http://www.pjbs.org

PJBS

ISSN 1028-8880

Pakistan Journal of Biological Sciences

ANSInet
Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Pakistan Journal of Biological Sciences 7 (6): 931-933, 2004
ISSN 1028-8880

Studies on the Genetic Constitution of Black and White Dairy Cattles Raised in Tahirova State Farm

Yahya Tuncay Tuna
Department of Animal Science, Agricultural Faculty, Trakya University 59030 Tekirdag, Turkey

Abstract: In this study 1504 individual milk yield records were analysed to evaluate the breeding potential of dairy cattles raised in Tahirova State Farm. Milk yields records of 468 Black and White cattle were obtained from the period of 1978-1995. Heritability of reproductive (first breeding age-FBE; first calving age-FCA; calving interval-Cl; service period-SP and days in dry-DID) and milk yield (lactation length-LL., 305 day milk yield-305d-MY) traits were estimated from the data. Phenotypic correlation's between reproductive traits and between milk yield traits were also calculated.

Key words: Genetic constitution, dairy, cattle

INTRODUCTION

Milk yield and reproductive performance are crucial factors that have important effects on the profitability in dairy farms[1]. Records of this traits are also important for the breeding programs conducted a national level. Such records are not completely done in Turkey condition except for some private dairy farms that have large herd size. On the other hand, data recording regarding milk yield and reproductive traits has been done for many years in state farm of Turkey, but unfortunately these data have not been used to a greater extent in national breeding programs[2].

In this study genetic constitution of Black and White cattles raised in Tahirova State Farm were evaluated.

MATERIALS AND METHODS

In this study 1504 individual milk yield records of 468 Black and White cattles raised Gönen-Tahirova State Farm were evaluated. Data were obtained from the period of 1978-1995.

First breeding age (FBA), first calving age (FCA), calving interval (CI), days in dry (DID) and service period (SP) data were used as a reproductive traits and lactation length (LL), 305 day milk production (305d-MY) were used as a milk yield trait. Descriptive values of animal materials of Tahirova State Farm were given in Table 1 with the reported average values by Kaymakçi[3] for each traits.

Following linear models were used to the estimation of genetic parameters for reproductive and milk yield traits, respectively.

Table 1: Descriptive values of animal materials

Traits	Average values*	Tahirova herd (x)
FBA	15-18 month	16.6 month
FCA	23-25 month	25.9 month
CI	12-13 month	12.6 month
DID	2 month	2.4 month
SP	60-90 days	3.3 month
LL	-	10.2 month
305d-MY	-	6337.74 lt

*Reported values by Kaymakçı[3]

$$Y_{ijk} = + S_i + YLN_j + e_{ijk}$$
$$Y_{ijk} = + S_i + YLNS_j + e_{ijk}$$

Where;

Y_{ijk} = observed value,
μ = estimated population mean,
S_i = random sire effect,
YLN_j = fixed year, lactation number effect
$YLNS_j$ = fixed year, lactation number, season effect
E_{ijk} = residual

RESULTS AND DISCUSSION

Heritability: Estimated heritability coefficiencies of reproductive and milk yield traits were given Table 2.

Heritability of growth rate is high[4] and FBA and FCA are related traits to growth rate. So it is normally expected that heritabilities of FBA and FCA would also be high in this study, heritability of FBA and FCA were estimated as 0.74±0.14 and 0.81±0.15, respectively. CA, SP and DID traits on the other hand are more affected by environmental factor then the FBA and FCA traits.

Heritabilities of CA, SP and DID traits were estimated as 0.60±0.04; 0.06±0.04; 0.0, respectively in this study. These results of the present study are consistent with those of published studies[5-12,18,19].

Corresponding Author: Dr. Yahya Tuncay Tuna, Department of Animal Science, Agricultural Faculty, Trakya University, 59030 Tekirdag, Turkey E-mail: yttuna@tu.tzf.edu.tr

Table 2: Estimated heritability coefficiencies for the reproductive and milk yield traits of Black and White cattles raised Tahirova State Farm

Traits	Heritability coefficient
FBA	0.74±0.14
FCA	0.82±0.15
CI	0.06±0.04
DID	0.0
SP	0.06±0.04
LL	0.05±0.03
305d-MY	0.27±0.07

Table 3: Phenotypic correlation between the reproductive traits

	FBA	FCA	CI	SP	DID
FBA	1.0000				
FCA	0.9546**	1.0000			
CI	0.0675	0.0678	1.0000		
SP	0.0670	0.0679	0.0999**	1.0000	
DID	0.0673	0.0680	0.4830*	0.4831	1.0000

**P<0.01; *P<0.05

Table 4: Phenotypic correlation between milk yield traits

	LL	305d-MY
LL	1.0000	
305d-MY	0.0213	1.0000

Heritability of milk yield was estimated as 0.27±0.07 in this study. Miglior *et al.*[13] reported that the heritability of milk yield for Black and White cattle was between 0.29-0.30, however Dong and Van Vleck[18,19] found the heritability of milk yield for same dairy breed in first lactation period as 0.27. In a study which was previously conducted in Tahirova State Farm, heritability of milk yield was found as 0.17[14].

Heritability of lactation length was found to be low in this study (0.05±0.03). this is not an unexpected finding because it is largely determined by environmental factors.

Phenotypic correlation's: Determination of first breeding age (FBA) for heifers is highly crucial in dairy production as this age is closely related to growth and future milk yield potential of heifers. The delay in the we of heifers for the first breeding age also affects the genetic progress at the same time[15,16]. Thus the delay in FBA results in the delay in FCA which is directly related to FBA. Correlation coefficiencies between FBA and FCA and between SP an CI were found as 0.95 and 0.99, respectively (Table 3).

High correlation between SP and CI is an expected case because service period length is used for calculating for calving interval[17].

It can be seen from Table 4. That the correlation coefficiency between LL and 305d-MY is low (0.021). This two parameters are heavily affected by environmental factors rather than genetically ones. This has major influence on this relationship.

High genetic variance in respect to FBA and FCA suggest that FBA and FCA can be reduced and this reduction would be possible to some extend. However the use of heifer for breeding at on early stage could have a negative effect on their future milk yield potential. The reason for high heritability of these traits may not be directly based on genetically factors.

The expectation of similar body size in first breeding from the sire families which have low and high mature body weight may cause this variation. Thus the average mature body weight of sire families should be known. In order to reduce economic losses due to the delay of first breeding, first breeding should be performed in view of mature body weight of sire families.

The environment is known to have a major influence on CI, SP and LL. This features are mainly controlled by the former. Service period is a measure of fertility in animal, thus it is expected that genetic variance of this traits is probable it is not suppressing that there was no genetic variance in DID trait which is only controlled by the farmer under conventional condition.

As a result, estimated heritability coefficiencies of different traits in this study should be evaluated with care and the results of this study should be subjected to further studies.

REFERENCES

1. Ensminger, M.E., 1980. Dairy Cattle Science. The interstate Printers and Publishers, INC. Panville, Ilinois, USA.
2. Akman, N. and S. Kumlu, 1999. Developments in Turkish Holstein Breeding. International Animal '99 Congress. 21-24 September 1999. Izmir-Turkey, pp: 9-16.
3. Kaymakçı, M., 1991. Biology of Reproduction Ege. Univ. Agric. Fac., Dept. Anim. Sci. Press No: 503 Izmir-Turkey.
4. Tömek, Ö., 1982. Investigation on Quality of Carcass Characters in Holstein Cattless. Ege Univ. Agric. Fac., Dept. Anim. Sci. Ege Univ., Izmir-Turkey.
5. Christen, K., P. Sorensen and O.A. Veng, 1973. A genetic analysis of 305 day yield in second lactation in Red Danish cattle and Black Pied Danish cattle. Anim. Prod., 16: 17-29.
6. Babona, B.B., K.H. Juma and A.A. Al-Rawi, 1982. Some genetic parameters of important Friesian cattle in Iraq. In'nd world congress on genetic applied to livestock production. 4-8th October 1982. Symposium (1) Madrid, Spain, Editorial Garsi, pp: 145-149.
7. Meijala, N.A., J.C. Milagres, A.E. M.De and A.C.G. Castro, 1982. Effect of genetic and environmental factors on calving interval in brown swiss and holstein friesian cows in central america (Honduras). Revista da sociedale braisileira de zootecnica, 11: 307-319.

8. Lee, H.K., Y.S. Sin, Y.Y. Cho and B.K. Ohh, Studies on estimation of genetic parameters for milk yield and reproductive performance in dairy herds. Korean J. Anim. Sci., 30: 660-665.
9. Milagres, J.C., A.J.R. Alves, J.C. Pereira and N.M. Texeira, 1988. Effect of genetic and environmental factors on milk yield of crossbred holstein, brown swiss, jersey and zebu cows. 2. Milk yield. Revista da sociedale braisileira de zootecnica, 17: 341-357.
10. Sain, K., R.V. Singh, C.V. Singh and Y.P. Singh, 1988. Age at first calving affecting the lactation traits during first three lactation in F1 crossbred cows. Livestock Adviser, 13: 5-10.
11. Arendonk, J.A.M. Van, R. Havonier and W.De. Boer, 1989. Phenotypic and genetic association between fertility and production in dairy cows. Livestock Prod. Sci., 21: 1.1-12.
12. Juma, K.H., T.R. Saad and A. Tikriti, 1990. Performances of Brown Swiss and Friesian in Central Iraq. Proceedings of the 4th world congress on genetics applied to livestock production. XV. Beef cattle, sheep and pig genetic and breeding. 23-27 July 1990. Edinburgh.
13. Miglior, F., E.B. Burnside and B.W. Kennedy, 1995. Production traits of Holstein cattle: Estimation of non-additive genetic variance components and inbreeding depression. Anim. Breed. Abst., 35: 3380.
14. Kumuk, T., 1989. Investigation of Fertility and Milk Yields of Holstein Cattles Raised in Tahirova, Dalaman, Türkgeldi and Sarmısaklı State Farms. E.Ü. Agric. Fac., Dept. Anim. Sci., Ph.D. Thesis, Ege Univ., Izmir-Turkey.
15. Akman, N., 1984. Seminar of Animal Advanced Techniques. 3-9 July 1984. Gönen-Tahirova State Farm, Turkey.
16. Düzgüneş, O. and A. Eliçin, 1986. Principles of Animal Breeding. Ankara.Univ. Agric. Fac., Dept. Anim. Sci. Ankara-Turkey, pp: 978.
17. O'conner, L.M., 1985. Measure and goal of reproductive efficiency. The cooperative Extension Service, The Pensylvania State Universty.
18. Dong, M.C. and L.D. Van Vleck, 1989. Correlations among first and second lactation milk yield. Survival and calving interval. J. Dairy Sci., 72: 1933-1936.
19. Dong, M.C. and L.D. Van Vleck, 1989. Estimates of genetic Environmental (co) variances for first lactation milk yield. Survival and calving interval. J. Dairy Sci., 72: 678-684.