

## Breeding Management amongst Holstein Farms

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### Abstract

Dairy industry is one of the major components of the agricultural sector in Iran. It plays an important role in the national economy, and in the socio-economic development of the country. This study was conducted in the Tehran province of Iran. 74 farms were selected on the basis of Probability Proportionate Sampling Technique. The significance of differences between two groups was evaluated with a t test, and statistical significance was accepted at  $P < 0.05$ . Results showed that the mean of milk production reached to 7364 (kg/year) per cow in 2009. The proportions of culled dairy cows were mainly due to involuntary culling, which was significantly higher than voluntary culling ( $P < 0.05$ ). The main findings were that Holstein farms in Tehran were doing well on almost all the fronts. The breeding, feeding, heeding and health-care was being maintained properly. Some key concern areas were identified like the incidence of diseases was well above the expected level. The culling percentage due to diseases was 10.14% against an expected 2.8%. Another important area of concern was culling percentage due to low production, this was also well above the expected level. Awareness campaigns, training programmes and mass media interventions need to be effected to resolve the problems.

**Keywords:** Breeding; Holstein farms; Culling

### Introduction

Dairy industry is one of the major components of the agricultural sector in Iran. It plays an important role in the national economy, and in the socio-economic development of the country [1]. The Iranian dairy herd includes 842,000 Holstein cows on commercial dairy farms [2]. The herd sizes vary from 20 to 3,000 dairy cows, with a mean 305-day milk production of over 7,000 kg (range 6,000-12,500) [3]. There has been a concentrated effort to increase milk production in Iran for the past 30 years. This effort has been a combination of government policies, importation and widespread use of Holstein semen, and extensive use of high percent Holstein sires generated in different province of Iran [4]. Several studies have shown that the reproductive efficiency declines with increased milk yield. A negative association between fertility and milk yield has been consistently reported in dairy cattle [5]. As the genetic ability to produce milk increases, more cows have sub fertility or production diseases. As more cows are culled for health or fertility reasons, the productive life of modern cows rapidly is declining [6]. Success of dairy farming depends mainly on four main factors, *viz.* breeding, feeding, management and health-care. Various indicators apropos dairy cattle development have been identified by different researchers<sup>3</sup> from time to time, which include total milk production, milk fat percentage, milk protein percentage, etc. Livestock diseases are major constraint on profitable farming, since many of them result into culling. Culling could be voluntary or involuntary [7]. Culling of high yielding dairy cows due to death, acute and severe disease or reproductive problems, is defined as involuntary culling. In contrast, removal of cows from dairy herd due to termination of productive life from other than health disorders, or due to excessive number of cows in the herd, is defined as voluntary culling [8]. 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 [7]. Culling decision is part of the whole farming process. Whether or not to cull a cow for a given health disorder (except for the ones inducing emergency disposal), depends not only on individual factors (age,

stage of lactation, performance), but also on herd factors (availability of replacement heifers, quota, milk and beef market, farmers' attitude with respect to risk and uncertainty) [9]. The objective of this study is to delineate the status of Holstein farms in Tehran in light of certain Dairy Cattle Improvement indicators.

### Research Methodology

Tehran Province of Iran was selected purposively for the study. The latitude and the longitude of Tehran, the capital of Iran, are 35°40' S and 51°26' E, respectively. A list of all industrial and semi-industrial Holstein Farms having hundred or more than hundred cattle was prepared (that number of total farms was 180 farms). Four categories of the Holstein farms were identified on the basis of number of cattle possessed by them. Then, 74 farms were selected from the list by adopting the probability proportionate sampling technique, as depicted below in table 1.

The farms in the respective categories were selected randomly. The data was collected for five consecutive years from 2005, on the basis of records maintained by respondents, by means of a pre-tested semi-structured interview schedule.

### Statistical analysis

Data were analyzed with a statistical software program (SPSS 11.5, 2004). The significance of differences between two groups was evaluated with a t test. Results were expressed as mean  $\pm$  SEM, and statistical significance was accepted for  $P < 0.05$ .

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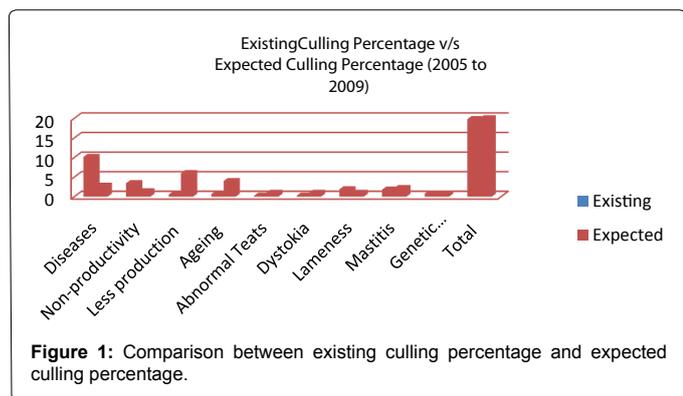
**Received** December 06, 2012; **Accepted** January 17, 2013; **Published** January 19, 2013

**Citation:** Sanjabi MR, Zandi M, Javanmardi JR, Khamoushi S, Rani K (2013) Breeding Management amongst Holstein Farms. J Veterinar Sci Technol S11: 002. doi:10.4172/2157-7579.S11-002

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S.No.	Categories of farms	Total number of commercial dairy farms in Tehran	Number of farms selected by probability proportionate sampling technique
1	Farms that had 100 cattle	31	13
2	Farms that had 101-250 cattle	41	17
3	Farms that had 251-500 cattle	28	11
4	Farms that had more than 500 cattle	80	33

**Table 1:** The total number of different categories of Holstein farms in Tehran Province, and the selected number of farms in the respective categories, on the basis of Probability Proportionate Sampling Technique.



**Figure 1:** Comparison between existing culling percentage and expected culling percentage.

## Results and Discussion

Results showed that the number of dairy cows increases from 2005 to 2007 and 2008 to 2009 at the rate of around 11% and 9%, respectively (Table 2). The opposite trend observed between 2007 and 2008 may have been due to higher incidence of diseases, and therefore, higher culling rate in the farms under study. Results in table 2 reveal that the mean of milk production has stayed consistently around 7000 kg, except a slight dip in 2007. This reflects that breeding, feeding, management and health-care of the cows is done on standard scientific lines. The results are well above the results revealed by Hashemi and Nayebpoor [10], who revealed that the mean milk yield of Holstein cows in Iran is 5123.20 kg. Results in table 2 show a pretty consistent trend in fat percentage mean, which is 3.48% for three of the five observations. This is lower to the results revealed by Maria et al. [11], who observed that the mean fat percentage of Holstein cows is 4.69%. The results are consonant with results revealed by Hashemi and Nayebpoor [10], who observed that the mean fat percentage of Holstein cows in Iran is 3.52% [10]. As shown in table 2, the mean protein percentage has stayed between 3.07 and 3.31%, which is considered good, given the trend is progressive. This is lower to the results revealed by Maria et al. [11], who observed that the mean protein percentage of Holstein cows is 3.62% [11].

The proportions of culled dairy cows were mainly due to involuntary culling, which was significantly higher than voluntary culling ( $P < 0.05$ ) (Table 3). The most frequent primary involuntary culling reasons were: diseases (10.33%), infertility or reproductive disorders (3.4%), mastitis (1.57%), dystocia (0.27%), lameness (1.88%), and genetic disorders (0.8%). A comparison of observed and expected value for culling percentage which reflect the healthy state of the Holstein farms in Tehran province of Iran are shown in figure 1. Culling rate stayed consistent except for the year 2007, when it was 25%. This may be attributed to the higher incidence of diseases during this period. Incidence of diseases

has been recorded around 9% for three of the five observations, except in 2007 when it had crossed 15%. This may be due to some outbreak in the farms under study. There is an urgent need to lower the incidence of diseases in the farms, by following proper husbandry practices like vaccination, deworming, etc. Culling due to infertility has been recorded around 3%, except 2009, where the percentage increased to 4.6%. Many published studies reported strong unfavorable genetic associations between milk yield and fertility measures, indicating that the decline in fertility observed on dairy farms, at least in part, is an unwanted consequence of successful selection for higher yields [12]. Our study showed that culling due to low milk production was consistent, except in 2009. The reason may be presence of high aged cows in the farms under study. The trend for culling due to ageing was on a progressive increase, this may be indicative of a higher requirement of replacement stock in future. The figures have stayed pretty consistent for culling due to body condition, and also for culling due to dystocia; however, there

2005	2006	2007	2008	2009
<b>Number of Dairy cows</b>				
35379	39153	43945	43663	47627
<b>Mean of milk production per cow (kg/year)</b>				
7078	7122	6927	7197	7364
<b>Mean of fat percentage</b>				
3.48	3.47	3.42	3.48	3.48
<b>Mean of protein percentage</b>				
3.07	3.30	3.28	3.31	3.21
<b>Culling rate in percentage*</b>				
19	18	25	18	17
<b>Culling percentage due to diseases</b>				
9.98	9.35	15.01	9.33	8.00
<b>Culling percentage due to non-productivity</b>				
3.7	2.46	3.04	3.20	4.60
<b>Culling percentage due to less production</b>				
0.4	0.6	0.63	0.40	0.72
<b>Culling percentage due to ageing</b>				
0.20	0.53	0.54	0.62	0.65
<b>Culling percentage due to abnormal teats</b>				
0.29	0.22	0.21	0.23	0.21
<b>Culling percentage due to dystocia</b>				
0.23	0.26	0.28	0.25	0.33
<b>Culling percentage due to lameness</b>				
1.80	2.10	1.79	1.57	2.14
<b>Culling percentage due to mastitis</b>				
1.33	1.51	1.70	1.78	1.53
<b>Culling percentage due to genetic disorders</b>				
0.64	0.70	1.02	0.95	0.68

\*Culling rate in percentage = Total number cows culled / Total number of cows  $\times 100$   
**Table 2:** The status of Holstein farms from 2005 to 2009, as per some indicators of Dairy Cattle Improvement.

	2005	2006	2007	2008	2009	Total
<b>*Voluntary Culling</b>	315 (0.89%)	528 (1.35%)	606 (1.38%)	546 (1.25%)	752 (1.58%)	549.4 $\pm$ 70.60 <sup>b</sup> (1.29%)
<b>Involuntary Culling</b>	6254 (99.11%)	6413 (98.65%)	10037 (98.62%)	7457 (98.75%)	8230 (98.42%)	7678.2 $\pm$ 690.88 <sup>a</sup> (98.71%)

<sup>a,b</sup> Different letters indicate statistical difference within column ( $P < 0.05$ ).  
<sup>\*</sup>Voluntary culling including low milk production in the absence of a known disease problem, old age, body condition, surplus to herd requirements and all other voluntary culling.

**Table 3:** Reasons for culling cows (voluntary and involuntary), in 74 studied dairy herds in Tehran province, Iran (2005-2009).

is need to lower the percentages by adopting scientific methods of dairy husbandry. There was an increasing trend in the incidence of lameness and mastitis. Ingvarstsen et al. [12] showed 14 genetic studies on the relationship between milk performance and health in dairy cattle. This study showed an unfavorable genetic correlation between milk yield and mastitis (0.15–0.68), and milk yield and lameness (0.24–0.48). Mastitis, primarily being a managerial disorder, needs to be dealt at the management level. Certain golden principles to prevent mastitis should be adhered in letter and spirit to scale down the incidence. Finally culling due to genetic disorders was around 0.6%, and it was consistent. High disease incidence, reduced ability to breed, decreased longevity, and modification of normal behavior are indicative of substantial decline in the welfare of dairy cows [12].

The figure 1 reveals that most of the figures apropos various culling percentages are lower than the expected figures, which reflect the healthy state of the Holstein farms in Tehran Province of Iran. Two fronts have depicted a negative trend, i.e. incidence of diseases and less production. These are the aspects that need be taken on priority basis for correction. Diseases incidence can be brought down to the expected levels by creating awareness among the dairy farmers, about the prevention and control tactics of different prevalent diseases in the area under study. Awareness campaigns, television, radio can be effectively used to deal with this problem. Training camps can be organised to create awareness among the people.

## Conclusion

Key concern areas were identified like the incidence of diseases was well above the expected level. The culling percentage due to diseases was 10.14% against an expected 2.8%. Another important area of concern was culling percentage due to low production, this was also well above the expected level. These are the aspects that need be taken on priority basis for correction. Diseases incidence can be brought down to the expected levels by creating awareness among the dairy farmers about the prevention and control tactics of different prevalent diseases in the area under study. Awareness campaigns, television, radio can be effectively used to deal with this problem. Training camps can be organised to create awareness among the people.

## Acknowledgements

The authors would like to thank Dr. R. Vaez-Torshizi and Dr. A. Lawaf for their invaluable contributions to this study.

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