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Survey of Reasons of Culling in Dairy Holstein Herds in Tabriz Area of Iran

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Abstract: To evaluate of the factors for culling of the Holstein dairy cows in an industrial herd in Tabriz, data of the reasons for deleting is divided in seven groups such as financial factors, infertility and reproduction problems, low milking cows, mastitis and udder problems, lameness, digestive system diseases, etc. At all, 2458 Holstein cows in 9 herds have evaluated. Selling the cow for the milk, infertility and low milking cows were the important reasons for culling that were 127 and 78 from 326 cows in order. The fourth reason for deleting was mastitis and udder problems that include 21 cows. The fifth factor was the digestive system diseases with 16 cows. The voluntary reason for culling was the selling cows plus low milking cows that was 56% of the culled cows. The most involuntary culling reason was for infertility and reproduction problems that were 24% of total and 41% of involuntary culling.

Key words: Culling, Holstein cow, infertility, reproductive disorders, 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). Culling is a complex issue and many factors are involved. Dairy cows may be culled for either involuntary reasons (i.e., death, acute disease, infertility) or voluntary reasons (i.e., low yield). Both biology and management affect the decision to cull. When making a decision, the dairy farmer considers five major reasons: illness, low milk yield, conception status, stage of lactation and parity. Culling potentially increases profits or reduces costs through the replacement of sick or open cows that are expensive to keep and may die or through the replacement of low yielding cows. The culling rate which varies from herd to herd, depends on input and output prices, yields, seasonal variation of price, incidence of disease and other variable factors (McCullough, 1991; Van Arendonk, 1985, 1986; Van Arendonk and Dijkhuizen, 1985). The indirect effects may be reflected in milk yield or even conception status. Lower yielding cows whether diseased or not are more likely to be culled. Conversely, high yielding cows even if they are diseased are more likely to be kept in the herd. Similarly, pregnant cows are more likely to remain in the herd than are open cows. To what extent diseases affect the culling process through lower milk yield or lower reproductive performance as measured by conception status is unclear. How the effect of disease may change through the inclusion of milk yield or conception status in the model was determined in this study. Although, several techniques have been used to study survival data, e.g., logarithm of Odds Ratios Method (Cobo-Abreu *et al*., 1979), discriminant analysis (Dohoo and Martin, 1984), path analysis (Erb *et al*., 1985), logistic regression (Grohn *et al*., 1986), path analysis combined with logistic regression (Oltenacu *et al*., 1990), survival analysis is now generally accepted as the most appropriate method. Survival analysis which became widely known after Cox (1972) developed the Proportional Hazards Model, accounts for all subjects even those that have not yet experienced the event of interest (in this study, culling). Diseases may have different effects on culling depending on when they occur and when the effect of the disease on culling is observed. In dairy cows, culling can occur throughout lactation. Similarly, some diseases, especially mastitis can occur at any time during lactation. Therefore, erroneous conclusions may be drawn if diseases are considered to have only one effect (i.e., at only one point in time) on culling (Beaudeau *et al*., 1995; Grohn *et al*., 1997). Time-dependent covariates address this problem because these values change depending on when they are observed. Only a few studies (Beaudeau *et al*., 1995; Grohn *et al*., 1997), using survival analysis have incorporated the dependence on time of some covariates because the statistical techniques available were not yet capable of handling this complexity. The primary interest of this study was the survey of reasons of culling in dairy Holstein herds in Tabriz area of Iran.

MATERIALS AND METHODS

In this term, data were collected from 9 herds in Tabriz during the 2011 and the reasons of culling were classified

in the 7 group included financial factors, infertility and reproductive disease, low milk production, laminitis, gastrointestinal disorders, etc., surveyed cows were 15 month age to 7 years old. In present study for calculation the left herd percentage, following equation was used. Total culled cows of each herd at the same year:

$$LHP = \frac{\text{Total culled cows}}{\text{Total cows of herd at the same year}} \times 100$$

$$RLHP = \frac{\text{Total No. of cows culled from the herd due to specific reason}}{\text{Total culled cows of each herd at the same year}} \times 100$$

Where:
LHP = Left Herd Percentage
RLHP = Relative Left Herd Percentage

RESULTS AND DISCUSSION

During the present study, 523 cows were culled from the herds. The most important reasons for culling were financial factors, infertility and reproductive disease and low milk production which include 196, 108 and 56 cows, respectively (Table 1). Culling due to infertility and reproductive disease were the reason for involuntary culling.

Voluntary culling is total cows sold whether with low milk production or high (Ruegg *et al*., 1998) which was 56% in present study. Most involuntary culling in this study was due to infertility and reproductive disorders which was included 24% of total and 41% of involuntary culling (Fig. 1).

To maximize the profits in their enterprise, dairy farmers must make decisions about which cows to keep in the milking herd and which to sell. Culling decisions are based on several factors including disease, milk yield, conception status, parity and stage of lactation. Also, pregnant and open cows are culled differently. In all models, cows with milk fever were more likely to be culled during the first 30 days of lactation than were cows without milk fever. Milk fever also increased the risk of culling during late lactation (after 240 days). Dohoo and Martin (1984) and Milian-Suazo *et al.* (1988) found that milk fever increased the risk of culling, especially when the cow was also down. However, Bigras-Poulin (1985) found the opposite effect; milk fever lowered the risk of culling by half. Retained placenta had no effect on culling. This result suggests that the milk yield and the conception status of a cow with retained placenta act as intervening variables in the effect of this disease on culling. Oltenacu *et al.* (1990) found that retained placenta increased the risk of culling but Beaudeau *et al.* (1995) found that retained placenta was protective against culling, at least during first lactation. Displaced abomasum was a risk factor for culling in early lactation (1-30 days). Displaced abomasum was not a factor in culling later in lactation. Culling for displaced abomasum appeared to be independent of culling for milk yield and conception status. Milian-Suazo *et al.* (1989) found that left displaced abomasum was associated with culling. In contrast, Cobo-Abreu *et al.* (1979), Martin *et al.* (1982) and Dohoo and Martin (1984) found no association between abomasal displacement and culling. The effects of ketosis within each stage of lactation were generally consistent among models, even after adjustment for milk yield and conception status. One exception was noted after

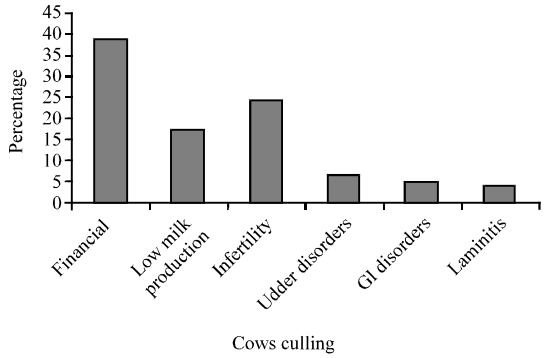

Fig. 1: Relative percentage of cows culled with its reason

Table 1: Percent of cows culled and percent of cows culled as voluntary and involuntary

Herd No.	Annual average of livestock	Voluntary culling	Involuntary culling	Total culled	Voluntary RLHP	Involuntary RLHP	Total culled percent
1	278	9	12	21	42.85	57.14	7.50
2	350	32	14	46	69.56	30.43	13.14
3	230	11	7	18	61.11	38.88	7.82
4	272	23	36	59	38.98	61.01	21.69
5	198	15	11	26	57.69	42.30	13.13
6	260	18	9	27	66.66	33.33	10.38
7	385	28	14	42	66.66	33.33	10.90
8	141	17	21	38	44.73	55.26	26.95
9	344	31	18	49	63.26	36.73	14.24
Total	2458	184	142	326	56.83	43.15	13.97

240 days when conception status was considered. One possible interpretation is that ketosis delays conception either because breeding of the ketotic cow is delayed or because fertility is decreased. When conception is not taken into account, the higher culling risk for open ketotic cows is attributed entirely to ketosis. When conception status is included, the direct effect of ketosis is reduced. Milian-Suazo *et al.* (1988) found that ketosis increased the risk of culling. Beaudeau *et al.* (1995) found that ketotic cows in parity 1 or 2 had nearly twice the risk of culling as did their nonketotic herdmates. Other studies (Grohn *et al.*, 1986; Oltenacu *et al.*, 1990) have found that ketosis decreases the risk of culling.

Estimates for the effects of disease on culling were therefore, total (direct and indirect) effects; they were not adjusted for other factors such as milk yield or conception status. In their literature review, Beaudeau *et al.* (1993) found that at least one half of all cullings are primarily due to disease. However, the estimates for the effects of disease indicated that dairy farmers also consider current milk yield in culling decisions. Most diseases cause a decline in milk yield; these decreases may be temporary (ketosis) (Detilleux *et al.*, 1994) or longer lasting. The inclusion of current milk yield in general led to a substantial decrease of the effect of mastitis but the estimates remained large which indicated that an indirect effect of mastitis on culling through reduced milk yield did exist but was not the only phenomenon involved in the culling process. However, the way the effect of milk yield on culling was accounted for may be questioned.

CONCLUSION

The results of this study suggest that diseases have an important effect on culling. Their effects differed depending on stage of lactation. Milk fever, retained placenta, displaced abomasum, ketosis, ovarian cysts and mastitis all raised the risk of culling at certain stages of lactation; ovarian cysts were protective against culling when conception status was also considered. Mastitis in particular had an effect on culling throughout lactation. High milk yield was protective against culling. Cows that did not conceive had a significantly higher risk of culling than did cows that did conceive. The effect of mastitis on culling was less but not null in models including current milk yield and conception status which suggests that milk yield, conception status and ovarian cysts and mastitis (and other diseases) are interrelated factors in their effect on culling. This research indicates that dairy farmers consider many factors including diseases, milk yield, conception status, parity and stage of lactation when deciding whether and when to cull a cow.

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