

# Culling Trends on a Hungarian Large Scale Dairy Farm

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## Abstract

Different diseases experienced in dairy farms cause decreased productivity and profitability. When a decision is made regarding culling, age, phases of lactation cycle, milk production, reproduction phase and health stage all have to be taken into account. Main reasons of culling are reproduction disorder, mastitis, low milk production and lameness. Based on 5-year data of the farm of this research, main culling reasons were identified. Another aim of this study was to find out in which lactation culling had the highest proportion and why. A number of 1175 cows left the farm as a result of culling during 5-year period. Thirty percent of cullings was caused by udder diseases and 22% of cullings occurred due to reproduction disorder. Twelve percent of culling was caused by the sum of low milk production, lameness and metabolic diseases. Thirty five percent of culling was caused by other diseases (lung-inflammation, heart defect, heat stress) and managerial decisions. Culling trends in each lactation: 23 % in first, 32 % in second, 25 % in third, 12 % in fourth, 8 % in 4< (5., 6., 7. and 8.) lactations. In the first lactation the main reasons of culling were reproduction disorder (7.74 %), udder diseases (4.94 %) and low production (4.5 %). However, in the second lactation the highest culling ratio was caused by udder diseases (8.77 %), lower by reproduction disorder (7.83 %) and the lowest by low production (2.8 %). In the third lactation udder diseases (8.43 %), low production (5 %) and reproduction disorder (4.09%) was the distribution between the different factors causing culling.

**Keywords:** culling, dairy cattle, dairy farm, Holstein Friesian, lactation

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## 1. Introduction

Cattle breeding is relevant economic activity all over the world providing safe livelihood for many people. Cattle serves basic foods and raw materials required for other products. Main aim of cattle breeders for the future is to satisfy higher food demand of humanity due to population growth. Improving efficiency and production quality of the sector is preliminary besides quantitative production. On a cattle farm varying disease cause decrease in productivity frequently. If an individual gets ill, it is not able to reach its genetically determined maximum milk yield. This results in income loss. Main aim of production to keep cattle with high productivity in production as

long as possible. Thus, length of productive lifetime can be increased [1]. Culling is a comprehensive decision. During that age, phases of lactation cycle, milk production, reproduction attributes and health stage all have to be taken into account [2]. Optimal timing is important at culling as too early or too late culling results in economic loss [3]. Culling decision is influenced by economic factors such as quantity and price of milk, price of culled cow, purchase price and raising cost of heifer [4]. Main reasons of culling are reproduction disorder, mastitis, low milk production and lameness [5,6]. According to calculations of Kerslake et al. [7], cost of reproduction disorder, udder problems and different diseases and injures is NZ \$ 10,286 /year. They recommend cattle farms to pay more attention on veterinarian treatments, genetics, production control and economic factors. Annual

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culling ratio of dairy cows in Canada is 28-30% nowadays [8]. This value in USA is 30-35% [9, 10]. Beaudreau et al. [2] claimed that at least half of culling is derived from cattle health issues. Currently veterinarian management focuses on prevention instead of treatment [11]. In order to increase profitability of a dairy farm, it is important to decrease production loss [12]. Losses need to be quantified, evaluated, analysed. As these data help farmers to economically appropriate culling decisions [13]. In Hungary culling of cows is after 3rd or 4th lactation on average. Therefore, many heifers have to be settled into production so all heifer which is suitable for reproduction has to be kept for breeding [14].

## 2. Materials and methods

### Introduction of investigated farm

Investigations were carried out in a Hungarian dairy farm. Data about herd size can be seen in Table 1.

**Table 1.** Herd size

Cow	604
Milking cow	520
Pregnant heifer	190
Uppgrowing	364
Calves (heifers + bulls)	102

There is untied keeping system on the farm. Cows are grouped based on productivity level and lactation stage. The platform is made of concrete. The litter is straw and manuring occurs every day. Every stable has runway with lean-to and feeder. Milking cows are in stables with two blocks and are located into seven groups. Besides this, there are calving house, stable for pregnant heifers and stable for ill animals. Parallel milking-house is equipped with 2x20 platforms, in which automatic udder nipple bathing and milking gum disinfection system. There is milking three times a day.

### Description of investigation

In this research reasons of culling were investigated in the given herd in this research. From these, mastitis related culling was analysed in more details. Extent of cullings was analysed considering different lactations. Culling reasons in the first three lactations were identified. Distribution of somatic cell number of cows suffering from mastitis was demonstrated. Demonstration of mastitis was accomplished by applying Californian Mastitis Test. Cows suffering from mastitis were differentiated into specific groups and they were milked separately. Data about their productivity, medical treatment was recorded and stored in farm monitoring system.

### Statistical methods applied for processing collected data

Statistical methods applied for investigation can be seen in Table 2.

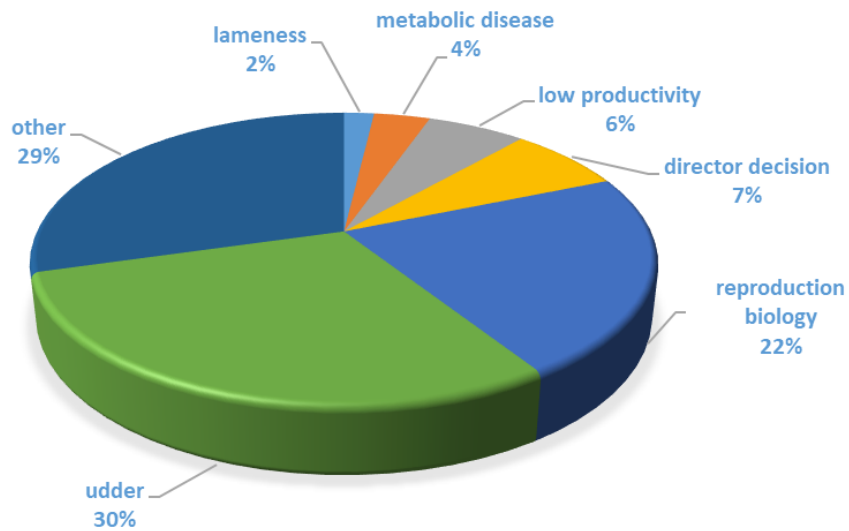
**Table 2.** Statistical methods applied for investigation

Applied statistical methods		Investigated area
Chi <sup>2</sup> probe	Testing coherence between variables	%-based distribution of
Cross-Tabulation Analysis		culling reasons in each lactation
		Serial number of fertilisations depending on lactations

Data were gained from RISKÁ farm monitoring system. SPSS for Windows 18.0 program was used for the analysis. Results were presented in tables and figures during investigation.

## 3. Results and discussion

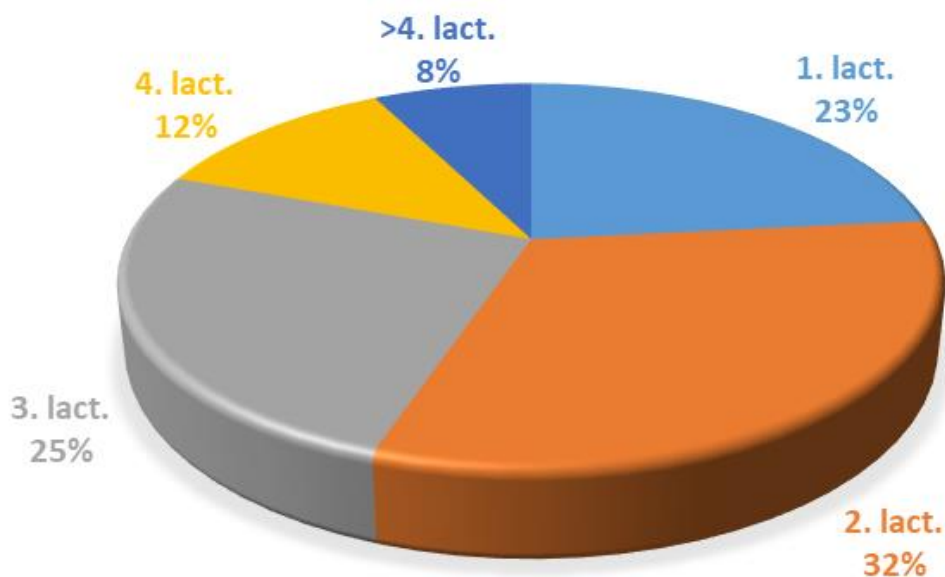
Investigations were made based on data collected between 2013 and 2017. Proportions of culling reasons in the herd can be seen in Figure 1.



**Figure 1.** General investigation of culling reasons in the herd

During 5-years period 1175 cows left the farm as a result of culling during 5-year period, which meant 235 individuals annually. There were significant differences between culling reasons. Mastitis represented the highest ratio with 30% of the total cullings meaning 348 individuals. Twenty nine percent was caused due to other reasons meaning 346 individuals. Twenty two

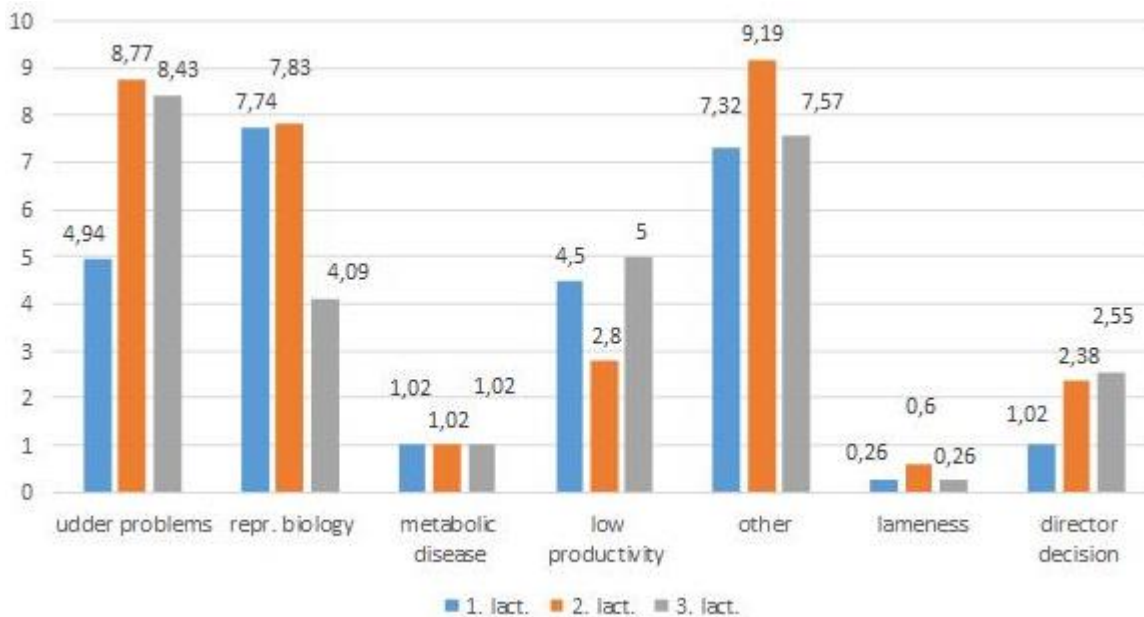
percent of cullings was caused by reproduction biology reasons meaning 261 individuals. Culling due to low productivity was relatively low proportion 6% meaning 72 individuals during the 5-year period. Twenty two percent presented cullings caused by both lameness and metabolic disease meaning 41 individuals.



**Figure 2.** Culling proportions depending on number of lactation

The proportion of culling based on number of lactations is presented in Figure 2. Results revealed that the highest proportion of culling occurred in the first three lactation. Culling proportion was similar in the first and third lactation with 23% and 25 %. Culling above 30% occurred only in the second lactation

meaning 374 cows independently from reasons. Culling proportions in the fourth lactation was 12%. Culling of cows above the fourth lactation did not reach 10% considering all of them. The oldest cow of the farm produced till its eleventh lactation.



**Figure 1.** Trends of culling reasons in the first three lactations

Trends of culling reasons in the first three lactations can be seen in Figure 3. Eighty eight percent of the total cullings occurred in the first three lactations. Twenty three percent was the proportion of culling in the first lactation as can be seen in previous figure. Eight percent of this 23% was caused by reproduction biology disorders and 7% was caused by other animal health issues. The third culling reason was mastitis with 5%. Considering the second lactation, culling proportion was 32%. From this 9% was caused by other reasons and 8.77% by mastitis. Culling caused by reproduction biology disorders decreased under 8% in this lactation. In the third lactation main reasons for culling were udder problems representing 8.5% from 25%. The second most frequent meant other reasons meaning 7.5% from 25%. In this lactation culling due to low productivity also occurred with 5%. Significant difference was presented in the distribution of investigated indicators by statistical probe ( $\chi^2=33,740$ ,  $df=12$ ,  $p=0,001$ ).

Ahlman et al. [15] identified the following culling reasons: udder health diseases, infertility, low milk productivity, lameness, metabolic diseases and other diseases. During this research all of these appeared but in different order. 30% of investigated individuals after culling had mastitis and other diseases followed it. Reproduction biology problems meant the third main culling reason in the investigated herd. Infertility can be influenced by several factors such as management, feeding practices and genetics [16]. Low portion of culling occurred due to lameness. Culling can occur during lactation as well, furthermore mastitis can appear at any phase of lactation [17]. Most culling occurred in the second lactation because the average lactation on the farm is 2.4. Mastitis caused culling proportion in this lactation is 8.77%. Shook and Schutz [18] identified that increased somatic cell number is in strict relationship with mastitis. Somatic cell count proportion of cows after culling in the second and third lactation was close to 50% with >1 million

cell/ml. As a conclusion, main reason of cullings was clinical mastitis. This was certified by Haraszti [19] who claimed that in case of 1 million cell/ml we can talk about clinical mastitis. Alhussein and Dang [20] considered this value between 500,000 and 750,000 cell/ml. Mastitis has a dangerous impact on animal health and productivity [21]. Mastitis is the most frequent and most costly disease of milk production [22; 23]. Mastitis often results in early culling [24]. Most individuals after the given lactation were culled without fertilisation. The reason of this could be that the individual did not get pregnant during lactation, suffered from paralysis from which it did not heal or other diseases, injuries came up. The most diseases appeared in the first 25 days of second lactation. Cows are treated after calving four times as an average in the given lactation. Culling decision influences the animal health issue and production too [25]. As a conclusion proportion of culling has to be minimised on the farm especially considering mastitis. Thus, production during lactation can be increased. As a result, genetic potential utilisation of individuals would be higher and production cost would be lower.

#### 4. Conclusions

Milk production of Holstein Friesian takes place in the forefront of world-class ranking. However excellent milk productivity goes together with several animal health issues, as these individuals have sensitive constitution. The most cullings in a herd are caused by diseases. If an animal got ill, there will be decrease in milk quantity and quality. This can lead to early culling. It is really important to decrease annual culling proportion as much as possible. Thus, profitability of production can be increased. By decreasing culling proportion genetic potential utilisation of individuals would be higher and these individuals can be kept in production for longer period. Results of this research revealed that decrement of culling proportion more efficient and profitable milk production can be achieved. For these proper animal health management and consultancy is inevitable. Mastitis was the reason of cullings in most of the cases. Appropriate udder health program helps to roll back mastitis. As a result, productivity of animals is higher and culling proportion decreases.

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