ESTIMATION OF GENETIC PARAMETERS AND SELECTION INDICES FOR SOME ECONOMIC TRAITS OF EGYPTIAN BUFFALOES

BY

Manal S. Kassab[1], Mostafa A. Ibrahim[1], Kawther A. Mourad[2] and Set El-Habaeib S. Awad[2]

1- Dept. of Animal Production, Fac. of Agric., Kafr El-Sheikh, Tanta Univ.

2- Agric. Res. Center.

ABSTRACT

The present study was carried out during the years 1990 to 1993 at the Experimental Farm of the Animal Production Department, Ministry of Agriculture. It included 352 normal first lactation records of buffaloes of the herd of Mahallet Mousa Farm.

The propose of the investigation was to estimate genetic parameters and selection indices for some economic traits of Egyptian buffaloes.

Results obtained may be summarized as the followings:

- Genetic and phenotic correlations were negative and significant ($P < 0.05$) except the genetic and phenotypic correlations between fat percentage and protein percentage.
- Single trait selection for 305 day milk yield (dMY) resulted in an expected increase of 34.58, 5.44 and 2.35 as a percentage of the overall mean of 305 dMY, F% and P%, respectively. Selection of F% compared with selection for 305 dMY resulted –28.16, -2.23 and 2.35% of 305 dMY, F% and P%, while selection for protein percentage resulted in –42.08, -5.43 and 2.36% of 305 dMY, F% and P%. Therefore, selection for 305 dMY is more economic than selection for F% and P%.
- Four indices of selection for improving productive traits of buffaloes were constructed involving all combinations of two or three traits studied.
- The selection index (I_1) which incorporated 305 dMY, F% and P% was the best (RIH = 0.63 and RE = 100%). This index was recommended for Egyptian buffaloes if the selection exercised at the end of the first lactation. The suggested index was $I_1 = 1.599$ (305 dMY) – 6.788 (F%) + 274.632 (P%). The expected genetic changes in one generation through this index will be: increase in 305 dMY by 128.87 kg, 0.14% of F% and 0.04% of P%. This index is very simple and early to construct.

INTRODUCTION

Buffalo is considered the main dairy animal in Egypt. Numbers of Egyptian buffaloes and their production of milk and meat represented by FAO report (1990) for Egypt compared to those of the world indicate that the contribution of the Egyptian buffaloes in milk and meat in the world is relatively considerable, i.e. about 5% and 14% of the world buffaloes milk and meat, respectively. Hazel (1943) recommended that, selection of indexes is the best method for multiple trait selection under farm circumstances.

The income for milk to dairymen in any countries depends mostly on the quantity of milk and its contents of fat and/or protein (Dommerholt and Wilmink 1986). Selection for parameters such as heritability of milk yield and its contents of fat and protein and various correlations among there traits are useful in estimating genetic progress and in planning breeding programs.

The main objectives of the present study were to estimate the genetic and phenotypic parameters of 305 day milk yield (dMY), fat and protein percentage in the first lactation of Egyptian buffaloes and evaluate and compare results of single and multiple yield traits in selection for 305 dMY, fat and protein percentages.

MATERIAL AND METHODS

Data

A total 352 normal first lactation records of buffaloes of the herd of Mahallet Mousa Farm, the experimental farm of the Animal Production Department, Ministry of Agriculture. This farm is located in Kafr el-Sheikh, province of the Delta, during the period from 1990 to 1993.

Genetic correlation

The genetic correlation (r_g) between two traits (x and y) was computed as:

$$r_g = Cov_s / (\sigma^2 s_{(x)} * \sigma^2 s_{(y)})$$

where: Cov_s is the sire components of covariance between traits x and y
$\sigma^2 s_{(x)}$ and $\sigma^2 s_{(y)}$ are the sire components of the variance for the traits x and y.

The standard error of the genetic correlation was estimated as follows:

$$S.E.r_g = (1 - r_g)^2 (S.E.h^2_{(x)} * S.E.h^2_{(y)}) / (2\ h^2_{(x)} * h^2_{(y)})$$

Phenotypic correlations

Phenotypic correlation (r_p) between two traits x and y was:

$$r_p = (Cov_s + Cov_e) / (\sigma^2 s_{(x)} * \sigma^2 s_{(y)}) (\sigma^2 e_{(x)} * \sigma^2 e_{(y)})$$

where: Cov_s and Cov_e are the components of covariance between x and y traits

$\sigma^2 s_{(x)}$ and $\sigma^2 e_{(y)}$ are the components of variance of the trait x
$\sigma^2 s_{(y)}$ and $\sigma^2 e_{(y)}$ are the components of variance of the trait y.

The standard error of the phenotypic correlations (S.E. r_p) was calculated by the formula given by Harvey (1987):

$$S.E.\ r_p = (1 - r^2_p) / (n - 2)$$

Selection

Single trait selection

According to Falconer (1981) expected direct and correlated responses to selection for one trait were estimated as:

$$R = ih^2\sigma_p \quad \text{and} \quad CR = ih_x h_y r_g \sigma_{py}$$

Where: R the direct response in selection for x trait
h^2 the heritability estimate of x trait
σ_p the standard deviation of phenotypic values
CR the correlated response to square roots of heritability estimates of trait x and trait y, respectively.
r_g the genetic correlation between the two traits
σ_{py} the standard deviation of genotypic values of trait y.

The expected genetic change in generation trait was set to 1.0 for only the comparison purposes.

Selection index

The selection index procedure condenses the available information into a single score or index which can be used for ranking animals. Selection index has been used in different situations such as:

1- Selection of individual for a single trait,
2- Selection on individual for several traits records on animals themselves only, and
3- Selection of lines or lines crosses.

Estimates of the relative economic values

Required information:

1- The economic weights (a_1, a_2, ..., a_k) for each traits. These economic weights are based on the value in terms of the price date and net profit.
2- The genetic and phenotypic variance: VA and VP for every trait considered in the selection index.
3- The genetic and phenotypic covariance: Cov. A and Cov. P between each pair of traits.

Construction of selection indexes

The principle of selection by means of an index as developed by Hazel (1943) was followed in deriving the different indexes used in the present study. Some modifications of this method was suggested by Henderson (1963). Four indices for improvement of productive traits of Egyptian buffaloes (involving all combinations of two and three traits studied) were constructed using the general computer program cited by Cunningham (1977).

The aggregate breeding value (H) of the index is:

$$X = \Sigma a_i g_i$$

where: g_i genotype value of trait

a_i net economic value of traits i.

In matrix notation, the index can be expected as:

$$I = \Sigma b_i X_i$$

where X_i phenotypic value of trait I

I number of traits in the index

b_i regression coefficient for X_i.

The information required in constructing a cow genetic index were specified in the following four vectors and three matrices:

y: a vector of additive genetic values for i^{th} yield traits included in the aggregate value

a: a vector of constants representing the relative economic values of yield traits, assuming the relative economic values of milk : fat as 1 : 13 based on prices values for milk and milk butter fat cited from Dairy Facts and Figures (1986). According to Dommerholt and Wilmink (1986), protein value is almost the same as that of fat. Hence, the relative economic values for yields of milk, fat and protein were set to be 1 : 13 : 13. Several authors have concluded that the efficiency of an index is not very sensitive to changes in the economic weights. In this respect, Vandepitt and Hazel (1977) showed comparatively large changes (e.g. by a factor of 2) in economic weights many have small effects on selection efficiency. Moreover, it is possible that a certain degree of variation in relative economic weights milk not change expected selection response very much (Lin and Allaire 1978).

X : a vector of phenotypic measures for the n variables or sources information to be included in the index (i.e., milk, fat and protein).

b : a vector of weighting factors to be used in the index (i.e., partial regression coefficients).

p : a squared matrix of phenotypic variances covariances of three variables in J^{th} variates.

G : a matrix of genotypic covariances between the n variables in J^{th} variates and the it trait in y.
C ; a squared matrix of genotypic variance covariances of y traits.

The partial regression coefficients (b's) were computed as:

$$B = p^{-1} Ga$$

where p^{-1} is the inverse of p (in matrix)

The correlation of the calculated index with the total aggregate genotype (RIH) was estimated as:

$$RIH = b' Ga/a Ga.$$

The expected genetic change (DG) in any trait is the product of the standard deviation of the index (σ_x) multiplied by the intensity of selection (I) and regression of each trait on the index (bYI), i.e. DG = $(\sigma_x)(I)(bYI)$ according to Cunningham (1970).

RESULTS AND DISCUSSION

Correlations

Genetic correlations (r_g) and phenotypic correlations (r_p) between different traits studied for all traits are given in Table 1. Most estimates of (r_g) were similar to the corresponding estimates of (r_p) in directions and were higher in magnitudes. This agree with Ragab et al. (1984) using another herd of Egyptian buffaloes and Singh et al. (1982) using Murrah buffaloes. This reflects the importance of environment and management factors and selection indexes with respect to productive and fertility traits.

Table 1. Estimates of heritability (on diagonal), phenotypic (above diagonal) and genetic (below diagonal) correlation traits*.

Traits	305 dMY, kg	F%	P%
305 dMY, kg	0.39 (0.15)	-0.12	-0.08
Fat (F)%	-0.56 (0.48)	0.03 (0.05)	0.31
Protein (P)%	-0.82 (0.90)	0.05	0.02 (0.03)

*Standard errors of estimates are given in parentheses.

Phenotypic correlations (r_p)

Estimates of phenotypic correlation (r_p) between different traits studied are given in Table 1. The phenotypic correlations between 305 day milk yield (dMY) and percentage traits (fat and protein percentage) fairly low and having negative sign
(-0.12 and –0.08, respectively). These results were similar to other workers (e.g. Singh et al. 1982 in Murrah buffaloes, Vankov and Peava 1982 in

Bulgarian and Murrah buffaloes). While other investigators disagree with the results obtained in the present study (e.g. Soliman et al. 1989 and Hamed and Soliman 1994 in Pinzguar and Fleckvieh cattles).
Positive estimate (0.31) of phenotypic correlation between fat percentage and protein percentage was found (Table 1). The present study is in close agreement with that reported by Ragab et al. (1984) in Egyptian buffaloes, Meinert et al. (1989) and Chauhan and Hayes (1991) in different breeds of dairy animals in different countries.

Genetic correlation

Estimates of genetic correlation (r_g) between different traits studied are given in Table 1. The genetic correlations between 305 dMY and percentage of (fat and protein percentages) were negative –0.56 and –0.82, respectively (Table 1). These correlations are in close agreement with those by Singh et al. (1982) in Murrah buffaloes, Meinert (1989) Santus et al. (1993) and Campos et al. (1994) in different dairy cattle breeds in different countries. While Hamed and Soliman (1994) working on Fleckvich cows found that the r_g between 305 dMY and fat percentage was positive 0.02.

Estimates of genetic correlation (r_g) between fat percentage and protein percentage was positive and 0.31 (Table 1). The present study is in close agreement with estimates that reported by Ragab et al. (1984) in Egyptian buffaloes, Meyer (1985), Cue et al. (1987), Meinert et al. (1989) Chauhan and Hayes (1991), Santus et al. (1993) and Campos et al. (1994) in different dairy cattle breeds in different countries.

Selection index

The phenotypic and genetic variances and covariances given in Table 2 are used to estimate the response to selection for one trait in one generation of buffalo selection. The selection intensity is set to 1.00 for only the purpose of comparative study of different traits under the present study. Expected direct and correlated responses are given in Table 3. These estimates are used to asses the relative effect of direct and indirect selection alternatives. Direct selection on a single traits resulted in higher advances in the designed direction in all traits studied except for protein percentage. Using a percentage fat or protein in 305 dMY as a criterion of selection resulted in a poor estimate of genetic improvement in the yield traits (Table 3) due to tha small value of genetic correlation between the percentage traits and 305 dMY.

Table 2. Phenotypic and genetic components of variance (on diagonal) and covariances (above and below diagonal) for first lactation milk traits of Egyptian buffaloes.

Traits	Phenotypic components			Genetic components		
	M	F	P	M	F	P
Milk (M)	273077	90.5541	-18.4219	107128	45.0442	-2.8303
Fat (F)	90.5541	2.2029	0.17455	45.0442	0.0613	0.1939
Protein	-18.4219	0.17455	0.1821	-2.8303	0.1939	0. 0034

Table 3. Expected direct (diagonal) and correlated response (off diagonal) from one generation of selection of Egyptian buffaloes for single traits*.

Traits	Milk, kg	Fat%	Protein%
Milk, kg	522.56	0.276	-0.093
Fat%	97.07	0.163	0.0020
Protein%	-113.37	0.007	0.030

* Selection intensity equal 1.00

Responses per generation expressed as percentages of the overall means were given in Table 3. Selection for 305 dMY resulted in an increase of 522.26 kg, 0.276% of milk and fat percentage and decrease –0.093% of protein percentage, respectively. Response per generation expressed as percentage of the overall means were 34.58, 5.44 and –2.35%, respectively. Selection for fat percentage compared with selection for 305 dMY, resulted in –28.16, -2.23, 2.35% of 305 dMY, fat percentage and protein percentage, respectively as calculated from Table 3. Selection for protein percentage resulted in –42.08, -5.43 and 2.36% for 305 dMY, fat percentage and protein percentage, respectively. Such procedure will lead to a decrease in generation interval and consequently increasing genetic gain per year. Therefore, selection for 305 dMY is more economic than selection for other traits. Similarly, Ashmawy and Khalil (1990) reported that selection for milk yield alone is more economic than selection for fat or for protein. Also, Dejager and Kennedy (1987) indicated that selection for any yield trait would trend to increase yields of other traits.

Multi-trait selection

For multi-trait selection, the following selection indices (Table 4) were constructed:

$I_1 = 1.599\ X_1 - 6.788\ X_2 + 274.632\ X_3$

$I_2 = 1.572\ X_1 + 18.692\ X_2$

$I_3 = 1.588\ X_1 + 265.342\ X_3$
$I_4 = 1.526\ X_2 - 0.375\ X_3$

Whe : X_1 305 dMY, kg
X_2 fat percentage
X_3 protein percentage

The design of the construction was so drawn that an one side there was an index (I_1 original index) with all the three varieties (i.e , 305 dMY, F% and P%) which was assumed to be 100% efficient in the genetic sense and used for improving aggregate genotype of the three traits and on the other side one or two varieties were dropped to select aggregate genotype.

Table 4. Selection indices (I's) for different traits of Egyptian buffaloes, expected genetic change per generation (EG), in each trait, correlation of index with aggregate genotypic (RIH) and the efficiencies (RE) of different indices relative to the original index (I_1).

	305 dMY, kg		F%		P%		RIH	RE%
	b	EG	b	EG	b	EG		
I_1	1.599	128.87	-6.788	0.14	274.632	0.04	0.63	100
I_2	1.572	81.84	18.692	0.10	-	-	0.60	95
I_3	1.588	27.50	-	-	265.342	0.035	0.54	94
I_4	-	-	1.526	0.10	-0.375	0.0004	0.001	0.00002

Index coefficients (b's)

The index coefficients (b's) are shown in Table (4). These partial regression coefficients indicate that relative emphasis each trait should receive to maximize profitable genetic response and they are nearly similarly to those obtained by Khattab and Sultan (1991) and Hamed and Soliman (1994). Values of 305 dMY were greater than those of other varieties in different indices. This may be attributed to negative and high genetic correlations between this trait and others (Table 1) which appeared in all indices. Also, a trait of high h^2 for 305 dMY in the index will have a high index weight.

Trait expected gain (EG)

The expected genetic gain (EG) in any trait achieved by the index is the genetic standard deviation for the trait multiplied by the correlation coefficient of the index and the genetic value for such trait, assuming selection intensity of one as mentioned before. The genetic improvement (EG) ranged between 27.50 and 128.87 for 305 dMY, between 0.1 and 0.14

for F% and between –0.004 and 0.04 for P% (Table 4), with the range being 101.37 kg for milk, 0.04 for F% and 0.0404 for P%. A large differences is noticed for milk yield, therefore it could be stated that considerable genetic improvement for buffalo productivity might be achieved through selection for milk yield Asker et al. (1966) working on two herds of Egyptian buffaloes, estimated that the genetic improvement for 305 dMY were 199 and 255 pound/year at Sakha and Sids farm respectively. El-Borgy (1986) working on 1838 records of Egyptian buffaloes, reported that the initial milk yield or 305 dMY can be used as a basis for early selection merit as quickly as selection on total milk yield. Gokhale and Nagarcenkar (1981) working on Murrah buffaloes, showed that efficiency of selection on yield in 3 months or 5 months was 1 and 6% more than selection on yield in total lactation and selection on the basis of 120-170 days lactations were also more efficient than selection on total milk yield. It is considered that part of lactation can be used profitability to determine culling policy. In addition, Singh et al. (1987) working on Murrah buffaloes, reported that annual genetic trend for milk yield, 300 day milk yield, age at first calving, service period and body weight at first calving were 58.18 kg, 71.68 kg, 1.95 d, 0.04 mo., 6.39 d and 10.21 kg, respectively. In cattle, Khalil and Soliman (1989) working on Biraunvieh cattle, found that expected genetic gain for milk yield ranged from 414 and 424 kg. Ashmawy and Khalil (1990) working on British Friesian cattle, estimated the expected genetic gain per generation for milk yield ranged from 157.6 and 194.2 kg. Khattab and Sultan (1991) constructed several selection indexes, reported that the expected genetic gain per generation ranged from 88 to 235 kg for 305 dMY, from 21 to 27 d for LP and from –0.36 to –1.96 mo. For AFC.

The maximum genetic improvement in milk yield was achieved, Table 4. The expected genetic gain in 305 dMY increased by 128.87 kg/generation, F% increased by 0.14% and P% increased by 0.04% (Table 4). Selection indexes not included protein percentage (dropped P%, i.e. I_2) increased 305 dMY 81.84 kg and increase F% from 0.10%. Selection indexes not included F% (dropped F%, i.e. I_3) increased 305 dMY 27.5 kg and P% increased by 0.035%. While selection indexes not included 305 dMY (dropped 305 dMY, i.e. I_4) increased F% by 0.1% and decreased P% by –0.0004. Ashmawy and Khalil (1990) showed that genetic improvement ranged between 157.6 and 194.2 kg for milk, between 5.1 and 6.6 kg for fat and between 4.5 and 4.9 kg for protein. A relatively large differences is noticed for milk yield (36.6 kg of milk Vs 1.5 of fat and Vs 0.4 kg of protein). The same authors concluded that the first index (I_1) which included all the variables result in slight increase in the value of the genetic gain over 12 and 13 and relatively high increase compared with 14 or 15 [149 (1) +

6.6 (13) + 4.4 (14) = 293.3]. Correlations coefficients of indexes with total genotypes were around 0.5. However, the lowest in accuracy.

Index accuracy (RIH)

The accuracy of an index is based on its correlation with the tatal aggregate genotype (RIH) where the genetic from use of an index is directly proportional to RIH. The correlations for different indices are ranged from 0.001 to 0.63 (Table 4). Indexes not including protein percentage (I_2) showed less in accuracy 0.60. Including 305 dMY and fat percentage (I_2) was the highest in accuracy (0.60) and it was superior to the original index (I_1) which incorporated all the three traits and assumed to be 100% efficient. In addition, other indexes included protein percentage (I_1 and I_3) are high in accuracy being, 0.54 and 0.63, respectively. Then the selection index I_1 incorporating 305 dMY, F% and P% is the best index and the expected genetic change in one generation through this index will be: (1) increase in 305 dMY by 128.87 kg (2) increase in F% and P% by 0.14 and 0.04, respectively. This index is very simple and easy to construct, therefore, this index was recommend for Egyptian buffaloes if the selection was exercised at the end of the first lactation.

In addition, figures of relative efficiency (RE) given in Table 4 show that the first index had the highest efficiency (100%). Adding fat percentage in the index I_2 the accuracy as demonstrated by I_1 the accuracy of index decrease by 5%. Also, addition protein percentage in the index I_3 decreased by 6%. In this respect, Smith (1967) stated that the main factors controlling the efficiency of index selection are largely determined by the values of the factors of h^2, the product of the economic weight (per standard deviation) and the heritability of each trait, i.e., if one trait dominates the index (for instance milk yield here in), the efficiency will of the other traits, but will be sensitive to the loss or reversal (to negative values) or weights for the originally important trait.

Finally, more research work in this respect is needed by using a new method of techniques and large herds. Considerable genetic improvement for yield traits of buffaloes might be achieved through multiple-trait selection based on reduced index including milk yield with either of fat percentage and protein percentage.

REFERENCES

Ashmawy, A.A. and Khalil, M.H. (1990) Single and multi trait selection for lactation in Holstein Friesian cows. Egypt. J. Anim. Prod., 27 (2): 171-184.

Asker, A.A., Bedeir, L.H. and El-Itriby, A.A. (1966) Genetic improvement in milk yield in Egyptian buffaloes. J. Anim. Prod., U.R.R., 6: 1-7.

Campos, M.S., Wilcox, C.J. Beceril, C.M. and Diz, A. (1994) Genetic parameters for yield and reproductive traits of Holstein and Jersey cattle in Florida. J. Dairy Sci., 77: 867-873.

Chauhan, V.P.S. and Hayes, J.F. (1991) Genetic parameters for first lactation milk production and composition traits for Holstein using multivariate restricted maximum likelihood. J. Dairy Sci., 74: 603-610.

Cunningham, E.P. (1970) Restriction of selection indexes. Biometrics, 26: 67.

Cunningham, E.P. (1977) Multi-stage index selection. Theor-Appl. Genetic, 46: 53.

Dairy Facts and Figures (1986). The Federation of United Kingdom Milk Marketing Board, pp. 121.

Dejager, D. and Kennedy, B.W. (1987) Genetic parameters of milk yield and composition and their relationship with alternative breeding goals. J. Dairy Sci. 70: 1258

Dommerholt, J. and Wilmink, B.M. (1986) Optimal selection responses under varying milk prices and margins for milk production. Livest. Prod. Sci., 14:109.

El-Borgy, E.I. (1986) Genetic improvement in persistency of milk production in buffaloes. Ph.D. Thesis, Fac. of Agric., Mansoura University.

Falconer, D.S. (1981) Introduction to quantitative genetic. 2nd Edition, 49: 879.

FAO report (1990).

Gokhale, S.B. and Nagarcenkar, R. (1981) Inheritance of part yields and their use in selection of buffaloes. Tropic Anim. Health and Prod., 13 (1): 41-47.

Hamed, M.K. and Soliman, A.M. (1994) Single trait selection for 305-day milk fat and protein in Fleckvieh cattle. Egypt J. Anim. Prod. 31: 281.

Harvey, W.R. (1987) Users guide for LSMLMW. The Ohio State Univ., Columbus, Ohio, USA.

Hazel, L.N. (1943) The genetic basis for constructing selection indexes. Genetics, 28: 476.

Henderson, C.R. (1963) Selection index and expected advance statistical genetics and plant breeding by Robison, H.F., 141-163.

Khattab, A.S. and Sultan, Z.A. (1991) A comparison of different selection indices for genetic improvement of some traits in Friesian cattle in

Egypt. J. Anim. Breed. Genet., 108: 349.
Lin, C.Y. and Allaire, F.R. (1978) Efficiency of selection on milk yield to fixed age. J. Dairy Sci., 61 (4): 489.
Meinert, T.R., Krover, S. and van Arendonk, J.A.M. (1989) Parameter estimation of milk yield on composition for 305 days and peak production. J. Dairy Sci., 72: 1534-1539.
Ragab, M.T., Farrag, F.H. and Mostafa, M.A. (1984) Fat and protein percentages in Egyptian buffalo milk and the relations between milk yield and constituents as affected by genetical and nongenetical factors. Indian J. Anim. Sci., 54:12, 1111-1118.
Santus, E.C., Evertt, R.W., Cuaas, R.L. and Galton, D.M. (1993) Genetic Parameters of Italian brown Swiss for levels of herd yield. J. Dairy Sci. 76: 3544-3600.
Singh, R. Chawla, D.S. and Tripathi, V.N. (1982) Genetic estimates of milk yield and its constituents in Murrah buffaloes. Indian J. of Heredity, 14: 1-4, 6-10.
Smith, C. (1967) A note on the improvement of a trait by selection on its components. Anim. Prod. Edinburgh, 9: 127.
Soliman, A.M., Ashmawy, A.A., Khalil, M.H. and Essi, A. (1989) Analysis of milk production of pinzguar cattle in Austria: 1. Nongenetic factors. J.Anim. Breed.
Genetics, 106: 423.
Vankov, K. and Peeva, T.S. (1982) Correlation between the breeding indicators of buffaloes. Zhivotnov dni- Nauki. 19, 7: 30-36.
Vandepitt, W.M. and Hazel, L.N. (1977) The effect of errors in the economic weights on the accuracy of selection indexes. Anim. Genet. Sci., 9: 87.

الملخص العرابي

تقدير المعايير الوراثية والأدلة الانتخابية لبعض الصفات الاقتصادية في الجاموس المصري

منال سعد كساب[1] ، مصطفى عبد الرحمن ابراهيم[1] ، كوثر مراد[2] و ست الحبايب شلبي[2]
١- كلية الزراعة بكفرالشيخ- جامعة طنطا.
٢- معهد بحوث الإنتاج الحيواني- وزارة الزراعة.

استخدمت بيانات الموسم الأول لعدد ٣٥٢ من الجاموس المصري (بنات ٥٦ طلوقة) من مزرعة الإنتاج الحيواني بمحطة محلة موسى بكفرالشيخ والتابعة لوزارة الزراعة بمصر وذلك في الفترة من ١٩٩٠الى ١٩٩٣. وكانت الصفات المدروسة هي محصول اللبن في ٣٠٥ يوما ونسبة الدهن ونسبة البروتين. وتم تقدير المعايير الوراثية والأدلة الانتخابية لتلك الصفات ويمكن تلخيص أهم النتائج التي تم الحصول عليها في الآتي:

١- كانت قيم معاملات الارتباط الوراثي والمظهري بين الصفات المختلفة سالبة وذات قيم منخفضة فيما عدا الارتباط الوراثي والمظهري بين صفتي نسبة الدهن ونسبة البروتين فكانت موجبة.
٢- يؤدي الانتخاب لصفة محصول اللبن في ٣٠٥ يوم الى زيادة متوقعة في محصول اللبن ونسبة الدهن قدرها ٣٤,٥٨ ، ٥,٤٤% أما نسبة البروتين فانخفضت ب ٢,٣٥% كنسبة مئوية من متوسط تلك الصفات على التوالي. أدى الانتخاب لصفة نسبة الدهن بالمقارنة للانتخاب لمحصول اللبن إلى عائد قدره -٢٨,١٦ ، -٢,٢٣ ، ٢,٣٥% لمحصول اللبن ونسبة الدهن ونسبة البروتين على التوالي وأدى الانتخاب لنسبة البروتين بالمقارنة لمحصول اللبن إلى عائد قدره -٤٢,٠٨ ، -٥,٤٣ ، ٢,٣٦% لمحصول اللبن ونسبة الدهن ونسبة البروتين على التوالي وعلى هذا فإن الانتخاب لمحصول اللبن يكون أكثر اقتصاديا من الانتخاب للصفات الأخرى المختلفة.
٣- استخرجت أربع أدلة انتخابية بغرض تحسين الصفات الإنتاجية حيث اشتملت على متغيرين أو ثلاث متغيرات.
٤- أوضحت الدراسة أن الدليل الأول و المحتوي على كل من إنتاج اللبن في ٣٠٥ يوما ونسبة الدهن ونسبة البروتين من أفضل الأدلة (معامل الارتباط = ٠,٦٣ ، الكفاءة النسبية = ١٠٠%) وينصح باستخدام و تطبيق هذا الدليل على قطعان الجاموس المصري حيث أن استخدام هذا الدليل يؤدي إلى زيادة في كمية اللبن بمقدار ١٢٨,٨٧ كجم ، ٠,١٤% زيادة في نسبة الدهن، ٠,٠٤% زيادة في نسبة البروتين وذلك في الجيل التالي.