EFFECTS OF WATER SOURCES AND WATERING FREQUENCY FOR DAIRY CATTLE ON WATER OFFERED AND MILK PRODUCTION IN KIAMBU DISTRICT

Muli A.N[1/4*]., Kaitho R[2/3]., Gachuiri C.K[1]., Wahome R.G[1].,and Tanner J[2].
[1]University Of Nairobi, Department of Animal Production
[2]International Livestock Research Institute
[3]Kenya Agricultural Research Institute
[4]Ministry of Agriculture, Livestock Development and Marketing

ABSTRACT

Data on water sources, mode of offer, watering frequency, amount of water offered, body weights and milk yield were collected from 21 randomly selected smallholder farms in Kiambu by means of farm visits and questionnaires fortnightly. Most farms (67%) had water on-farm but 76% of them needed labour to deliver the water to the animals. Fifty two percent of the farms practised continuous watering. Water troughs (67%) were mostly used to water dairy cattle.

Farms with on-farm water offered dairy cows more (134 ml/kg live wt) water compared to those collecting (76ml/kg live wt) or purchasing (81ml/kg live wt) water. Preliminary results on milk yield using descriptive statistics show that dairy cows with on-farm water produce less milk (6.4 l/day) compared with 8.0 l/day and 9.0 l/day for those collecting or purchasing water respectively. Dairy cows using water troughs produced less milk (6.34 l/day) than those using bowls or buckets (8.44 l/day).

Key words: Dairy cattle, Milk yields, Water offered, Watering frequency.

INTRODUCTION

Dairy cows in milk, compared with other ruminants, require higher amounts of water in proportion to their weight or surface area since water constitutes 85-87% of the milk produced and 55-65% of body weight (ARC, 1980). A cow in Europe would require 2.67-2.92 kg of water at ambient temperature range of 21.1-26.7^{o}C for each litre of milk produced (Winchester and Morris 1956). Data on water requirement for dairy cattle in the tropics is scarce (ARC, 1980).

More water and a higher watering frequency for lactating cows is recommended in the tropics (ARC, 1980). Dairy cows, which have water continuously available, drink 18% more water and yield more milk than when watered once a day (ARC, 1980). Water intake as high as 118 l/day for a lactating cow and a herd average of 70 l per cow has been reported (Wright and Jones, 1975). Farmers in 4 out of 6 villages in Kiambu District are likely to suffer water shortage (Gitau, 1997) and nearly 40% of the farms have no water transport facilities. This is likely to affect water availability and result in reduced milk yields. This study monitored the effects of water source and watering frequency on amount of water on offer and milk yield.

MATERIALS AND METHODS

Twenty one smallholder farms were randomly selected from 365 households, which were randomly selected from Kiambu District. Phase 1 of the study grouped farms into: those with water source on the farm (on-farm), purchasing water outside the farm (off-farm purchased) and collecting and transporting water outside the farm (off-farm collected). Watering frequency was defined as continuous or non-continuous. In phase 2, amount of water offered and milk yields were measured fortnightly. Water on offer does not include water in feed and metabolic water

though these are important water sources for ruminants. Watering containers were grouped into 2 categories (troughs of volume 100-250 litres and bowls or buckets of volume 20-40 litres).

RESULTS

Most of the farms (67%) have on-farm water source, while 33% had off-farm. More than half (57%) of the farms with off-farm water source collected water free of charge while 43% purchased water at the same time ferrying it using 20-l buckets, wheelbarrows, bicycles or donkey drawn cart. Few farms had piped water (24%) directly to the watering source.

Most farms (43%) drew water from a radius of less than 200m while 33% had to trek between 200m and 2km.to fetch water. In more than 50% of the farms water was drawn by hand and on back. Very few farms (19%) relied on donkey drawn cart or wheelbarrow or bicycle.

Table 1. Effect of water source on average volume of water offered to dairy cows (in ml/kg live wt per day) and milk production (l/day per 300kg live wt cow)

Water source	Water offered (ml/kg live wt cow per day)	Milk production (l/day per 300kg live wt cow)
On-farm	134	6.4
Off-farm collected	76	8.0
Off-farm purchased	81	9.0

Table 1 shows that, average volume of water offered to cows in farms with on-farm water was higher than in the other farms. Higher milk yields were observed in farms with off-farm water, which offered less water than in farms with on-farm water offering higher amounts of water. Breed, parity, stage of lactation, DMI, etc were not considered though these are important determinants of milk yields.

Table 2 Effect of mode of offering water on average milk yield, average amount of water offered per day and watering frequency.

		Household proportion		Watering frequency and average amount of water offered (ml/kg lwt per day)	
Watering source	Milk yield	Conti-nuous	Non--continuous	Continuous	Non-continuous
Water troughs	6.34	43%	24%	154	98
Water bowl/bucket	8.44	9%	24%	75	63

NB. Average milk yield in litres per day per 300kg live wt cow

Most farms (67%) used water troughs to water their dairy cattle while 33% used water bowl or bucket. Most farms using water troughs practised *adlibitum* watering and offered high amount of water. In farms using water bowls and those practising non-continuous watering, water offered was far much less than in the other farms. Milk yields were higher in farms using bowls to water their dairy cows than the ones using water troughs.

DISCUSSION

Despite the fact that ARC (1980) and NRC (1989) recommend water be available to lactating dairy cows at all times of the day, more than half of the farms in Kiambu provide water infrequently. Consequently, less amount of water was available to dairy cattle in farms purchasing or collecting water off-farm and those using buckets to water dairy cattle. Many farms had neither on-farm water nor water transport facilities. Lack of information on dairy cattle water requirement, apportioning water to other household uses and costs associated with buying and transporting water and hiring labour led to less amount of water offered and the infrequent watering.

The high amount of water offered to dairy cattle in farms with on-farm water and those using water troughs do not lead to higher milk yields as reported by ARC (1980). Instead, less amount of milk (6.4 l/day) was produced in farms offering high amount of water than in farms offering less (9 l/day). The reasons behind these preliminary results are unclear, though water may not be a limiting nutrient during the wet season due to the high moisture content (80%) in feedstuffs.

A 350 kg cow in Europe producing 10 kg of milk require 200 ml/kg live wt per day (ARC, 1980). Cows reported here are offered between 60-154 ml of water/kg live wt per day. Given that temperatures in the tropics are high, water intake is expected to be higher than in temperate areas. The high water intake is necessary for body temperature regulation (Hyder *et al.,* 1968). The results presented above are only for wet season and because season and rainfall are closely related, cows may drink more water during the dry season than in the wet season.

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