

Research Application Summary

Genetic and non-genetic factors influencing production in two boer goats studs

King, F.J.M.¹, Fair, M.D.² & Neso, F.W.C.²

¹Instituto de Investigação Agrária de Moçambique, Av. das FPLM, 2698; Caixa Postal: 3658, Maputo, Moçambique

²Department of Animal Wildlife and Grassland Sciences, University of the Free State, P. O. Box 339, Bloemfontein, 9301, South Africa

Corresponding author:

Abstract

The effect of genetic and environmental factors on weaning and post-weaning traits of boer goats was studied using 3233 records collected from 1998 to 2008. Least square analysis was used for estimation of environmental effects. Genetic parameters were estimated using ASREML. All fixed effects were significant ($P < 0.05$) for both traits. The direct heritability estimates varied from 0.24 for weaning weight to 0.31 for post-weaning weight. The corresponding maternal permanent environment due to the dam was 0.11 and 0.44, respectively. The maternal heritability (0.03) for weaning weight was lower than its corresponding direct heritability.

Key words: Boer goat, heritability, post-weaning weight, weaning weight

Résumé

L'effet des facteurs génétiques et environnementaux sur les caractéristiques de sevrage et de post-sevrage des chèvres de Boer a été étudié en utilisant 3233 enregistrements collectés de 1998 à 2008. L'analyse du moindre carré a été employée pour l'évaluation des effets sur l'environnement. Des paramètres génétiques ont été estimés en utilisant ASREML. Tous les effets fixes étaient significatifs ($P < 0.05$) pour les deux caractéristiques. Les évaluations directes d'héritabilité ont changé de 0.24 pour le poids de sevrage à 0.31 pour le poids de post-sevrage. L'environnement permanent maternel correspondant dû à la mère était 0.11 et 0.44, respectivement. L'héritabilité maternelle (0.03) pour le poids de sevrage était inférieure à son héritabilité directe correspondante.

Mots clés: Chèvre de boer, héritabilité, poids après sevrage, poids de sevrage

Background

Meat is one of the primary incentives for goat husbandry in South Africa and the Boer goat is one of the most numerous goat breeds, accounting for about 30% of all commercial goats.

To maximize goat production genetic and non-genetic factors need to be identified and accurately estimated. The present study evaluated effects of some non-genetic factors on body weight of Boer goat and estimated the genetic factors for these characteristics.

Literature Summary

Growth is one of the most important traits for meat production. It is therefore used as the main selection criterion (Archer *et al.*, 1998; Olivier, 2002). Early growth is influenced by genes of the individual, maternal environmental and non-genetic effects (Albuquerque and Meyer, 2001). Maternal influences can be due to the dam's own genotype for milk production and mothering ability and maternal permanent environmental effects (Lewis and Beatson, 1999). Some of non-genetic factors known to affect growth include age of dam, herd, birth year, lamb's sex, birth type and season (Neser *et al.*, 2001; Rashidi *et al.*, 2008). Identification and evaluation of factors that have an effect on production performance resulted in more accurate estimations of an animal's genetic potential (Van Wyk *et al.*, 1993; Rashidi *et al.*, 2008).

Study Description

The edited data comprised of 3233 records for weaning and post weaning weights collected between 1998 and 2008 in two boer goat studs. Data were analysed using (PROC GLM) of (SAS, 2006) to estimate the effect of sex, age of dam at kidding, herd year of birth, season of birth, type of birth and age of the kids as a covariate for weaning weight (WW) and post-weaning weight (PW). (Co) variance components and genetic parameters were estimated using ASREML (Gilmour *et al.*, 2002) by fitting seven different single-trait animal models (M1 to M7).

Research Application

The fixed models explained 31% and 80% of the phenotypic variances in weaning weight and post-weaning weight, respectively. The effects of sex, type of birth, age of dam, year of birth, herd, season and age of kid, were significant ($P < 0.05$) for both traits.

Heritability estimates varied substantially in this study. Direct heritability estimates for WW and PW were moderate and increased with age from 0.24 to 0.31, respectively. The maternal heritability estimates (0.03) for weaning weights were lower than the direct heritability. The permanent maternal environmental effects were low to moderate and varied from 0.11 for WW to 0.44 for PW.

Table 1. Overall means (standard deviation) and test of significance for weaning and post-weaning weights.

Fixed effects	Df	WW(kg)	PW(kg)
Overall mean		21.65 (4.36)	35.68 (5.45)
Age of kid	1	**	**
Sex of kid	1	**	**
Year of kidding	10 ^a	**	**
Herd	1	**	*
Season	2	**	**
Age of dam	2	**	*
Type of birth	2	**	**
R ² (%)		31	80

Df = degree of freedom; WW = weaning weight; PW = post-weaning weight; a = 8 df for PW; * = P<0.05; ** = P<0.01.

Recommendation

The results suggest that adjustment for environmental effects need to be accounted for in the estimation of genetic parameters and prediction of breeding value for body weight in Boer goat. The magnitude of heritability estimates for weaning and post weaning indicated that these traits would respond to selection.

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