Technical note

Comparison of Alpine and Nubian goats for some reproductive traits under dry tropical conditions

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Abstract

The objective of this study was to compare some reproductive traits of Alpine and Nubian goats under an intensive management system in a dry tropical environment. Goats were kept under confinement in half-covered pens and fed grass hay plus a commercial concentrate. Data were analyzed for kidding interval, prolificacy and gestation length. No significant (p > 0.05) breed effect was found for kidding interval; Alpine averaged 390.7 vs. 414.4 days for Nubian. There was, however, a significant effect (p < 0.01) attributable to year of kidding; means ranged from 284 in 1989 to 590 days in 1994. Prolificacy was significantly affected (p < 0.01) by breed and year of kidding; Alpine and Nubians averaged 1.25 and 1.38 kids per parturition, respectively. Prolificacy ranged from 1.53 in 1989 to 1.39 in 1994. A significant (p < 0.01) breed effect on gestation length was found; means for Alpine and Nubians were 151.6 and 149.2 days, respectively. Kidding interval increased as years advanced, while prolificacy decreased the first 4 years of the study, thereafter began to increase. © 2000 Elsevier Science B.V. All rights reserved.

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1. Introduction

In Venezuela there are ≈1.4 million goats raised mainly in arid and semiarid regions of the Lara, Zulia and Falcon States (Dickson and García, 1991). Most of the goats are raised under a prevailing extensive system, which involves limited feeding and sanitary practices and reproduction is never controlled. In early 1980s, a small group of farmers located in more favorable areas of the country in term of feed supply decided to raise goats under more technical management conditions. To improve productive performance of native Criollo goats, farmers have used bucks of imported breeds such as Alpine, Nubian, Toggenburg, Saanen, and most recently Canarian, or to increase milk production and its by products have imported small herds of specialized dairy goats (mainly from USA).

Kidding interval, prolificacy and gestation length, among others, are traits influenced by genetic, environmental, and management factors. They have eco-
onomic significance since they determine reproductive performance (Terril and Foote, 1987) and the productivity of a goat enterprise. Accordingly, they might determine the preference of breeders for one breed over another within a production system. There is still limited information on reproductive performance of goats from temperate climate performing in the tropics (Chawla and Bhatnagar, 1984; Wilson and Murayi, 1988; Jan and Gupta, 1992; Mourad, 1993) and particularly in Venezuela.

The present study was undertaken to estimate kidding interval, prolificacy, and gestation length in a herd of Alpine and Nubian goats imported from the United States to Venezuela in 1988, and evaluate their reproductive performance when raised under intensive management.

2. Materials and methods

2.1. Animals and management

Data for this study were collected from a goat herd founded initially with 133 does and their progeny maintained in facilities located at El Cují State of Lara, northeast of Barquisimeto (10°04′N and 69°19′W). This region is a valley 420 m asl with average rainfall estimated at 586.9 mm and average temperature of 23.6°C. The region is considered a very dry tropical forest. Data from 1988, the year of importation, were not included in the analysis since they were considered atypical.

The herd was managed under intensive conditions. Goats were kept in six groups according to sex and physiological condition: (1) milking goats on; (2) dried and non-pregnant goats; (3) suckling kids; (4) goats in their last two months of gestation; (5) growing kids; and (6) bucks. Age of initial goats in the herd ranged from 1 to 2 years, and from 1990 on 15 yearling goats were incorporated each year to the breeding herd. Feeding consisted of a constant supply of Buffel (Cenchrus ciliaris) and Star grasses (Cynodon plectostachyus) given as hay. A high energy commercial concentrate ration with 17% CP was given at the rate of: 0.5 kg/day to open and growing females, 1 kg/day to does 2 months before parturition, 1.5 kg/day to milk producing does, 0.3 kg/day to bucks and ad libitum to suckling kids. A complete mineral supplement and fresh water were always available. Osuji (1987) gave additional details on the feeding management.

All goats were treated against internal parasites monthly, and were given dip baths against external parasites every 3 months. Goats were vaccinated against malignant edema, bacteridian carbon, hemorrhagic septicemia and tetanus.

The reproductive management consisted of controlled mating after weaning. Does whose body weight exceeded 25.0 kg were exposed to males for the first time. Bucks were kept in separate pens from females. Heat was detected using teaser bucks kept with the females year-round. Does in heat were exposed twice to a breeding buck selected according to breed and size. The following data were recorded: identification of doe and buck, date of mating, weight of doe after parturition, sex and weight of kid, and date of kidding. Approximately, 10 different bucks were utilized every year. In 1989 and 1990, does were bred to 10 imported bucks; thereafter, bucks born and selected from the same herd were utilized, trying to avoid deliberate inbreeding.

2.2. Statistical analysis

The General Linear Model procedures of the Statistical Analysis System were used (SAS, 1992). Data on kidding interval, prolificacy, and gestation length were analyzed using a mixed model. Independent variables included in the model were breed of doe, doe nested within breed, year of kidding, season of kidding, type of kidding (except for prolificacy) and the interaction between year of kidding and season of kidding. A preliminary analysis showed that the effect of age of doe was not significant. Tukey’s test was used to compare means (Steel and Torrie, 1980).

3. Results and discussion

Differences between Alpine and Nubian were significant for prolificacy \((p < 0.05)\) and gestation length \((p < 0.01)\). Year of kidding had significant effect on kidding interval \((p < 0.05)\) and prolificacy \((p < 0.01)\). All other factors had non-significant effects on the three traits studied.
3.1. Kidding interval

Least-squares means for Alpine and Nubians were 390.7 and 414.3 days, respectively (Table 1). Lower values for this trait were found in the literature for both Alpine and Nubian breeds. Ali et al. (1983) reported 361 and 352 days, respectively, in the USA. Chawla and Bhatnagar (1984) reported 364 days and Silva et al. (1998) reported 345 days for Alpine in India and Mexico, respectively. Whereas for Nubian, Jan and Gupta (1992) reported 337 days in India under intensive management. In Rwanda, Wilson and Murayi (1988) reported a kidding interval of 343 days in Small East African goats and its crosses with Anglo-Nubian and Alpine, and indicated that no significant differences existed among these genotypes. García et al. (1977) mentioned that imported goats of European breeds have much longer kidding intervals (up to 100 more days). On the other hand, Sands and McDowell (1978) have indicated that European breeds performing in tropical conditions have kidding intervals very close to 1 year (345 days).

Year of kidding had a significant effect \((p < 0.01)\) on kidding interval; least-squares means increased linearly from 284.4 days in 1989 to 411.4 in 1993 (Table 1). The sudden and unexpected increase observed in 1994 (590 days), cannot be reasonably explained other than the possibility of management and climate factors. Other authors have also found a significant effect of year on kidding interval (Wilson and Light, 1986; Wilson and Murayi, 1988; Odubote, 1996). Generally, important changes in climatic conditions from one year to the next such as rainfall and temperature, as well as feeding and health practices, can be the main causes of year effect.

3.2. Prolificacy

Least-squares means for prolificacy for Alpine and Nubian does were 1.25 and 1.38 kids/kidding, respectively (Table 1). A higher prolificacy of Nubian does over that of Alpines (1.64 vs. 1.41) was also found by Jan and Gupta (1992) in India. Mourad (1993) reported an average of 1.45 for Alpine does, while Cabello et al. (1992) reported a value of 1.86 for Nubians. In Rwanda, Wilson and Murayi (1988) reported that differences in prolificacy among SEA goat and its crosses with Anglo-Nubian and Alpine were not significant (overall mean 1.75).

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Prolificacy decreased from 1.53 in 1989 to 1.22 in 1992, and then increased to 1.33 in 1993 and 1.39 in 1994 (Table 1). Odubote (1996) found that litter size in...
West African Dwarf goats was significantly affected \((p < 0.05)\) by year of kidding.

### 3.3. Gestation length

Gestation length was 151.6 for Alpine and 149.2 for Nubian does \((p < 0.01)\). Chawla and Bhatnagar (1984) showed that the differences between Alpine and Saanen does in gestation length were not significant. However, Gangwar and Yadav (1987) reported a significant effect \((p < 0.05)\) on gestation length when comparing four breeds of goats in India (mean 145.1 days). Montaldo et al. (1987) also found a significant breed effect \((p < 0.05)\) on gestation length in Alpine, Nubian, Saanen, Toggenburg and Granadina goats under stall feeding in Mexico; in that study, Alpine does had a longer gestation length (152 days) than Nubians (151 days). Similar differences between Alpine and Nubian were reported by Ali et al. (1983). Jan and Gupta (1992) found that gestation length of Alpine (151 days) was one-day longer than in Nubian. This is probably an effect attributable to differences in body size among breeds, since there is a trend toward increased gestation length from small to large breeds (García and Gall, 1981).

The non-significant effect of type of kidding on gestation length found in the present study is in agreement with that found by Chawla and Bhatnagar (1984) and Gangwar and Yadav (1987); however, Montaldo et al. (1987) reported that gestation of single (152 days) and twin births (151 days) were longer than that of triplet birth (149 days).

### 4. General discussion

The main reason to import Alpine and Nubian goats into Venezuela was to increase milk production. Steinbach (1987) pointed out the need to evaluate imported breeds for their productive potential in the new environment and under management levels which are economically feasible, and added that ‘the performance of high-yielding exotic breeds is likely to suffer, to a variable degree, in a new, more stressful environment’. Kidding interval and prolificacy (except the last 2 years) deteriorated as years progressed. From crosses of Alpine, Nubian and Toggenburg goats with Criollos, García et al. (1977) reported that the reproductive performance of these European breeds was generally reduced in dry tropical areas because of the environmental stress and, more importantly, inadequate nutrition. In this study, feeding and health management was considered to be appropriate, thus, the possibility of a nutritional stress is unlikely. Therefore, it is possible that stressful forces that affected this herd were due mainly to climatic or management factors.

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### References


