rate was 13.1% (4.4 to 25.3% per herd). On a cumulative basis, 36.79% of the culls occurred by the end of the 4th year and 53.48% by the end of the 5th year. A high culling rate (19.11%) was noted at the end of the 3rd year (Fig. 1).

Table 2 categorizes the reasons of culling for the culled animals at different ages. Fig. 2 demonstrates the percentages of culled animals due to specific disorders at specific ages. Voluntary culling represented 1.5% of the disposals and the remaining

98.5% was involuntary or enforced. Old age (1.1%) and low milk yield (0.4%) were reasons for voluntary culling. Poor fertility remained the single most important reason (34.9%) for involuntary culling, regardless

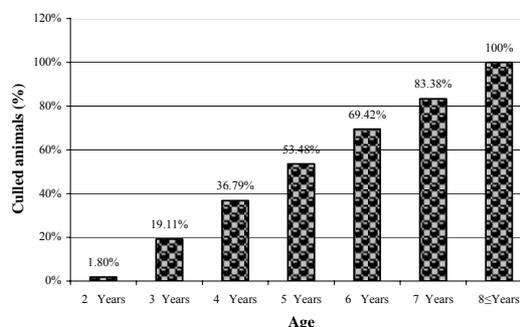


Fig. 1: Culled cows on a cumulative basis in 23 studied herds in Neishaboar area, Iran (2001-2003)

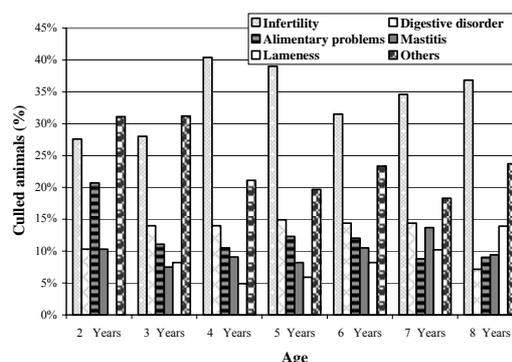


Fig. 2: Effect of age on the proportions of culling for major health problems in 23 studied herds in Neishaboar area, Iran (2001-2003)

Table 1: Definition of the reasons for culling of Holstein dairy cows

| Category | Definition |
|---------------------------------|---|
| 1 Age | More than 8 years old |
| 2 Low milk yield | Poor milk production |
| 3 Conformation | Congenital defect |
| 4 Infertility | Failure to conceive |
| 5 Calving difficulties | e.g. Uterus and vaginal rupture |
| 6 Mastitis | Severe udder inflammation with no response to treatment |
| 7 Lung problems | e.g. Pneumonia, pulmonary abscess |
| 8 Others infectious diseases | e.g. Johne's disease, MCF, TB, brucellosis, rabies |
| 9 Lameness | e.g. Sole ulcer, digital/interdigital lameness |
| 10 Metabolic disorder | e.g. Milk fever, ketosis, fatty liver |
| 11 Digestive disorder | Displaced abomasa, T.R.P |
| 12 Alimentary problems | Diarrhea, bloat, colic |
| 13 Other noninfectious diseases | Post vaccinal reaction, tumor, prolapse |
| 14 Injury | e.g. fractured bones |
| 15 Recumbency | e.g. Downer cow |
| 16 Other udder problems | e.g. Atrophic quarter, teat necrosis |
| 17 Unknown reasons | Without any recorded reason |

Table 2: Reasons for culling cows in 23 studied dairy herds in Neishaboar area, Iran (2001-2003) at different ages

| | 2 Years | 3 Years | 4 Years | 5 Years | 6 Years | 7 Years | 8 \geq Years | Total |
|-----------------------------|-------------|--------------|--------------|--------------|--------------|--------------|----------------|---------------|
| Age | | | | | | | 17 (6.39%) | 17 (1.1%) |
| Low milk yield conformation | | 1 (0.4%) | 2 (0.7%) | 1 (0.4%) | 1 (0.4%) | | 2 (0.75%) | 6 (0.4%) |
| Infertility | 8 (27.6%) | 78 (28.0%) | 115 (40.4%) | 105 (39.0%) | 81 (31.5%) | 78 (34.6%) | 98 (36.84%) | 563 (34.9%) |
| Calving difficulty | 3 (10.3%) | 27 (9.7%) | 4 (1.4%) | 2 (0.7%) | 2 (0.8%) | 5 (2.2%) | 3 (1.13%) | 46 (2.9%) |
| Mastitis | 3 (10.3%) | 21 (7.5%) | 26 (9.1%) | 22 (8.2%) | 27 (10.5%) | 31 (13.7%) | 25 (9.4%) | 155 (9.6%) |
| Lung problems | 3 (10.3%) | 5 (1.8%) | 11 (3.9%) | 5 (1.9%) | 2 (0.8%) | 3 (1.3%) | 2 (0.75%) | 31 (1.9%) |
| Other infections | | 8 (2.9%) | 7 (2.5%) | 10 (3.7%) | 5 (1.9%) | 7 (3.1%) | 2 (0.75%) | 39 (2.4%) |
| Lameness | | 23 (8.2%) | 14 (4.9%) | 16 (5.9%) | 21 (8.2%) | 23 (10.2%) | 37 (13.91%) | 134 (8.3%) |
| Metabolic disorders | | | 2 (0.7%) | | 4 (1.6%) | | | 6 (0.4%) |
| Digestive disorders | 3 (10.3%) | 39 (14.0%) | 40 (14.0%) | 40 (14.9%) | 37 (14.4%) | 25 (11.1%) | 19 (7.14%) | 203 (12.6%) |
| Alimentary problems | 6 (20.7%) | 31 (11.1%) | 30 (10.5%) | 33 (12.3%) | 31 (12.05%) | 20 (8.8%) | 24 (9.02%) | 175 (10.85%) |
| Other non-infectious | | 2 (0.7%) | | | | | 1 (0.58%) | 3 (0.18%) |
| Injury | 1 (3.5%) | 9 (3.2%) | 6 (2.1%) | 4 (1.5%) | 5 (1.9%) | 10 (4.4%) | 13 (4.8%) | 48 (2.9%) |
| Recumbent cow | 1 (3.5%) | 19 (6.8%) | 20 (7.0%) | 25 (9.3%) | 31 (12.05%) | 19 (8.4%) | 18 (6.7%) | 133 (8.25%) |
| Other udder problems | 1 (3.5%) | 8 (2.9%) | 4 (1.4%) | 3 (1.1%) | 6 (2.3%) | 4 (1.7%) | 4 (1.5%) | 30 (1.86%) |
| Unknown reasons | | 8 (2.9%) | 4 (1.4%) | 3 (1.1%) | 4 (1.6%) | | 3 (1.1%) | 22 (1.36%) |
| Total | 29 (100.0%) | 279 (100.0%) | 285 (100.0%) | 269 (100.0%) | 257 (100.0%) | 225 (100.0%) | 268 (100.0%) | 1612 (100.0%) |

of the age of the animal. Mastitis was the most common infectious disease that contributed to culling, and on average, it was responsible for 9.6% of disposals. Culling due to mastitis increased linearly with parity and reached nearly 13.7% at 7 years of age.

Lameness accounted for 8.3% of disposals, which increased with age from 0% in two-year-old animals to 13.91% in eight-year-old animals. The average rates of culling due to digestive disorders and alimentary problems were 12.6 and 10.85%, respectively. A further 1.36% of the recorded cullings were for unknown reasons. In terms of the cow's age, this type of culling was highest at the age of three years (2.9%) which then fluctuated between 0 and 1.6% in older ages (Table 2).

In summary, poor fertility, digestive disorders, alimentary problems, mastitis and lameness were the major reasons for culling of cows in the studied herds (Fig. 3).

Discussion

Culling is one of the most complicated

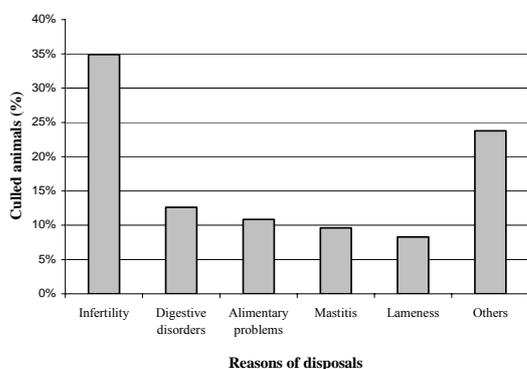


Fig. 3: The most common causes of disposals in 23 studied herds in Neishaboar area, Iran (2001-2003)

decisions that dairy producers make on an almost day-to-day basis. The most important factors considered in culling decisions are age, health status, fertility status, stage of lactation and level of milk production, as well as the value of the replacement animal and its cost (Allaire *et al.*, 1977). The probability of a cow being culled differs, depending on the age of the animal; in a study by Dohoo and Martin (1984), the risk of removal was highest in cows between 3 and 5 years of age and also in cows over 7 years of age. This age-dependency of culling rate is similar to what we have reported in this study. Other studies have reported that risk of culling increases with age (Allaire *et al.*, 1977; Young *et al.*, 1983; Gröhn *et al.*, 1998; Rajala-Schultz and Gröhn, 1999a). The reasons for culling also change with age (Allaire *et al.*, 1977). Table 2 summarizes the reasons for culling cows at different ages.

Baudeau *et al.* (1993) estimated that more than half of all cullings were associated with health disorders. Morbidity of a health disorder plays a significant role in culling decisions. In addition, indirect effects of diseases on culling are manifested through decreased milk yield and/or fertility of a cow. Many diseases can reduce the milk production (Detilleux *et al.*, 1997; Rajala and Gröhn, 1998; Rajala-Schultz and Gröhn, 1999a) and it might be the low yield that triggers the decision to remove the cow rather than the disease occurrence itself. Timing of diseases is also an important aspect when considering their effects. Some dairy cow diseases like mastitis and lameness can occur at any time during the

lactation period, while others like milk fever may occur only at or around calving. Thus, a difficulty in analyzing culling data is that there can be a temporal disconnect between the time of a decision to cull a cow and the time of the actual culling event. Rajala-Schultz and Gröhn (1999a) showed that the effects of diseases on culling can be different in different stages of lactation. In the studies of Rajala-Schultz and Gröhn (1999a, b), dystocia, milk fever, and metritis increased the risk of culling at the time of their occurrence, and also at the end of lactation. Ketosis, on the other hand, only increased the risk of culling around the time of its occurrence, whereas the effects of mastitis and lameness on culling extended throughout the lactation.

Also, diseases can delay conception and lengthen the period of days open (Dhaliwal *et al.*, 1996; Harman *et al.*, 1996; Gröhn and Rajala-Schultz, 2000). Open cows are more likely to leave the herd than pregnant ones. Although much of the literature emphasizes the importance of certain reproductive diseases, there are still discrepancies on the impact of some diseases. For example, the effect of ovarian cysts on culling is not clear; some studies have found no association (Dohoo and Martin, 1984), while others have reported an increased risk of culling for cows with cystic ovaries (Erb *et al.*, 1985), and still others have reported that cystic ovaries protected against culling (Martin *et al.*, 1982; Rajala-Schultz and Gröhn, 1999a).

In the present study, the reproductive status of a cow was the most important factor in the farmer's culling decisions. This is in agreement with several other studies, which have indicated that a failure to conceive at first service or a longer period of days open increases the risk of culling (Martin *et al.*, 1982; Erb *et al.*, 1985; Beaudeau *et al.*, 1995). Also, Gröhn *et al.* (1998) reported that conceiving decreases the risk of culling. Thus, the literature clearly indicates that farmers tend to make decisions to cull dairy cows based on their production and fertility status.

The culling rate in our study was lower than that reported for other parts of the world (Gröhn *et al.*, 1998; Stevenson and Lean, 1998; Dutil *et al.*, 1999; Whitaker *et*

al., 2000). In contrast to other studies, (Esslemont and Kossaibati, 1997; Gröhn *et al.*, 1998; Stevenson and Lean, 1998) reasons for involuntary culling such as infectious diseases constituted a considerable proportion of culls in our study. This is likely to be related to the diseases present in the herd or in the region, as there is a strong relationship between the existing diseases in a herd and culling rate (Gröhn *et al.*, 1998; Stevenson and Lean, 1998). Also, in contrast to other studies, digestive disorders and alimentary problems constituted a considerable proportion of culling in the present study. This is likely to be related to nutritional and feeding problems in the studied farms.

The major problem revealed in this survey was the high incidence of involuntary culling (98.5% of total culling in the average herd). In fact, very few animals were culled for low yield or old age. Also, this study showed high rates of premature culling in the early stages of the productive life of the cows (more than 50% of the cows culled had gone by the end of 5-year-old). It could be very uneconomical that so many cows were wasted before they had a reasonable lifespan. Many of these young animals could have been saved through the adoption of higher standards of management and husbandry in four main areas: herd fertility, nutritional management, mastitis, and lameness (Fig. 3). Management techniques may be improved in this area for minimizing the effects of diseases. It is, therefore, crucial that more detailed epidemiological studies addressing these diseases be carried out if proper preventive and control strategies are to be developed and implemented.

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