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Evaluation of Management and Performances of Dairy Goats in Aridlands of Northern Kenya, Marsabit County

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Abstract
A study aimed at establishing feeding management and performances of dairy goats in arable pockets of Marsabit County in arid lands of northern Kenya was conducted in six sites. Semi-structured questionnaire was used to collect data from randomly selected individual dairy goats keepers, dairy goats rearing groups and development agents who supported dairy goats production. The data was entered and analyzed using the SPSS version 10.5. The study established that, 93.3% of farmers rely on natural forages to feed their dairy goats and about 50% of dairy goats keepers lacked appropriate management skills. The study further established that about 70% of the farmers on Mt. Marsabit and 64.3% in Kalacha owned conserved fodder plots, of natural pastures, lack of storage sheds was noted among key constraint to storage. Mineral supplements were provided by all farmers on Mt. Marsabit and only 14.3% in Kalacha. The age of reproductive maturity for female Alpine was is 10.7±2.3mo and 10.5±1.7mo was comparable to young cross breeds at 10.5± 2.01mo and 13.2± 2.1mo in the oases and mountain areas, respectively. Crosses had shorter kidding intervals (7.13± 1.47mo in Kalacha and 6.54±1.19moon Mount Marsabit) than Alpines (8mo in Kalacha and 7.77± 1.03mo in the mountain). The average milk yields for alpine, crosses and local goats were 2.62, 1.43, and 0.64 kg/day, respectively. In conclusion, Alpine and crossbreed goats have high milk yield than the local goats. This implies that dairy goats production in arable pockets is a viable project which can be integrated with crops. Unlike other indigenous goats and livestock which move from place to place in search of pasture and water, dairy goats are kept in intensive or semi-intensive systems in farms i.e. the keepers would always access milk from daily goats and by extension households' food security is increased. Children in sedentarized pastoral farming households would feed on this milk and thus their nutritional status enhanced. The household food and nutrition security is also increased as households keeping dairy get income from sale of milk and breeding stock.
Keywords: Dairy goats, Marsabit, arable pockets, northern Kenya, feeding management, performances**.**

1. Introduction

The role of goats in the economies of developing countries and their contribution to the livelihoods of many resource-poor small holder farmers cannot be overemphasized (Owen et. al., 2005). Goats and also sheep production, provides one of the practical means of using the vast arid and semi-arid areas, where crop production is impractical (Baker and Rege, 1994). In Kenya, sheep and goats accounts for 30% of red meat and nearly 98 million litres of milk consumed in the country (Cheruyot, 2004). In upper eastern of Kenya where Marsabit county is located, there 1.9 million sheep and 4.7 million goats (CBS, 2009). Goats score higher over other livestock species as they have multiple functions and advantages. They have low initial and maintenance costs, can survive on scarce feed and water resources, have rapid market turnover rate and therefore enhances household income, and produce year-round milk and meat for households. Goats show lower drought related mortality rates than cattle, and post-drought and post-disease recovery is much faster. In the arid and semi-arid lands of Kenya inhabited by pastoral and agro-pastoral communities, they provide meat, milk, skin, manure and also play a very important socio-cultural role (Ben Salem, H. and T. Smith, 2008). However, in these areas recurrent droughts have decimated pastoralists of their livelihoods especially cattle where previously kept in study areas , increasing sedentarisation, changes in land use pattern and the rapid population growth has led to increasing food insecurity. Hence dairy goats rearing offers an option in supply of milk, meat and income through sales of offspring/breeding stock to the households keeping them. Improving the performance of goats can directly improve the diet and the standard of living of many households because these animals are inherently well suited to the needs of the small holders and pastoralists and to the dry conditions.

The demand for dairy goats in Kenya as an emerging source of milk is growing very fast (Ogolla *et al,* 2010) and the current population of dairy goats was approximately one hundred and eighty thousand (GTZ-PSDA, 2011). Dairy goat breeds (*Saanen*, *Toggenburg*, and *German Alpine*) were introduced in Marsabit district, northern Kenya, in the nineties by development agents. The aim was to provide the resource-poor households with alternative dairy animals which can increase milk production and, therefore, improve their nutritional status and, through crossbreeding, enhance the efficiency and productivity of the indigenous goats. Dairy goats have, therefore, became a very important investment, though their feeding management and performances in arable pockets of northern Kenya were not well understood and that necessitated this study.

1.1 Material and methods

The study was conducted in the Mt. Marsabit area and oases areas in Kalacha in the lowlands of Marsabit County in northern Kenya. The areas lie in the Arid and Semi-arid Lands of Kenya. The area is characterised by chronic seasonal water shortages and is traditionally a key dry season fall back area especially for cattle, goats and sheep. The vegetation in mainly shrub savannah, bush land and woodlands dominated by various *Acacia* trees. These areas are inhabited by pastoralists and agro-pastoralists communities. Traditionally, the oasis was used as a dry season grazing reserve, watering point and salt lick. Currently, a section of the oasis has been developed for dryland crop production. The main farming systems include irrigated forage production (mainly grasses for cut and carry), on- farm grazing, and minimal vegetable growing.

1.1.1 Data collection and analysis

Semi-structured questionnaire, focus group discussions and participant observations were used to collect data from individual dairy goat farmers, dairy goat farmers' groups, and development agents respectively, in selected clusters in the study areas. A sample size of 52 individuals, 9 groups, and 2 Development Agents (DAs) was selected from a sampling frame of 65 individuals, 9 groups, and 2 DAs, respectively. Selection of survey respondents was done through systematic random sampling. Data was analysed using the SPSS program (version 10.5). Descriptive statistics (frequencies, percentages, means and standard deviation) were used to summarise and describe various distributions of scores and measurements. Paired t-test was used to compare the responses from farmers in the two study sites.

1.2 Results and discussions

1.2.1 Feeding management of dairy goats

The production of milk from goats managed under extensive range grazing conditions can be affected in quantity and quality by nutrient content of the forages on the rangelands (Haenlein and Ramirez, 2007). Inadequate yearly supply of good quality feed forage is common throughout tropical Africa regions, where native pastures are the main and in most cases, the only component of livestock nutrition (Yahaya *et.al*. 2000). In the study area, both the pastoralists and agro-pastoralists (93.3%) strongly rely on natural forages (trees, shrubs) to feed goats; crop residues and farm grown forages were minor feeds for the goats. In Kalacha, the households follow a flexible management system which allows goats to scavenge in the oasis farms when feed is plenty, and during scarcity the goats are taken to roam in the communal land. During wet seasons, to utilise the wide range of feeds in the communal land, most households subject the dairy goats to free range grazing system. However, in lowland areas of Marsabit district, forage availability and quality, particularly in the herb layer drastically decline after the rains (Schwartz *et. al.*, 1991).

The exotic goats and their cross breeds were reported to have high water requirements and were, therefore, watered daily in the oasis together with indigenous milk goats. Most of their F1 crosses were withdrawn from the mobile flocks since they could not cope with the long watering intervals (3-4 days) that the local Galla goats were subjected to. The limited water intake of *fora* (satellite camps) herds, and the high sensitivity of goats to elevated temperatures negatively affected feed intake of the crosses and, therefore, severely reduced their performance. It seems that crossbred goats would perform better in sedentary herds watered on daily basis in the oasis areas.

Almost 50% of the households with dairy goats in both sites lacked skills on feeding exotic and crossbred goats, and this was reported as the main cause of reduced production. The observations are in agreement with the findings by Kosgey *et. al*., (2004) that poor feeding management was one of the major bottlenecks that hinder the progress of optimal utilization of small ruminant by resource-poor smallholder farmers in Kenya. However, feeding of dairy goats by cut and carry method was not a new concept. Traditionally women and young girls, who are principally involved in the management of small stock in the pastoral areas, feed the kids and lactating goats in the feed gap periods by applying this technique. The findings are consistent with those reported by Kariuki and Letitiya (1999) that among the Samburu pastoralists, neighbouring the study area, forage was collected for all species and ages of livestock, with the exception of donkeys and suckling animals. Also, Mbogo (2007) reported on sheep and goats production in Kenya, that apart from the indigenous pastures, pastoralists cut and carry fodder for feeding small ruminants particularly in feed gap periods.

Only 24.6% of the households in the two sites acquired training on forage production and conservation from various organizations. Forage conservation was practiced in pastoral areas of southern Ethiopia and northern Kenya albeit at low levels during feed stress periods (Coppock, 1994; Kaye et al, 2014). Feeding strategies should be for the entire annual cycle, thus the potential need for conservation of forages and other available feeds (Owen et. al., 2005). Limited skills on feeding management would result in underfeeding and imbalances in nutrients consumed by goats. Poor feeding of dairy goats would lower milk production and undermine their reproduction performance. Inadequate feeding could be responsible for slow herd growth observed among groups and individual dairy goat farmers in the study area.

1.2.2 Forage production and conservation

In the ASAL areas of Kenya, a variety of feed resources, such as grasses, crop residues, leguminous trees pods, and other local feeds are conserved by pastoral and agro pastoral goat keepers as fodder banks (Mbogo, 2007). About 64.3% of households with dairy goat in Kalacha oasis had established farm fodder. The most common established forages are grasses – local and introduced (accounting for 24% and 28% of farm forages, respectively), *Leucaena*, and Napier grass. Other forages growing in oasis farms were sweet potato vines (about 6%) and other exotic trees (about 8%). Seventy percent of the households with dairy goats in Kalacha conserve feeds, the major feeds being grass hay (conserved by 64% of the households), *Acacia tortilis* and *Prosopis* pods (conserved by 37% of the households) and crop residues, mainly papaw leaves and sugarcane leaves (conserved by only 8% of the households). One of the strategies for coping with feed shortages was use of alternative feed sources like browse trees, enclosures and crop residues (Abate et. al., 2010). In Samburu district, neighbouring the study site, forages most often collected and conserved were grasses, tree leaves and Acacia tortilis pods (Kariuki and Letitiya, 1999). *Acacia tortilis* pods were also reported by Abdulrazak *et.al.* (2001) as an important emergency feed resource conserved for feeding animals in northern Kenya. *Acacia* pods, which are rich in minerals and protein nutrients (19% CP), would improve the nutrition status of free ranging dairy goats.

The most common method of forage conservation was hay bulking (about 63%) and harvesting of dry pods (38%).The observation on forage conservation was consistent with those reported by Adugna and Abebe in southern Ethiopia (2007) that one way of overcoming feed shortages was to conserve excess forage in the wet season in the form of hay. A few households had reserved grass plots for grazing their goats. Majority of farmers reported conserved feeds to be insufficient to last the entire dry season (at least 3 months). Other constraints in feed conservation included lack of storage sheds and limited skills in forage conservation.

Though agro-pastoral households on Marsabit Mountain put more emphasis on crop production than on livestock keeping, many (about 70%) had established fodder compared to Kalacha (64.3%). Farmers had few established trees and other forage species in their farms that could best be utilised for supplementary feeding of the goats. Trees and shrubs are perennials allowing the provision of permanent fodder compared to herbaceous, which rapidly decline in quality and quantity after the rains (Sanon, 2007). Fodder trees are an attractive to the expensive protein concentrate for feeding dairy cattle and goats (Franzel *et al*., 2003).

The bulk of grown forages (46%) was *Leucaena* and Napier grass (about 28%). Other forages included local grasses (about 8%) and sweet potato vines (about 6%). Farmers reported frequent loss of Napier grass to drought and demanded drought tolerant varieties that could survive and carry green biomass in the dry seasons. About 54% of farmers on Mt. Marsabit conserve feeds, the major ones being crop residues (conserved by 31.1% of the households), grasses (27.7%), and tree pods (19.6%). Use of concentrate feeds in goats' diets can be replaced by crop residues without loss of performance (Meffeja *et. al.* 2000). Crop residues are known to have low content of available protein, energy and minerals and their feeding value would be enhanced by use of protein and energy supplements (Rey *et. al.,* 1992). In the pastoral feeding system good quality grass and tree leave fodder would be the most appropriate sources of protein and energy supplements. The pods of *Leucaena* and *A. tortilis* were kept in bags and stored in the farm store. Crop residues, mainly maize stover and bean waste, were collected and kept in the farm store and the bulk of grass conserved was collected from the communal land. The forage store, constructed of locally available materials, should consist of a raised floor, to stop rising damp and allow vermin control, in a roofed structure, to prevent rain damage, but with adequate ventilation (Smith *et al.*, 2000). The major problems in Marsabit Mountain hindering feed conservation included limited skills in feed conservation, lack of feeds to conserve, lack of storage sheds and frequent destruction of potato vines by elephants. Destruction by elephants discouraged many households from planting the crop. Crop-Wild life conflict management would be necessary to mitigate loss of value food and fodder crops to errant elephants.

The major source of forage germplasm for farmers in the two sites was through social networks and farmers' individual efforts; only 27.8% of respondents acquired forage germplasm from the development agents. Development agents can play an important role in sourcing appropriate forage germplasm for farmers considering differences in ecology, and also help farmer groups in seed propagation and production. There is a high-untapped potential for conserving grass from the communal land on Marsabit mountain zone during the growing season. Farmers can also enclose grass plots around their homesteads as reserve for grazing goats in the dry season and apply goat's manure to enhance grass biomass production.

1.2.3 Supplementary feeding of dairy goats

Due to differences in ecology and, therefore, in vegetation structure, forage feeds for dairy goats varied between the two study sites. Goats usually utilise diverse plants in the communal land and in the mountain zone there is high species diversity than in the oasis area. There were 16 woody species that are utilised by goats in the mountain zone, compared to 6 in the oasis area. Goats in mixed pastures have higher performance than in single species pastures (Goodwin *et. al.,* 2002). It seems that, the mountainous areas with wide range of forage plants would favour dairy goat keeping than the low land areas. In the oasis area, only a small proportion (14.3%) of farmers supplement dairy goats with mineral supplements, the most common being the local *chalbi* salt (natural salt obtained from Chalbi desert) and manufactured mineral mix. The survey finding was in agreement with those reported by Mbogo (2007) on small ruminants in the ASAL of Kenya that pastoralists depend on natural salt licks, and local salts as mineral supplements. The local mineral sources are known to have imbalanced mineral profile, which can impede dairy goat performance.

All the households with dairy goats interviewed in the Mountain area supplement their herds with mineral salts, which they purchase from village shops and Marsabit town. The most commonly used mineral salt was commercial mineral mix (44 % of the respondents), local *chalbi* salt (24% of the respondents) and common table salt (22 % of the respondents). Minerals are vital in animal life functions, influencing growth, health status, immune system function and synthesis of animal products. Availability of minerals to animals in appropriate quantities is a pre-requisite for their health and productivity (Underwood and Suttle, 1999). There is need to sensitise farmers in both sites on the value of mineral supplements and also on deficiencies of the local salts as incomplete mineral supplements for lactating dairy goats. Evaluation of the mineral status of feeds consumed by dairy goats need to be conducted to identify and correct any mineral deficiencies and imbalances in the study sites.

The oasis areas had a high potential of forage production, particularly grasses and leguminous trees/shrubs that act as permanent fodder banks. To maximise on the available water resource at the oasis, there is need to intensify and establish other high quality forage varieties of sweet potatoes, grass species and trees/shrubs adapted to saline soils of the oasis. To increase the availability of dairy goat feeds, there is need to train farmers on feed conservation techniques and promote grazing plots in the oasis farms as reserved grazing for dairy goats in the dry seasons. Biomass production from the grazing plots can be enhanced by application of goat's manure, which is high in organic matter. Due to perennial water scarcity in the Mountain zone, farmers require drought tolerant forage species established by applying water harvesting and conservation technologies. Trees/shrubs such as *Calliandra, Morus alba* and *Gliricidia sepium* that are easily established through cutting, and observed to have good performance in these areas, can be propagated by dairy goat farmers in Marsabit Mountain. These forage species are drought tolerant, have high feed value and regenerate fast. Supplementing natural vegetation with planted forages is one of the solutions to the problem of food scarcity. This was in agreement with the conclusion by Peacock, *et. al.,* (2005) that goat keepers can reduce the seasonality of feed supply by growing out-of season forage crops and also by conserving forage and other locally occurring feed resources.

1.2.4 Performances of pure breds and their crosses

1.2.4.1 Age at maturity

Females of Alpine and their crosses attained reproductive maturity nearly the same period (8-12 months). The Alpines attained maturity late and dropped their first kid in 15.67± 2.31 months (Kalacha) and 16.63± 1.44 months in the Mountain area (Table 1). Cross breeding improved the age of maturity of the young local goats, since local goats mature in > 12 months (Harry, 1999), and the crosses mature at 10.5± 2.01 months in Kalacha and 13.2± 2.1 in months on the mountain. The age of reproductive maturity of the Alpine, was comparable to the local Nubian goats in south Sudan attaining maturity at 9.15±0.17months (El-Abid and Nikhaila, 2009). The late age of reproductive maturity may be related to the poor pre-weaning and post-weaning young stock management practices. To improve on the age of reproductive maturity and longevity, measures should be directed to improve young stock growth rate in the pre- and post-weaning stages.

1.2.4.2 Age at first kidding and kidding interval

The mean age at first kidding of crossbred was 17.0± 5.24 months in Kalacha and 16.19±1.44 months on Mountain; whereas the age at first kidding for Alpines for both sites is 15.67±2.31 and 16.63±1.44 months, respectively (Table 1). The mean ages of reproductive maturity were comparable to 16 months reported by CTA (2007) in Kenya dairy goats and crossbred dairy goats by Kataktalware (2004). In the pastoral system where continuous breeding is practiced, other stress factors such as disease and nutrition may contribute to slow growth rate of the young does, resulting in late maturity and, therefore, late age of first kidding of Alpine does. To encourage early maturity and age at first kidding, kids and weanersk s should be well managed, to promote fast growth and early attainment of mature body weights.

In the two sites, crosses had a shorter kidding interval (7.13± 1.47 months in Kalacha and 6.54±1.19 months in Mountain) than the Alpine does (8 months in Kalacha and 7.77± 1.03 months on the mountain) (Table 1). Crossbreds are postulated to cope well with available feed resources and their kidding intervals within normal

range. Dairy goats keepers mainly aimed at building up their flocks and, therefore, rarely restricted mating except in the 2-3 months in early lactation. Most keepers allowed lactating does to be served after second and third month after kidding and, therefore, resulting into shorter kidding intervals. The shorter kidding interval calls for proper management of the does by timely drying of pregnant does, accompanied by sound steaming up. From this kidding patterns, the Alpine and their crossbreds does have two kid crops per year and it is crucial to provide the breeding stock with high plane of nutrition, health management, breeding management and proper housing to maintain two kid crops annually.

1.2.4.3 Prolificacy

The highest estimated prolificacy rate was recorded for Kalacha Alpine goats (1.73±0.25 kids per birth), followed by cross breed goats in the Mountain (1.61± 0.49). The Mountain Alpines achieved a litter size of 1.54± 0.4 kids per birth compared to 1.23± 0.41 kids per birth for Kalacha cross breeds (Table 1). The litter sizes were comparable to those reported by Montaldo *et al*, (1995) of Alpines does in Mexico that range between 1.73-1.65 kids per birth. Better feeding management seems to influence litter size, whereas breed effect was not important. In Kalacha the Alpine does, which are kept in the oasis farms, have reliable feed supplies throughout the year and, this may be responsible for the multiple births, while the crosses are exposed to periods of feed stresses in the mobile herds and this hampers their reproductive performance and fecundity rate. The Mountain cross breds adapted to extensive grazing maximised on the natural forages and, therefore, attained a high fecundity rate. Twin births were the most common multiple birth recorded. To attain high fecundity rate for does keepers can plan to breed does at favourable periods with maximum feed availability. Although prolificacy is influenced by other factors such as parity and breed, improved nutrition has been found to resiliently increase ovulation rate and the incidence of multiple births in goats (Harry, 1999). Therefore to enable farmers to build their dairy goat flocks, improved feeding management need to be promoted.

1.2.4.4 Milk production

Dairy goats in Kalacha had significantly higher milk yields (2.62±0.65 kg/day) than those on the Mountain areas (0.7±1.04 kg/day). The level of milk production of dairy goats in Kalacha was higher than those reported by Norris *et.al*, (2011), in South Africa alpine goats kept under extensive system, yielding 0.75± 0.14 kg/day. However, this level was comparable to the milk yield of mountain Alpine does. Kalacha does, also produce milk similar to those reported by FARM Africa (2007) in 75% Toggenburg does in Meru, yielding 2.8kg/day. Generally, the lactation lengths of alpine does were lower than the range of 9-8.37mo reported on stall feed alpine goats in Mexico (Montaldo *et al*, 1995). This high milk yield may be sustained by the high quality feed component of all year-round browse, rich in protein and minerals, available in the oasis farms and riverine ecosystem vegetation. Poor feed management combined with high incidences of ecto- and endo-parasites in the mountain may be responsible for the low milk yield of the Alpine does. Improved feeding management and health care is necessary for the mountain Alpine goats to realise their milk production potential. Generally, the Alpine goats produced less than the reported production of about 3 kg of milk daily (Haenlein, 2004), realized under improved management regimes. The mountain crosses, which have yields that rival the mountain Alpines, are better adapted in the free range system and can maximise on the available natural browse to achieve high milk production. In the semi-intensive management systems where goats scavenge in the oasis farms and also feed on cut and carry forages, goats had high milk yield and few incidences of diseases, as the level of interaction with other local goats was minimised. The main limitation of farmers in this management system is lack of forages compelling them to free range the dairy goats. Since traditional goat management is geared towards survival rather than support for optimum production, the productivity of lactating does can be improved through quality feeding and improved health care management. In Kalacha it was noted that farmers milk Alpine and crossbred does throughout the pregnancy period and some up to the day of parturition. Dairy goat farmers require training on management at pregnancy and lactation as continuous milking would cause does to drop kids with low birth weights and affect subsequent lactation.

1.3 Conclusions

The results show that the exotic and crossbreds goats have high milk yield than the local goats. This was in agreement with the conclusion by Serradilla (2001) that exotic breeds have higher milk production than local goats, but lower than yields in their countries of origin. In order to realize their milk production potential, the cross breed goats (F1) and alpine does, need to be subjected to intensive management and provided with adequate nutrition. The study demonstrates that better feeding management as observed in the Kalacha goats would improve milk yield and reproductive performance of dairy goats. However, individual farmers keeping cross breed goats have insufficient skills and knowledge related to feeding management and feed conservation. Scarcity of quality feed and water, particularly in the dry season, hamper performance of dairy goats, which have high demand for water and feed than the local goats. Due to lack of forage germplasm, dairy goat farmers have inadequate quality grown forages for supplementary feeding of goats in the dry season. To ensure the establishment of high quality fodder, farmers need to be assisted to source appropriate germplasm suited to their

specific environments. In the oases areas, in the dry season there are limited feeds for dairy goats both in the communal grazing land and oasis farms, thus constraining dairy goat keeping. To maximize the potential of dairy goats in this pastoral and agro-pastoral areas, then efforts should be geared towards feed production and conservation, animal nutrition and general management of the dairy goat. Feed conservation, which was practiced traditionally, would easily be adopted by pastoral and agro-pastoral farmers. Improved feed conservation technologies need to be introduced to ensure that farmers have adequate year around feed for their dairy goats. Farmers require a complete training package on improved dairy goat husbandry practices such as breeding, health, housing and feeding management. Adequate nutrition and health care would ensure that the dairy goats would be able express their milk production potential.

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Notes

Table 1. Productive performance of Alpine and cross breeds goats

Site	**Kalacha**		**Mountain**	
Breed	Alpine	Cross bred	Alpine	Cross bred
Age of maturity (months)	10.7±2.31 (n=3)	10.5±2.01 (n=7)	10.5±1.73 (n=11)	13.2±2.1 (n=14)
Age at 1st kidding (months)	15.67±2.3 (n=3)	17.67±5.24 (n=8)	16.63±1.44 (n=5)	16.19±1.75 (n=22)
Kidding interval (months)	8 (n=4)	7.13±1.47 (n=8)	7.77±1.03 (n=6)	6.54±1.19 (n=14)
Prolificacy (kids/ birth)	1.73±0.25 (n=3)	1.23±0.41 (n=11)	1.54±0.37 (n=5)	1.61±0.49 (n=17)

Table 2. Milk production of dairy goats

Breeds	**Kalacha**				**Mountain**			
	Milk yield[a]				Milk yield[a]			
	Peak (kg/day)	Average (kg/day)[b]	Total Lactation (kg)[c]	Lactation length (months)	Peak (kg/day)	Average (kg/day)[b]	Total Lactation (kg)[c]	Lactation length (months)
Alpine	3.2± 0.98	2.62± 0.65	516	7.33	2.07± 0.42	0.70±1.04	169	6.5
Crosses	2.43± 0.73	1.43± 0.61	297	7.33	1.95± 0.83	1.23±1.04	222	5.2
Local (G, SEA)[d]	1.12	0.638±0.2	122		0.62±0.23		57	4.3

[a]The yields are inclusive of what is suckled by the kids. [b]based on the mean of peak, mid and late lactation milk [c]based on the lactation length and mean daily yield [d]G=Galla, SEA=Small East African