Abstract

The aim of this study was determining optimum bteeding program for Adani goats. To estimate genetic parameters and variance components, especially dominance and epistasis genetic effects, for growth traits in Adani goat, 2068 records that descended from 106 sire and 748 does were collected in a 11 years period (2005-2015) in the Adani Goat Breeding Center of Bushehr Province, were used. Analyses were carried out by Bayesian method via Gibbs sampler animal model by fitting of eighteen different animal models. A deterministic static model which assumes no variation among animals for the important traits was used to determine of breeding objective and economic values. In order to estimate the required parameters (demographic, productive, reproductive, management and economic), for a whole year of production, seven flocks of Adani goats with 920 does were directly recorded. The economic values of the traits were calculated by generating profit equations. In order to compare genetic gain, inbreeding rate and generation intervals from three breeding programs, include open nucleus, closed nucleus and sire reference through stochastic simulation, four levels of herd size, three levels of number of female per male, and four selection indices in three breeding programs includ open nucleus, closed nucleus and sire references were combined to make of 144 scenarios.

Result showed sex of kids, type of birth, age of dam and year of birth showed significant effect on all traits except W9 and W12 traits which type of birth and age of dam were not significant. Direct heritability estimates were 0.347, 0.178, 0.158, 0.359, 0.210 and 0.214 for BW, WW, W3, W6, W9 and W12 traits, respectively. Based on the DIC, maternal permanent environmental effect was significant for BW, WW, W9 traits but maternal genetic effect was significant for W3 and W12 traits. The addition of dominance and epitasis effects to modeles led to significant reduction in DIC almost for all traits and as a proportion of phenotype variance were ranged 0.116 to 0.279 and 0.107 to 0.193, respectively. These result indicate that maternal effects and dominance and epistasis effects on growth traits of Adani goats were important and need to be considered in any selection program for this breed. The estimates of the genetic correlation among traits were positive and ranged from 0.41

for BW-W6 to 0.97 for W6-W9. Also, phenotype correlation between all traits were positive and ranged from 0.16 for BW-W9 to 0.90 for W9-W12. The range of accuracy of breeding values estimated for growth traits with appropriate evaluation models is 0.452 to 0.652, 0.534 to 0.694 and 0.520 to 0.684 for total animals, 10% of best males and 50% of best females, respectively. The accuracy of breeding value estimated for males is more than the females. When dominance and epistasis effects added to models (for all traits), the error variance was reduced and the accuracy of breeding value estimated increased. For all traits, the spearman rank correlation of estimated breeding values was high and depend on the traits and models varied from 0.907 to 1. In many traits, the animal's ranking has changed on the basis of the breeding value compared to the simpler model, and their ranking showed a significant difference with one ($p < 0.01$). The phenotypic trend was positive but the genetic trend was negative. The highest income was the share of kid sales and milk and the largest share of the cost was the management and labor contribution. The traits that were included in the objective goals of the Adani goat including kidding rate, number of kidding per year, doe survival, the weight of the kid sales at 12 months, litter size, conception rate, survival of the kid to weaning, , survival from weaning to sales, milk production and mature doe weight were 25.27, 15.84, 13.04, 12.36, 10.90, 9.9, 8.47, 4.35, 1.23 and -1.45, respectively. In Adani goat, reproduction, survival and production traits were the most important, respectively. Increasing nutrition and management costs by as much as ± 20, the economic values of the traits were less than 20% affected except for the mature doe weight, that its economic value changed by 22%. When the revenues changed by ± 20, the economic values of the traits were equal to or more than 20% of the changes. The highest total genetic gain and genetic gain of traits were obtained in the open nucleus system. The closed nucleus had the lowest generation interval, and it in terms of the inbreeding rate was between the other two systems. The sire reference system had the least amount of inbreeding and maximum generation interval. The generation interval affected by herd size and showed a significant difference in the herd level and increased with increasing herd size. The number of female per male significantly affected the inbreeding rate and

generation interval, but total genetic gain and genetic gain of the traits were less affected, and the high value was observed in the 25 female per male scenario. The selected indices showed a significant effect on the total genetic gain, and the highest value was obtained in index 4 (Weight at selling, Number of kidding per year, Litter size). Considering the size of the herd in the nucleus, significant difference was observed in total genetic gain and generation interval, but the inbreeding rate factor was not affected. In the open nucleus, closed nucleus and sire reference, 300, 300 and 50 herds, and 15, 25 and 35 female per male scenarios were more suitable, respectively. With regard to selection indices in the three breed systems, index 4 was the best because of its simplicity and had more genetic gain.

Keywords: Growth traits, Additive and non-additive genetics, Breeding goals, Economic weights, Breeding strategy

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