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**Identification systems and selection criteria of pastoral goat keepers in northern Kenya-  
Implications for a breeding programme**

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**Abstract**

The objective of this study was to describe and assess the animal identification systems and selection criteria among pastoralist goat keepers (the Rendille and the Gabra) in Marsabit district of northern Kenya. Data on identification modes and selection criteria were collected from a total of 200 respondents (100 from each community) in a four month field survey using semi-structured and structured questionnaires. Data were analyzed through calculation of indices, which represented a weighted average of all rankings of a particular variable. Ranks were based on the first three choices of priority records, identification modes and characteristics by the respondent. The index was derived as the sum of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] for a particular variable divided by sum [3 for rank 1 + 2 for rank 2 + 1 for rank 3] for all variables in question. The most important records kept are dates of birth, castration and entries into the flock from outside. Other records like dates of weaning, culling, performances, health and exits are also kept but ranked lower. Most of the animal identification is done through ear notching, branding and coat colour of the animals. Selection criteria with index 0.200 were considered important and included big body size (Rendille, 0.260; Gabra, 0.251) and milk yield (Rendille, 0.206) for the buck's dam. Big body size (Rendille, 0.264; Gabra, 0.245) and offspring quality (Rendille, 0.252; Gabra, 0.265) were considered important attributes for the buck's sire. Less attention was paid to individual phenotypes of the buck because selection is done at juvenile age. The results from this study imply that pedigree and performance recording has been practiced through intricate knowledge. It was apparent that the pastoralists have deliberate selection criteria. Productive and adaptive traits are important in the selection of breeding stock. In general, this study provides a framework needed for the development of community-based genetic improvement programmes.

**1. Introduction**

Indigenous goats are predominantly kept under pastoral production systems in arid and semi-arid areas. In these systems, traditional indigenous knowledge pertaining to management and breeding practices is applied. Pastoralists also have a deep understanding of how to influence goat populations with regard to desired characteristics under their respective environmental conditions. As the pastoral people pass their knowledge and cultural identity orally from one generation to the next, their animal related knowledge is not systematically documented to the understanding of outsiders. Presently, community-based genetic improvement strategies are being advocated for pastoral production (Kahi et al., 2005). These strategies would require a good understanding of the community's indigenous knowledge of their animals (Köhler-Rollefson, 2003). Among the important subjects are the identification systems and selection criteria. These issues, particularly for small ruminants, have hardly been studied and/ or formally reported for

the pastoral Rendille and Gabra communities of northern Kenya. The present study describes and analyses the two communities' goat identification systems and selection criteria.

## 2. Materials and methods

The study was carried out in Marsabit district of northern Kenya. The area lies between latitude 1° 15' North and Longitude 36° 3' East and 38° 59' East. The Rendille and the Gabra communities predominate this district. Data on the identification systems and the goat breeding practices were collected in a four-month field survey using structured and semi-structured questionnaires. A total of 200 respondents were interviewed, 100 each from the Rendille and the Gabra sites. Indices were calculated to rank records, identification modes and traits perceived by the herders as important according to the formula: index = sum of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] for a particular variable divided by sum [3 for rank 1 + 2 for rank 2 + 1 for rank 3] for all variables in question.

## 3. Results and discussion

### 3.1. Animal identification systems

Table 1 shows the records kept by the pastoralists and identification systems used to ensure smooth management of their flocks. Those variables mentioned in first, second or third places were considered most important. The most important records kept by the pastoralists are dates of birth of their animals, castration and entries into the flock from outside. Other records like dates of weaning, culling, performances, health and exits are also kept but ranked lower. In an endeavour to differentiate within and without flocks, the most important identification system included branding, ear notching and coat colour of the animals. Matrilineal naming and recall system is also used but ranked lower. It was clear that whatever system used, the herders are able to identify a particular animal throughout its lifespan.

Table 1. Ranking of records and identification systems of the Rendille and the Gabra pastoral communities

Item	Rank (%)			Sum (1,2,3)	Index
	1	2	3		
<b>Records</b>					
Date of birth	24.5	14.5	8.5	47.5	0.1881
Date of weaning	4.5	2.5	4.5	11.5	0.0389
Castration	19.0	22.0	31.0	72.0	0.2237
Culling	1.5	4.0	3.0	8.5	0.0262
Performance	16.0	12.5	5.0	33.5	0.1322
Health	1.0	10.5	19.0	30.5	0.0728
Entries	23.0	14.5	11.0	48.5	0.1847
Exits	9.0	18.0	15.5	42.5	0.1330
<b>Identification system</b>					
Matrilineal naming system	16.5	0.5	9.0	26.0	0.1007
Colour	10.5	8.0	45.5	64.0	0.1498
Recall system	6.5	9.0	17.5	33.0	0.0923
Ear notching	64.0	24.5	5.0	93.5	0.4093
Branding	2.5	58.0	23.0	83.5	0.2479

### 4. Selection criteria

Table 2 presents the ranked characteristics of the new buck's dam considered by the Rendille and the Gabra in selection. Only characteristics mentioned in first, second or third places were considered. Characteristics with sum of rank  $\leq 1$  are not included and these included temperament, meat quality, mohair, skin, milk problems and lack of dystocia in both communities, and prolificacy among the Gabra. The most important characteristics of the new breeding buck's dam were big body size, milk yield, and offspring quality for the Rendille pastoralists. For the Gabra, big body size, drought tolerance and offspring quality were considered most important.

Table 2. Ranked characteristics of the new buck's dam considered by the Rendille and the Gabra herders (n = 100 respondents each) in selection

Characteristic	Rendille					Gabra				
	Rank 1	Rank 2	Rank 3	Sum	Index	Rank 1	Rank 2	Rank 3	Sum	Index
Big body size	29.0	27.0	14.0	70.0	0.260	29.0	24.0	16.0	69.0	0.251
Conformation	7.0	5.0	2.0	14.0	0.055	7.0	5.0	5.0	17.0	0.060
Coat color	3.0	2.0	2.0	7.0	0.026	2.0	-	2.0	4.0	0.013
Good body health	7.0	11.0	3.0	21.0	0.077	-	2.0	-	2.0	0.007
Drought tolerance	12.0	10.0	7.0	29.0	0.106	25.0	21.0	19.0	65.0	0.226
Fertility	1.0	-	1.0	2.0	0.007	2.0	1.0	4.0	7.0	0.020
Prolificacy	5.0	-	2.0	7.0	0.032	-	-	-	-	-
Horns	1.0	3.0	5.0	9.0	0.023	2.0	3.0	-	5.0	0.020
Milk yield	16.0	26.0	23.0	65.0	0.206	12.0	24.0	22.0	58.0	0.176
Mothering ability	3.0	4.0	7.0	14.0	0.040	1.0	3.0	3.0	7.0	0.020
Offspring quality	14.0	9.0	33.0	56.0	0.156	28.3	26.7	45.0	100	0.183
Udder	1.0	-	2.0	3.0	0.003	4.0	-	1.0	5.0	0.023

The ranked characteristics of the new buck's sire considered by the Rendille and the Gabra in selection are given in Table 3. For the Rendille, important characteristics of the new breeding buck's sire were big body size, offspring quality and mating ability. The Gabra mentioned big body size, offspring quality and drought resistance as the most preferred traits.

Table 3. Ranked characteristics of the new buck's sire considered by the Rendille and the Gabra herders (n = 100 respondents each) in selection

Characteristic	Rendille					Gabra				
	Rank 1	Rank 2	Rank 3	Sum	Index	Rank 1	Rank 2	Rank 3	Sum	Index
Big body size	23.0	40.0	10.0	73.0	0.264	27.0	26.0	14.0	67.0	0.245
Muscular/strong fighter	13.0	11.0	13.0	37.0	0.123	15.0	5.0	5.0	25.0	0.100
Coat color	5.0	1.0	6.0	12.0	0.038	-	-	-	-	-
Offspring quality	31.0	24.0	11.0	66.0	0.252	28.0	30.0	15.0	73.0	0.265
Drought tolerance	2.0	5.0	8.0	15.0	0.040	14.0	10.0	11.0	35.0	0.121
Disease resistance	1.0	-	4.0	5.0	0.012	-	1.0	2.0	3.0	0.007
Temperament	2.0	-	-	2.0	0.010	-	-	-	-	-
Meat quality	-	1.0	1.0	2.0	0.005	-	-	-	-	-
Beauty	2.0	-	3.0	5.0	0.015	4.0	5.0	8.0	17.0	0.050
Mating ability	20.0	13.0	32.0	65.0	0.196	7.0	11.0	23.0	41.0	0.110
Fertility	1.0	1.0	4.0	6.0	0.015	1.0	1.0	1.0	3.0	0.010
Visual assessment	2.0	3.0	7.0	12.0	0.032	5.0	10.0	19.0	34.0	0.090

## 5. General considerations and conclusions

Generally, identification systems contribute to improved management of animals on the farms. In the long term, analysis of such records enables genetic evaluation of animal populations to be done. For most indigenous populations, this activity can contribute to value addition of the farmers' animals. Different communities have strong attachment to various identification modes, which do not infringe on their traditional norms and cultures. Ear notching and branding were the major identification systems among the pastoral communities. This implies that there is no need to use ear-tags, banding, or any other artificial identification markers that conflict with the traditional beliefs of these pastoral people.

Conventionally, the criteria investigated in this study were for the selection pathways dams to breed sires (DS) and sires to breed sires (SS). In breeding programmes for most species, animals in DS and SS selection pathways are selected very intensely with a higher accuracy than in the other selection pathways. Selection is based on breeding values estimated using either a selection index or, if possible, best linear unbiased prediction (BLUP). Depending on the traits under considerations, these procedures require information on the performance of the individual

and its relatives. Such procedures are too complex for the pastoralist to apply but this should not be misconstrued to mean that they do not consider the performances of the individual and its relatives when selecting animals to be parents of the next generation. The pastoral communities involved in this study predominantly did individual and family selection, with much attention paid to the latter. Body size, offspring quality, milk yield and drought tolerance were important qualities of the potential new buck's dam (DS). On the buck's sire (SS), body size, offspring quality, mating ability and drought tolerance ranked highly.

In pastoral flocks, high mobility, and shared pasture and watering facilities do not reduce independence, especially with regard to breeding decisions. Recent studies (e.g., Kosgey et al., 2006), indicate that there is great scope for conservation, genetic improvement and utilisation of the indigenous small ruminants in Kenya, which makes village-based breeding programmes become attractive. Pure breeding programmes in developing countries are mostly designed as open nucleus breeding schemes (Jaitner et al., 2001). In order to set up a breeding programme for indigenous small ruminants, the predominant production system has to be well characterised. The results obtained in the present survey provide information for deciding how to approach small ruminant herders in order to establish community-based breeding programmes. The basic steps would include the clear definition of terms of membership, an agreement on the objectives of the breeding scheme, the formulation of appropriate breeding goals, the formation of a breeding or foundation stock, screening of the candidate animals and the contribution of animals to the nucleus herd (Wollny, 2003).

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