GENETIC MODELS FOR IMPROVING SHEEP IN EGYPT

By

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LIST OF ABBREVIATION

BW	Body weight at birth
WW	Body weight at weaning
YW	Body weight at 12 months
NLB	Number of lambs born per ewe joined in the first parity
NLW	Number of lambs weaned per ewe joined in the first parity
TNLB	Total number of lambs born per ewe joined in the first three parities
TNLW	Total number of lambs weaned per ewe joined in the first three parities
TKGW	Total kilograms weaned per ewe joined in the first three parities
SI	Selection Index
SE	Standard Errors
EWs	Economic weights
G.Sample	Gipps sample program

List of Abbreviations

WW	Ewe weaning weight.
YW	Ewe yearling weight.
KGW	Kilo grams weaned per ewe joined in the first parity.
TKGW	Total kilo grams weaned per ewe joined in the first three parities
NLB	Number of lamb born per ewe joined in the first parities
TNLB	Total number of lamb born per ewe joined in the first three parities
NLW	Number of lamb weaned per ewe joined in the first parities
TNLW	Total number of lamb weaned per ewe joined in the first three parities

1. INTRODUCTION

Lamb growth performance and reproductive efficiency of the ewe are major components in determining the productivity and economic return of sheep. Farafra sheep breed in Egypt is considered the most prolific among Egyptian sheep breeds. The Egyptian Ministry of Agriculture has established and maintained a flock of this breed under an accelerated lambing system of a crop every eight months. Weaning weight has a great economic importance under this prevailing management system. Roger (2005) introduced that in sheep selection, interest is focused on several traits not a single trait. Selection index procedures enable genetic gains to be achieved simultaneously for several traits with an optimum economic balance between them.

Measuring ewe reproduction performance early in ewe lifetime as selection criteria would decrease the genetic interval and enhance the genetic return in any selection program. Kilograms weaned per ewe joined are an important trait compared with other reproductive traits from the economic perspective. Weaning weight (WW), yearling weight (YW), kilogram weaned (KGW), number of lambs born (NLB) and number of lambs weaned (NLW) could be taken as selection criteria to enhance mutton production of local sheep breeds. Favorable genetic and economic responses to selection were observed for litter weight weaned (Ercanbrack and Knight, 1998). Therefore, KGW, NLB and NLW per ewe joined were used as the selection criteria in a selection program to improve the production and economic return of Farafra sheep. Genetic and phenotypic variance-covariance components of the studied traits are needed to construct selection indices.

Many authors studied the differences between selection methods, such as (Hazel and Lush, 1942, Young 1961, Abplanalp, 1973 Elwardany *et al.,* 1992, Enab *et al.,* 2000, Ben Naser 2007 and Abou Elawa 2010). All authors show that selection index is the best to evaluate breeding values comparing with another methods.

In selection index we need to know the breeding objective which includes all traits of economic importance in production system (Othman,1997).

Selection index transform all net values of traits of selection criteria into single index value. Selection index depends on heritability estimates of all traits in the index, correlation among all traits and economic value of each trait. The number of traits in breeding objective reduce the individual rate of improvement but may be increase the overall productivity, Faidallah (2010).

The objectives of the present study were, estimating genetic and phenotypic parameters of WW and YW of the ewe, NLB, NLW and KGW per ewe joined for constructing and investigating six selection indices to evaluate ewe performance, improve their productivity and increase litter size and kilograms weaned.

2. REVIEW OF LITERATURE

2.1. Breeding objective and selection criteria

Animal genetic improvement needs to define the breeding objectives and selection criteria of breeding program.

Roger (2005) defined the breeding objective as ‶a list of traits that can be improved by selection, ordered according to their relative economic values. It is aimed at improving farm income”. Pattie *et al.* (1990) reported that the measurable traits chosen to achieve the breeding objective can be defined as selection criteria. They also indicated that to estimate the breeding values of these traits, we need to estimate heritabilities and genetic and phenotypic correlations.

Johnson and Garrick (1990**)** stated that, the breeding objective must be defined before starting any breeding program in terms of those traits that need to be improved regardless of their ease of measurement and degree of inheritance. Selection criteria consist of all genetically or phenotypic correlated characters in the breeding objective.

2.2 Genetic and phenotypic parameters for the studied traits

The estimates of genetic parameters are the milestone to construct any selection index used as a method of genetic improvement in any selection program (Othman *et al.* (1997). Cameron (1997) described the relationship between two traits as " the regression coefficient describes the linear relationship between two traits, while the correlation coefficient is a measure of the variation in trait Y attributable to the linear relationship with trait X". In study on pig, Hanenberg *et al.* (2001) from Johnson *et al.*, (1999) reported that the undesirable correlated such as piglet mortality and litter size may be decreased overall effectiveness of selection on litter size.

REVIEW OF LITERATURE

2.2.1. Heritability estimates.

The estimates of variance–covariance components, heritability and genetic correlations are major estimates for the selection programs aimed to improve the concerned traits (Faidallah,2010). Estimates of heritability reported in the literature for different economic traits are presented in Tables (1) to (6).

Table (1): Estimates of heritability (h^2±SE if available) for weaning Weight (WW).

h^2	Breed	Reference	Method of estimation
0.25	Suffolk	Yamaki (1994)	Bivariate with BW
0.09	Suffolk	Yamaki (1994)	bivariate
0.34	Suffolk	Yamaki (1994)	Bivariate with KGW
0.07	Composite	Al-Shorepy & Notter (1996)	REML
0.34	Swedish finewool	Nasholm & Danell. (1996)	Bivariate
0.14	Swedish finewool	Nasholm & Danell (1996)	Univariate
0.31	Segurena	Analla *et al.* (1997)	Multitraite& Univariate
0.15	Baluchi	Yazdi *et al.* (1997)	Univariate
0.19	Baluchi	Yazdi *et al.* (1997)	Bivariate
0.41	Afrino	Snyman *et al.* (1998b)	DFREML Bivariate
0.12	Composite	Mousa *et al.* (1999)	Multivariate
0.09	Composite	Mousa *et al.* (1999)	Univariate
0.21	Hungarian Merino	Nagy *et al.* (1999)	Multivariate
0.16	Targhee	Rao & Notter (2000)	DFREML Multivariate
0.13	Suffolk	Rao & Notter (2000)	DFREML Multivariate
0.10	Polypay	Rao & Notter (2000)	DFREML Multivariate
0.12	Sabi	Matika *et al.* (2001)	ASREML