بسم الله الرحمن الرحيم

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REASONS FOR CULLING IN A COMMERCIAL HOLSTEIN HERD IN EGYPT

By

AHMED HASSAN AMIN ABD-ALLAH
B.Sc. Agric. Sci. (Animal Production), Fac. Agric., Cairo Univ., 2008

THESIS
Submitted in Partial Fulfillment of the
Requirements for the Degree of

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Agricultural Sciences
(Animal Production)

Department of Animal Production
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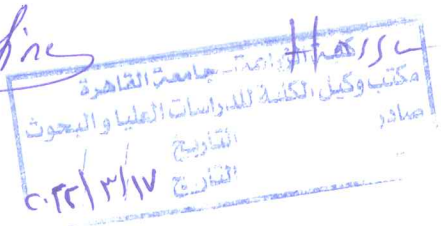

APPROVAL SHEET

Reasons for Culling in a Commercial Holstein Herd in Egypt

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ABSTRACT

The study aimed to identify the culling reasons of Holstein cows raised in a large commercial herd in Egypt with emphasis on the performance of retained and culled cows. A total of 31534 complete lactation records for 10994 cows calved from 2008 to 2019 were used. The overall rate of culling per lactation was 61.1%. Involuntary culling represented 92% of all culling cases. The reasons for culling included mastitis and udder problems (24.2%), reproductive disorders (18.7%), metabolic and digestive disorders (13.6%), lameness (13%), endemic diseases (10.8%), low milk yield (8.1%), respiratory diseases (4.3%) and unknown causes (7.3%). Means of 305-day milk yield and daily milk yield were significantly higher in retained cows than the culled ones. On the other hand, no significant differences were observed between retained and culled cows for days open and the number of services/conception. The high involuntary culling rate of Holstein under the Egyptian conditions revealed that management practices regarding mastitis prevention and reproductive efficiency should be improved.

Keywords: Culling reasons, Egypt, Holstein, Milk production, Reproductive performance

DEDICATION

This Work is Dedicated to the soul of the late Dr. Ali Attia Nigm, Professor of Animal Breeding, Faculty of Agriculture, Cairo University and Former Dean of the Faculty for his advice, guidance, and his support throughout this study.

A special dedication of this work is to my parents, my sisters, and my brothers for their continuous support throughout my life.

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CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

DHIA	Dairy Herd Improvement Association
Dairy Comp 305	Valley Ag Software, Tulare, CA
ICAR	International Committee for Animal Recording
305-DMY	305-day milk yield
TMY	Total milk yield
LP	Lactation period
DMY	Daily milk yield
DO	Days open
NSPC	Number of services per conception
AFC	Age at first calving
TMR	Total Mixed Ration
FMD	Foot and Mouth Disease
LSD	Lumpy Skin Sisease
RVF	Rift Valley Fever

INTRODUCTION

Culling refers to the process of removing animals from the herd. Culling could be voluntary due to low milk production or sale of excess animals or could be involuntary, as a result of illness, injury, infertility, or death. Both types of culling are applied to keep herd economics high. However, a high rate of involuntary culling reduces the herd profit, particularly for high-yielding cows. Replacement of heifers necessitates replacing culled cows, which adds a financial load on the dairy unit. Rearing replacement of heifers represents about 20% of total variable costs (Karszes, 2014).

Culling strategies vary from one farm to another. These strategies can be also modified within the same farm over time. Culling decision is a complicated process since one should consider the price of culled cows, availability of replacement heifers within the farm and the cost of rearing replacement heifers. Pinedo et al. (2010) studied cows calved between 2001 and 2006 in the Eastern United States and found that the main culling causes were death (20.6%), reproduction (17.7%), injury/others (14.3%), low production and mastitis (12.1% for both). However, in the Polish population of Holstein, Adamczyk et al. (2017) found that the primary reasons for culling were reproductive disorders (39.6%) and udder problems (15.5%). However, the main reasons for cow culling in the Dairy Herd Improvement Association (DHIA) during 2015 were injury, reproduction disorders, mastitis and death (CDCB, 2019). In Spanish dairy cattle farms (2006 -2016), Armengol and Fraile

(2018) found that reproductive disorders were the most frequent reason for cow removal (30.2%), followed by low milk yield (23.4%), accidents (7.7%), diseases (7.2%), locomotor disorders (2.4%), and obstetrics (2.4%). Doornewaard et al. (2018) also stated that the main reasons for culling dairy cows were reproduction failure, mastitis and udder health, low production, and leg diseases in Wageningen, Netherland. The rate of culling varies due to parity, stage of lactation, breed, and management strategies (Pinedo et al., 2014). De Vries (2017) reported that the rate of culling was within the range of 28-64%.

In Egypt, Holstein cattle are the main dairy cattle in commercial farms which supply the local market with milk stably and steadily. Egypt lies in the semi-arid subtropical zone where the temperature and humidity are high mainly in the summer season, besides, there are limited feed and water resources. Thus, dairy farms in Egypt have to pay for imported feeds and vaccinations and also for installing and maintaining cooling systems. These harsh conditions markedly increase culling rates, shorten Holstein's longevity and rise the cost of raising replacement heifers. Breeding programs should take into consideration the way to diminish the causes of involuntary culling. Therefore, it is necessary to identify the reasons for culling Holstein cows raised in Egypt.

Although the performance of Holstein in Egypt has been intensively studied, few available reports are found concerning culling reasons. Therefore, the objective of this study was to identify the culling reasons as well as, examining the performance of retained and culled cows in a large commercial Holstein herd in Egypt.

REVIEW OF LITERATURE

A high culling rate in dairy farms is a big problem facing farmers who desire to increase their herds, especially with a shortage of replacement heifers. Longevity and culling are opposites so that by controlling the culling in the herd we can increase longevity. Longevity in a dairy farm is important because the margin of milk sales over feed costs in the first three lactations is usually not large enough for the cow to make a profit, and a cow becomes profitable only when it reaches its fourth lactation (Esslemont and Kossaibati, 1997). Only the first two lactations needed to repay the cost of heifer rearing as reported by Boulton et al. (2017)

The Management software allows recording only one reason for culling. Nevertheless, most cows are likely removed from dairy herds after they have displayed several reasons that would lead to culling (Allaire et al., 1977). The decision to cull an animal is a complex one. Farmers may behold many cow factors, such as: age, lactation status, milk production, health status, disposition and reproductive performance when determining to cull or not Bascom and Young (1998).

In this section, we will review studies on culling rate, culling reasons, and their relations with milk production, reproduction performance, and the economic impact on the dairy herd.

1. Definition of culling

Hadley et al. (2006) described culling as the act of identifying and removing a cow from a herd and, assuming a constant or expanding herd size, replacing the cow with another cow, often the first-lactation heifer.

The American Dairy Science Association was formed in 2006 for the purpose of reviewing terms currently in use on dairy farms relating to culling to standardize the use of culling terminology.

Fetrow et al. (2006) defined culling as the departure of cows from the herd because of sale, slaughter, salvage, or death. They classified the destination of the culled cow into three groups: (1) Dairy Sale, the cow was sold alive to another dairy farm, with a goal of continuing to provide income, such as producing milk, calves, or embryos; (2) Slaughter, which means that the cow left the dairy alive to be slaughtered for human consumption, and (3) Death, means that the cow was died.

2. Classification of culling

The culling is categorized into Voluntary and involuntary. The voluntary culling takes place when the farmer chooses to cull a healthy, and fertile cow because of low milk production compared to their herd mates and needs to replace it with another higher milk production. The involuntary culling, on the opposite hand, takes place when the farmer is compelled to remove a productive, profitable cow because of illness, injury, infertility, or death.