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RESEARCH ARTICLE

Reproductive Performance of Saanen Goats under Rural or Intensive Management Systems in Elazığ Region, Turkey

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ABSTRACT

This study was carried out to compare the reproductive performance of Saanen goats under rural (n:75) and intensive (n:206) management systems in Elazığ region. Single and multiple births, stillbirth, dystocia, abortion and kids survival rates were determined in both the goat flocks between February 1 and April 30 2011. Percentages of single and multiple births, stillbirth, dystocia and abortion were not statistically different between the flocks. However, the kids survival rates of intensive management system (74.05%) were lower than rural management system (88.88%), ($P < 0.003$). Overall percentage of single and multiple births, stillbirth, dystocia, abortion and kids survival in all goats were 45.08, 54.92, 17.62, 12.29, 13.16 and 78.40%, respectively. Our results show that rural and intensive management systems do not have an important effect on reproductive performance of Saanen goats.

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INTRODUCTION

Reproduction in goats is described as seasonal; the onset and length of the breeding season is dependent on various factors such as latitude, climate, breed, physiological stage, presence of the male, breeding system and photoperiod (Fatet *et al.*, 2011). The average estrous cycle length, first mating age, kidding age and gestation length of Saanen goats are 21 days, 9-10 months, 13 months and 150 days, respectively (Haris and Frederick, 1996; Fatet *et al.*, 2011). Goats are the most fertile species of the domestic animals, with conception rates in the range of 90% (İnce, 2010).

Goat breeding is more concentrated in developing countries (more than 95% of stock) and tends to be more localized in dry tropical and subtropical areas of poor agricultural potential and even on marginal land (Morand-Fehr and Boyazoglu, 1999; Holtz, 2005; Guerra *et al.*, 2011; Notter, 2012). Goat breeding is economically and socially important in Turkey (İnce, 2010). Goat stock in Turkey in 2010 was around 5,128,290 heads (FAO, 2010). In our country, where hair goat breeding is common in highlands and forestland, goat breeding is done in about 500,000 farm business and this production branch contributes to the income of nearly 3 million people (Dellal and Dellal, 2005). The gradual increase seen in demand for goat products (ice cream, cheese and pasteurize milk) in the

world in recent years has also shown its impact in Turkey. In Turkey, milk goats are raised mainly in Aegean region as well as Marmara and Thrace regions. Saanen goats were brought to Turkey in 1959 and are still being raised as pure and crosses (Koyuncu, 2005). Owing to adaptability to different climatic conditions as one of the most significant characteristics of Saanen race, these species can adapt to different places easily (Özder, 2006).

Reproductive performance of goats is a major determinant of productivity and economic viability of commercial goat farms (Mellado *et al.*, 2006). The reproductive process is regulated by genetic and environmental factors (Mellado *et al.*, 2006; Aleexandre *et al.*, 2010; Guerra *et al.*, 2011; Notter, 2012). Fertility is influenced by prepuberal nutrition, postpartum nutrition, body condition, use of biotechnologies, management system and age in healthy goat flocks (Song *et al.*, 2006; Nunes and Salgueiro, 2011). With excellent management and controlled feeding throughout breeding lifetime, puberty can be stimulated to start at young ages and first parturition can be expected during their first kidding season without reducing life expectancy of does, but increasing productive longevity (Pérez-Razo *et al.*, 2004). Litter size varies depending on breed, parity number, season, and environmental conditions (Holtz, 2005; Mellado *et al.*, 2006). The natural breeding season is limited to autumn and early winter in breeds from temperate zones (Holtz, 2005).

Neonatal kid mortality in goat breeding has an important influence on the productivity of the farm and the sustainability of the flock (Mellor and Stafford, 2004; Konyalı *et al.*, 2007; Nunes and Salgueiro, 2011). Factors that may be implicated in the survival rate of kids include birth weight of the kid, genetics, mothering ability and milk production of the dam, adverse environmental or feeding conditions, diseases and predators (Snyman, 2010). The advanced age, breed, parity, mating season, difficulty in conceiving, low social status and pregnancy with two and more fetuses, previous abortion, malnutrition and low energy intake in dairy goats are described as causes of non-infectious abortions (Mellado *et al.*, 2004).

Total rate single birth of Saanen goat was 41-50% and multiple was 50-59% (Goonewardene, *et al.*, 1997; İnce, 2010). The overall incidence of stillbirth was 0.5-4% for dairy goats (Gaddour *et al.*, 2007). The dystocia rates of Saanen goats were 17% (Konyalı *et al.*, 2007). The overall incidence of abortions was 3-8% for dairy goats (Mellado *et al.*, 2006; Gaddour *et al.*, 2007). The survival rate of Saanen goats at weaning was 79% (İnce, 2010), Saanen X Hair crossbred goats 96% (Şengonca *et al.*, 2003).

This study was conducted to compare the reproductive performance in Saanen goats with two different management systems (rural vs. intensive) in Elazığ region, Turkey.

MATERIALS AND METHODS

This study was carried out between February 1 and April 30, 2011 in Elazığ province of Turkey. Elazığ located at latitude of 38° 40'N, at longitude of 39°14'E, at longitude of 39°14'E and at an altitude of 1067 m. It has a continental climate, with cold and snowy winters and mild and dry summers.

In the study, a total of 281 Saanen goats were investigated. The animals were divided into two groups, one of which was managed with rural system (n:75) and the other was managed with intensive system (n:206). The goats that used in the study had been brought from Çanakkale to Elazığ in 2010. The goats were mated with free mating system between September 1 and September 15, 2010.

Single and multiple (including twins, triplet and quadruplet) birth rates, stillbirth rates, dystocia rates, abortion rates, and kid survival rates between born and 1 month after birth were recorded in both flocks. All manipulations during birth were classified as dystocia. Termination of pregnancy before 130 days was described as abortion.

The goats under rural conditions (n:75) were maintained in free sheepfold with adequate space and shelter. Animals were reared freely on pasture for approximately 8 h daily. Goats were fed a balanced commercial concentrate (200 g/head day) with mineral salt and water *ad libitum*. The goats under intensive conditions (n:206) were confined in a large barn with a metal roof and adequate stroll place. Goats were fed straw and alfalfa (500-600 g/head day) and a balanced commercial concentrate (400-500 g/head day) with mineral salt and water *ad libitum*. Data were analyzed using SPSS for windows packet program. Differences were analyzed using the Chi-Square test.

RESULTS AND DISCUSSION

Table 1 is showing the single and multiple birth rates, stillbirth rates, dystocia rates, abortion rates and kids

survival rates. The total percentages of single and multiple births, stillbirth, dystocia, abortion and kids survival were 45.08, 54.92; 17.62, 12.29, 13.16 and 78.40%, respectively. There were non significant differences between rates of single birth, multiple birth, stillbirth, dystocia and abortion in the two management systems. On the other hand, kids survival rates in rural management system (88.88%) was higher than intensive management system (74.05%). The difference was found statistically significant ($P<0.003$).

Table 1: Reproductive performance of Saanen goats under rural or intensive management systems

| Parameters | Rural System | Intensive System | Total |
|-------------------------|---------------------------|----------------------------|---------------|
| Goat Numbers | 75 | 206 | 281 |
| Single Rate (%) | 37.09 (n:23) | 47.81 (n:87) | 45.08 (n:110) |
| Multiple Rate (%) | 63.91 (n:39) | 52.19 (n:95) | 54.92 (n:134) |
| Stillbirth Rate (%) | 14.51 (n:9) | 18.68 (n:34) | 17.62 (n:43) |
| Dystocia Rate (%) | 16.12 (n:10) | 10.98 (n:20) | 12.29 (n:30) |
| Abortion Rate (%) | 17.33 (n:13) | 11.65 (n:24) | 13.16 (n:37) |
| Kids Survival Rates (%) | 88.88 (n:88) ^a | 74.05 (n:177) ^b | 78.40 (n:265) |

a,b: $P<0.003$ Different letter on the same line is significant.

The rate of single and multiples births in goats varies depending on breed, parity number, season, and environmental conditions (Holtz, 2005; Mellado *et al.*, 2006). Total percentages for single and multiples birth of Saanen goats were found as 41 and 59% by Goonewardene *et al.* (1997), 46 and 54% by İnce (2010), 50 and 50% by Konyalı *et al.* (2004), respectively. The percentage of single and multiples born in Korean native goats were 41 and 59% under natural flock, and 34 and 66% under intensive conditions, respectively (Song *et al.*, 2006). The overall rate of single and multiples born in Toros Alaca goats were 52.8 and 47.2%, respectively (Ceyhan, 2007). The overall percentage of singletons (45.08%) and multiples (54.92%) in the present study were similar to the literature (Goonewardene *et al.*, 1997; Konyalı *et al.*, 2004; Song *et al.*, 2006; Ceyhan, 2007; İnce, 2010).

The overall incidence of stillbirth was found as 4.2% by Mellado *et al.* (2006) and 0.5-4% by Gaddour *et al.* (2007) for dairy goats. The oldest goats were 90% more likely ($P<0.05$) of having stillbirths than the younger does. The risk of stillbirth was also lower in those goats bred in the fall, as compared with goats mated in summer (Mellado *et al.*, 2006). Percentage of stillbirth in this study was higher (rural rate: 14.51%, intensive rate: 18.68%) compared to other researchers (Mellado *et al.*, 2006; Gaddour *et al.*, 2007). It is thought to be related to adaptation and management.

The birth type of Korean native goats was not different in either intensive or natural management system (Mellado *et al.*, 2006). Konyalı *et al.* (2004) reported that the dystocia rates of Saanen goats were 37%. The percentages of dystocia of this study in the intensive and rural management systems were 10.98 and 16.12%, respectively. These results are similar to the findings reported by Mellado *et al.* (2006) and lower to Konyalı *et al.* (2004).

Goats with thinnest, primiparaous, polled, low blood serum Ca and high blood serum urea levels under extensive conditions had a high abortion rate (Mellado *et al.*, 2004). The parity groups 2-5 were half as likely ($P<0.05$) to abort as were primiparaous or older goats. The overall incidence of abortions was 3.5% (Mellado *et al.*, 2006), by other researcher (Gaddour *et al.*, 2007) it was 3-8% for dairy goats. The percentages of abortion of this study in the

intensive and rural management systems were 11.65-17.33 %, this rates were similar to the researcher (Mellado *et al.*, 2004), and was higher according to the others (Mellado *et al.*, 2006; Gaddour *et al.*, 2007; Ceyhan, 2007; Toplu and Altinel, 2008). The reason for this is unclear.

Neonatal kid mortality rates vary in different countries between 7 and 51% (Mellor and Stafford, 2004; Konyalı *et al.*, 2004; Gaddour *et al.*, 2007). Survival rates for Pure Hair and Saanen x Pure Hair crossbred kids at weaning were 82.50 and 90.62%, respectively (Şimşek and Bayraktar, 2006). The kids survival rate at weaning was 76 and 85% for natural and intensive groups, respectively (Song *et al.*, 2006). Taşkın *et al.* (2003) reported that the survival rate of kids until weaning in Saanen and Bornova goats were 82 and 98%, respectively. The survival rate of Saanen goats at weaning was 79% (İnce, 2010), SaanenXHair crossbred goats 96% (Şengonca *et al.*, 2003), Toros Alaca goats 83.5% (Ceyhan, 2007). Snyman (2010) reported that average pre-weaning mortality rate was 11.5% (mortality between birth and weaning at four months of age). The kids survival rates of intensive management system (74.05%) in this study were significantly ($P<0.003$) lower than rural management system (88.88%). The higher total kids mortality in the intensive management system can be explained by substantially management problems such as inadequate and unpracticed farm staff, worse environment conditions, kids nutritional problems and kids bad management.

Conclusion: The majority of the investigated parameters in both flocks were approximately similar. But, the kids survival rate of intensive management system were significantly lower than rural management system. Management system (staff, environment and bad management problems etc) in the flock may affect kids survival rate of Saanen goats. In conclusion, rural and intensive management systems were not observed to be an important factor of reproductive performance of Saanen goats. Additionally, the Saanen goats were found to be adapted to climatic conditions of Elazığ region. The intensive management systems should include trained and experienced staff, a hygienic environment and effective herd health programs. The size of herd in goat breeding could be limited depending on conditions of management.

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