ESTIMATION OF GENETIC PARAMETERS FOR MILK PRODUCTION AND REPRODUCTIVE TRAITS IN A HERD OF HOLSTEIN FRIESIAN CATTLE IN EGYPT

By

NAJI QASIM ALI MOHAMMED SHADDAD

B. Sc. Agric. Sci. (Animal Production), Fac. Agric. and Vet. Med., Ibb Univ., Yemen, 2000
M. Sc. Agric. Sci. (Animal Production), Nasser's Fac. Agric. Sci., Aden Univ., Yemen, 2009

THESIS

Submitted in Partial Fulfillment of the Requirements for the Degree of

DOCTOR OF PHILOSOPHY

In

Agricultural Sciences
(Animal Production)

Department of Animal Production
Faculty of Agriculture
Cairo University
EGYPT

2014

APPROVAL SHEET

ESTIMATION OF GENETIC PARAMETERS FOR MILK PRODUCTION AND REPRODUCTIVE TRAITS IN A HERD OF HOLSTEIN FRIESIAN CATTLE IN EGYPT

Ph. D. Thesis
In
Agric. Sci. (Animal Production)

By

NAJI QASIM ALI MOHAMMED

B. Sc. Agric. Sci. (Animal Production), Fac. Agric. and Vet. Med., Ibb Univ., Yemen, 2000
M. Sc. Agric. Sci. (Animal Production), Nasser's Fac. Agric. Sci., Aden Univ., Yemen, 2009

APPROVAL COMMITTEE

Dr. ABD EL HALIM ANIES ASHMAWY ……...……
Professor of Animal Breeding, Fac. Agric., Ain-Shams University

Dr. RABIE RAGAB SADEK. ……...…….....
Professor of Animal Husbandry, Fac. Agric., Cairo University

Dr. ALI ATTIA NIGM ……...……...……
Professor of Animal Breeding, Fac. Agric., Cairo University

Date: 24/ 12/ 2014

SUPERVISION SHEET

ESTIMATION OF GENETIC PARAMETERS FOR MILK PRODUCTION AND REPRODUCTIVE TRAITS IN A HERD OF HOLSTEIN FRIESIAN CATTLE IN EGYPT

Ph. D. Thesis
In
Agric. Sci. (Animal Production)

By

NAJI QASIM ALI MOHAMMED SHADDAD

B. Sc. Agric. Sci. (Animal Production), Fac. Agric. and Vet. Med., Ibb Univ., Yemen, 2000
M. Sc. Agric. Sci. (Animal Production), Nasser's Fac. Agric. Sci., Aden Univ., Yemen, 2009

SUPERVISION COMMITTEE

Dr. ALI ATTIA NIGM
Professor of Animal Breeding, Fac. Agric., Cairo University

Dr. HOSSAM EL-DIN RUSHDI AHMED
Lecturer of Animal Breeding and Genetics, Fac. Agric., Cairo University

Dr. USAMA MOHAMMAD EL-SAIED
Head Research of Animal Breeding, Animal Production Research Institute

Name of Candidate: Naji Qasim Ali Mohammed Shaddad **Degree**: Ph.D.
Title of Thesis: Estimation of Genetic Parameters for Milk Production and Reproductive Traits in a Herd of Holstein Friesian Cattle in Egypt
Supervisors: Dr. Ali Attia Nigm
Dr. Hossam El-Din Rushdi Ahmed
Dr. Usama Mohammed El-Saied
Department: Animal Production **Branch:** Animal Breeding
Approval: 24/ 12/ 2014

ABSTRACT

Genetic parameters for some milk production and reproductive traits were estimated in a herd of Holstein Friesian (HF) cattle in Egypt. A total of 502 lactation records of 300 HF cows sired by 29 bulls from a herd belonging to Alexandria Copenhagen Company for Dairy and Meat Production, was used in the present study. Data were collected during 7 years (2005-2011) and analyzed using SAS, XLSTAT and WOMBAT.

Means of total milk yield (TMY), 305 day milk yield (305-DMY), lactation period (LP), days open (DO) and calving interval (CI) were 10718 kg, 8805 kg, 397 day, 193 day and 472 day, respectively. Parity had no significant effects on all traits, except for 305-DMY ($P<0.0001$). Season of calving, also had no significant effects on all traits, except for LP ($P<0.0025$) and DO ($P<0.021$). Heritability estimates of TMY, 305-DMY, LP, DO and CI were 0.19, 0.25, 0.15, 0.11 and 0.11, respectively. The moderate estimate of heritability of 305-DMY indicated that improvement in this trait could be made through selection as well as better managemental practices. Repeatability of TMY, 305-DMY, LP, DO and CI were 0.40, 0.39, 0.34, 0.25 and 0.23, respectively.

Positive genetic and phenotypic correlation coefficients were obtained among all traits and ranged from 0.003 to 0.99 and from 0.12 to 0.96, respectively. except for the phenotypic correlations between 305-DMY with DO and CI which were negative (-0.01 and -0.02, respectively).

Results indicated possibility of genetic improvement of milk yield by selection for 305-DMY only, due to its higher estimate of heritability, compared to TMY, and also because of its reasonably high genetic correlation with TMY.

Key words: Holstein Friesian, milk yield, repreductive performance, heritability, repeatability, genetic and phenotypic correlation.

DEDICATION

I dedicate this work to the dearest people to my heart, my children, Asmaa, Mohammed Al-Fateh, Al-Bara' and Al-Munther and my wife. And also to my father and mother who gave a lot for my life and education. To everyone who encouraged me and supported the development of my skills. To my beloved country on which precious land I grew up, Yemen.

ACKNOWLEDGEMENT

Praise and thanks be to Allah for helping and guiding me in every step throughout my life .

I would like to express my deep gratitude to Dr. ***Ali Attia Nigm*** *Professor of Animal Breeding, Faculty of Agriculture, Cairo University, for moral support during my studies and research work, continuous encouragement, constructive guidance and the supervision until the reach this point.*

Sincere gratitude and appreciation to Dr. ***Hossam EL-Din Rushdi Ahmed*** *Lecturer of Animal Breeding and Genetics, Faculty of Agriculture, Cairo University for his continuous advice, support and continuous energetic help, supervision during this work and preparation of the manuscript.*

I would be honored to convey my gratitude to Dr. ***Usama El-Saied*** *Head Research, Animal Production, Research Institute, ARC, MALR, for his supervision and help.*

I wish to express my deepest thanks to ***Dr. Rabie Ragab Sadek*** *and Dr.* ***Mohamed Abdel Aziz Mohamed Ibrahim*** *Professors of Animal husbandry, Faculty of Agriculture, Cairo University for their continuous help and support in the work.*

Finally, I would like to express my deep gratitude to all the staff members and colleagues in Cattle Information Systems/ Egypt (CISE) of Cairo University, for their sincere help, support and encouragement.

I would like to thank all my friends who helped me in many ways during my postgraduate life. Special thanks go to Dr. Ali Alba'dani from Ibb University, Ibb, Yemen for his continuous encouragement for me.

LIST OF ABBREVIATIONS

305-DMY : 305-day milk yield
AM : Animal model
CI : Calving interval
CISE : Cattle Information Systems / Egypt
d : Day
DO : Days open
F : Friesian
H : Holstein
h^2 : Heritability
HF : Holstein X Friesian
LP : Lactation period
MAS : Marker assisted selection
NRC : National Research Council
QTL : Quantitive treat loci
r_g : Genetic correlation
r_p : Phenotypic correlation
RIP-dip : Records in progress – dip
SAS : Statistical Analysis System
t : Repeatability
TMR : Total mixed ration
TMY : Total milk yield
TPI : Total performance index

CONTENTS