Body weight and preweaning growth rate of pure indigenous, Toggenburg goat breeds and their crosses under smallholder production systems in Kenya

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Introduction Livestock improvement programmes involving smallholder farmers have not been common in the past particularly where cross-breeding is involved, partly because smallholders have no infrastructure to support a cross-breeding programme. FARM-Africa has introduced an alternative approach, the community based goat improvement programme, with smallholder farmers. The objective is to increase the productivity of the local goats in the eastern highlands of Kenya, thereby increasing the livelihood and welfare of the smallholder farmers. The strategy has been, to use the farmers self-help groups as an entry point to the community. Activities include the establishment of buck stations, for cross-breeding with local goats, breeder units for the production of pure Toggenburgs in the groups and the formation of a farmers organization to manage and coordinate the improvement activities and ensure sustainability of the programme. The benefits that farmers enjoy include faster growth rates and milk from the cross-bred goats.

Material and methods Data on reproductive and growth performance was collected on goats of various genotypes from all farm records of participating farmers in a community-based dairy goat genetic improvement and health care project, being undertaken by FARM-Africa in collaboration with the government of Kenya, in Meru District in central Kenya. The goat genotypes included the exotic dairy Toggenburg (T) breed, the indigenous meat breeds, including the East African (EA), and the F_1 cross-breds arising from mating Toggenburgs with EA and Galla (G) indigenous goat breed, as well as the products of back-crossing the F_1s (TxEA and TxG females) to the Toggenburg males. The detailed mating plan and project's approach is given elsewhere (Ahuya,, 1997). The farmers are grouped into voluntary farmer- groups, with each group sharing in breeding bucks, to which all their does are mated. The group members also share common basic animal healthcare services and technical advice from the local extension staff on goat husbandry and forage technologies. The kids were weaned at an average age of 120 days. This paper presents and discusses, the comparative birth weights, 60-day weights and average daily gains of goat kids of the various genotypes. Least squares analysis of variance was performed using GLM procedures of SAS (Version 8), (SAS, 2001) to investigate the effects of year of birth, genotype, agro-ecological zone, sex, type of birth and farmer-group on single birth weight, 60-day kid weight and average pre-weaning daily gains of the kids.

Results Least squares means and their standard errors for birth weights, 60-day weights (Table 1), and average daily gains (Table 2), for the various genotypes are presented. Toggenburg kids were superior to the other genotypes in all the growth traits, while the East African kids' performance level was the lowest for all traits, with the F_1 kids, as expected, being mid-way between their parental means for birth and 60-day weight, but much higher than their mid-parental means for average daily gain. The Toggenburg kids were twice as heavy at 60-days and gained two and half times as much weight as their East African counterparts up to weaning. The back crosses, with the exception of the ¾Toggenburg- ¼ Galla were not significantly (P>0.01) different from the F_1s in all the traits. These findings are consistent with, and slightly better than earlier results on cross-bred goats involving the same breeds and breed levels (Ahuya, 1987; Ruvuna et al., 1988; Ruvuna et al., 1992; Okeyo et al., 1999). In the earlier studies, as in this study, it was observed that crossing of Toggenburg with Galla goats resulted in a heavier and faster growing animals than when the former was crossed to the East African goat. However, the East African goats are more tolerant and resilient to the local diseases and gastro-intestinal parasites (Okeyo, 1985; Baker et al., 1998), hence the need to have a combination of all the three breeds (EA, G and T).

Conclusions The results of this study demonstrate that crossing of the Toggenburg dairy goat breed with the indigenous Kenyan meat goat breeds is economically beneficial, as it results in significant improvements in growth rate and meat production potential. Reasonably high growth rates are achieved at farm level, and are better than those achieved at experimental stations, hence community-based breed improvement programmes have merits.

Table 1 Least squares means (± standard errors) for birth and 60-day weights of East African (EA), Toggenburg (T) and crosses between Toggenburg and EA or Galla (G) goat kids.

Genotype	No. of observations	Birth weight (kg)	Weight at 60 days (kg)
East African (EA)	357	2.98 ± 0.21	6.32± 0.15
Toggenburg (T)	329	3.72 ± 0.19	13.51± 0.34
T x EA	575	3.42± 0.04	9.87± 0.65
T x Galla	143	3.56± 0.06	10.34± 0.21
¾ T ¼ G	74	4.10± 0.38	11.54± 0.36
¾ T ¼ EA	98	3.57± 0.35	10.62± 0.08

Table 2 Least squares means (± standard errors) for average daily gain (g) of East African (EA),Toggenburg (T) and crosses between Toggenburg and EA or Galla (G) goat kids.

Genotype	Number of observations	Average daily gain (ADG) (gm)
¾ T ¼ EA	175	121± 0.05
¾ T ¼ G	86	149± 0.03
TxEA	467	129 ± 0.67
Toggenburg (T)	256	230± 0.42
East African (EA)	193	89± 0.43

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