

Public Abstract

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Title:Selection for Parasite Resistance in Kiko x Boer goats

In the United States, goat production has increased over the last three decades because of their economic value as efficient converters of low-quality forages in quality meat, milk, and hides for specialty markets. However, the prevalence of gastrointestinal nematodes is a major challenge for goat producers as it is a leading cause of health issues and death loss, especially since goats are more susceptible to internal parasites than any other farm ruminants. However, one practical and most sustainable approach to combatting internal parasites is to select naturally immune goats. Therefore, the objectives of this study were to estimate genetic parameters for parasite resistance, reproduction, growth, and carcass traits in a closed line of Kiko x Boer goats divergently selected for parasite resistance. Beginning in December, 2011, 146 mixed-age Boer and high percentage Boer does (B) were assigned to one of two selection lines: a high line (HL) selected for high resistance to internal parasites and a low line (LL) selected for low resistance to internal parasites. All available parasite-related data collected were used to calculate Expected Progeny Differences (EPD) to rank and sort does into each corresponding line. Twelve unrelated Kiko (K) bucks were purchased on the basis of parasite resistance (six high and six low), as indicated by mean fecal egg count (FEC). After this, lines were closed and all selection was from within line. Kiko bucks were exposed to each corresponding doe line in separate breeding pens beginning in December each year from 2011 to 2013 to produce F1 K x B progeny. The F1 doe progeny from K x B matings were selected prior to the breeding season based on parasite resistance as determined by FEC EPD. Selected F1 K x B HL and LL does were then backcrossed within line to K bucks to produce F2 $\frac{3}{4}$ K x $\frac{1}{4}$ B progeny. Since parasite resistance cannot be measured directly, in order to evaluate parasite load indicator traits such as FEC, packed cell volume (PCV), and FAMACHA[©] scores were measured monthly on all animals from weaning up until breeding. Genetic parameters for parasite resistance, reproduction, growth, and carcass traits were estimated using ASREML statistical procedures. Heritability estimates for FEC, PCV, and FAMACHA[©] score were 0.13, 0.06, and 0.11, respectively. Correlations between FEC and FAMACHA[©] were large and positive ($r = 0.46$), while correlations between FEC and PCV and FAMACHA[©] and PCV were slight ($r = 0.00$ and $r = -0.09$, respectively). Adjustment for kid sex, type of birth (for birth weight) type of rearing (for weaning weight), and age of dam (for litter size, birth, and weaning weight) were made on performance traits to correct for non-genetic effects and resulted in heritability estimates of 0.23 for litter size, 0.18 for birth weight, and 0.17 for weaning weight. Positive genetic correlations ($r = 0.24$) were also found between direct birth weight and weaning weight. Heritability estimate for final live weight was 0.58, 0.14 for hot carcass weight, and both loin eye area and shear force estimates were skewed (1.00) because of insufficient records. Results of this study indicate that parasite resistance may be lowly heritable, suggesting that selection progress would be possible, yet slow. It appears that anthelmintic resistance issues may be abated through genetic selection based on parasite resistance.