

MILK OFFTAKE IN WEST AFRICAN DWARF GOATS DURING EARLY LACTATION

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ABSTRACT

A study of milk offtake in West African Dwarf goats was carried out using four lactating does in their first and second parities. Daily mean milk offtake value was low (14.576 ± 1.16 ml). It was observed that parity ($P < 0.05$) and day of lactation ($P > 0.001$) had significant effect on milk offtake. Does in their first parities had more milk offtake (9.904ml) than does in their second parities (3.498ml). Daily milk offtake was found to increase with day of lactation and it reached its peak on the 8th day (36ml) and then declined drastically to 5ml on the 9th day remaining fairly constant till the 28th day. Does with single kids have more milk offtake (7.733ml) than does with twins (5.66ml) but the difference was not significant ($P > 0.005$). It was concluded that parity and day of lactation significantly influenced milk offtake while litter size did not have any significant effect on milk offtake.

keywords: Day of lactation, goat, lactating does, litter size, milk offtake, parity.

INTRODUCTION

Goats are domesticated ruminant animals typically kept as livestock. West African Dwarf goats have shown to be trypanotolerant and resist infections than other known breed of goats (Chiejina and Behnke, 2011). Goats are valued primarily for meat production while skin, milk, fiber and manure are of secondary importance (Monteiro *et al.*, 2018). Goats require lesser capital to start and maintain than beef and dairy cattle hence their contribution to the nutrition and wealth of several million people cannot be over emphasized.

Milk is opaque white fluid rich in fat and protein secreted by female mammals for the nourishment of their young. Young mammals including human infants are fed milk (colostrum) shortly after their birth and in most cases, it continues to be the sole constituent of their diet for a considerable period of time.

Goat milk production in Nigeria is at a very low level and their milk is rarely used for human consumption (Lawal *et al.*, 2021). However, there is a growing awareness of importance of goat as a potential source of milk reviewed by Butswat *et al.* (2002).

Milk offtake is the residual milk in the udder evacuated after the kid(s) might have suckled to satisfaction. The balance of milk left in the udder of suckled does is a measure of milk offtake (Bemji, 2003). Milk offtake connotes the milk extracted from the animal for human consumption and it could be sold. Therefore, this study aims at looking into the quantity of milk offtake that can be obtained from West African Dwarf goats during early lactation.

MATERIALS AND METHODS

The experiment was carried out at the goat unit of the College of Animal Science and Livestock Production of the Federal University of Agriculture, Abeokuta.

Experimental animals and their management

The experiment was carried out using four lactating does in their first and second parities. The does were intensively managed in a cross ventilated pen with slatted floor. In the morning they were fed concentrate consisting of wheat offal, dry brewers' grain, groundnut cake, bone meal, mineral mix and common salt (Table 1). In the evening, the animals were fed *Panicum maximum*. They were also provided with water *ad-libitum*.

Table 1

Ingredients	Kg
Wheat offal	50
Dry brewers' grain	35
Groundnut cake	7
Bone meal	5
Mineral mix	2
Salt	1
Total	100

Measurement of milk offtake

The doe was restrained by tying the animal at the hind limb using ropes. Another rope was used to tie the animal at the neck for proper restrain. The udder was then washed using disinfected water to remove dirt and stimulate let down (Richard, 1993). The udder was dried with clean towel. The doe was then hand milked. The offtake was measured using 5ml and 10ml syringes depending on the quantity of milk offtake. Each doe was milked daily for four weeks starting from the fifth day postpartum to the 28th day when the kids were weaned.

Statistical Analysis

The data collected were subjected to least square analysis of variance as described by Steel and Torrie (1980). Day of lactation was included as covariate in the model. The factors were incorporated into the following linear model using Systat (1993).

$$Y_{ijk} = \mu + L_i + P_j + bD + E_{ijk}$$

Where Y_{ijk} = milk offtake

μ = population mean

L_i = effect of i^{th} litter size ($i=1,2$)

P_j = effect of j^{th} parity ($j=1,2$)

b = regression coefficient of the day of lactation on milk offtake

E_{ijk} = residual error

Finally, relationship between variables (doe live weight, litter size and day of lactation) were determined by Pearson correlation matrix.

RESULTS AND DISCUSSION

Table 2 presents the analysis of variance of the effect of litter size, parity and day of lactation on milk offtake during early lactation while Table 2 shows the Least Square Means ($\pm$ SE) of the effect of litter size and parity on milk offtake in WAD goats during early lactation

Table 2 Analysis of variance showing the effects of litter size, parity and day of lactation on milk offtake

Source	DF	Mean-square
Litter size	1	43.813
Parity	1	661.006*
Day of lactation	1	1556.753***
Error	87	121.849

* $P < 0.05$, *** $P < 0.001$, DF = Degree of Freedom

Table 3 Least Square Means ($\pm$ SE) showing the effect of litter size and parity on milk offtake

Variable	Sub-class	LSM (ml)	SE	N
Overall		14.516	1.16	
Litter size	1	7.733	1.375	73
	2	5.669	2.943	18
Parity	1	9.904	2.334	49
	2	3.498	1.731	42
B		-0.6132.943		

The overall mean milk offtake value was 14.516 ± 1.16 ml. from Table 3, sources of variation which had significant effect on milk offtake were parity ($P < 0.05$) and day of lactation ($P < 0.001$) while litter size had no significant effect ($P > 0.05$) on milk offtake. From Table 3, does with single kids had more milk offtake (7.733 ml) compared to does with twins (5.669 ml). Also, does in their first parity had more milk offtake (9.904) than does in their second parity (3.498 ml). Daily milk offtake increased with day of lactation and it reached its peak on the 8th day and then declined drastically to 5 ml on the 9th day remaining fairly constant till the 28th day as shown in Figure 1.

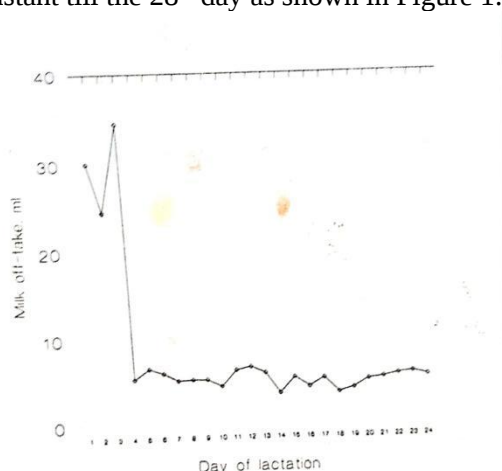


Figure 1 Daily milk offtake in West African Dwarf goats during early lactation

Relationship between milk offtake and other variables studied

Table 4 presents correlation coefficients between milk offtake with day of lactation, doe live weight and litter size.

Table 4 correlation coefficient between milk offtake with day of lactation, doe live weight and litter size

	Milk offtake	Day of lactation	Doe live weight	Litter size
Milk offtake	1.000			
Day of lactation	-0.366**	1.000		
Doe live weight	0.046	-0.067	1.000	
Litter size	0.096	0.002	0.932***	1.000

** $P < 0.01$, *** $P < 0.001$

Correlation coefficient between milk offtake and day of lactation was negative and highly significant ($r_p = -0.366$; $P < 0.01$) while the correlation coefficient between milk offtake and doe live weight ($r_p = 0.046$; $P > 0.05$) and milk offtake and litter size ($r_p = 0.096$; $P > 0.05$) were positive and significant. Correlation coefficients between litter size and doe live weight ($r_p = 0.932$; $P < 0.001$) was positive and significant while other coefficients were not significant.

DISCUSSION

The mean daily mean offtake value was 14.516 ± 1.16 . this is comparable to the daily milk offtake of 16.45 ± 3.56 ml reported by Bemji (2003). Milk offtake value was quite low and this may be due to the small size of the does compared to other breeds.

The observed more milk offtake from does with single kids when compared to does with twins could be due to the fact that twins would have suckled more milk hence lower milk offtake in does with twins. The insignificant effect of litter size on milk offtake agreed with the finding of Bemji (2003).

The effect of parity was found to be significant on milk offtake and this agreed with the finding of Peterson *et al.* (2004) and Zahraddeen *et al.* (2009). The observed more milk offtake from does in their first parities when compared with does in their second parities was as a result of multiple births in does in their second parity.

The observed significant effect of day of lactation indicated that milk offtake decreased from 8th day when it reached its peak to the 28th day. The trend observed was similar to that reported by Bemji (2003) on milk offtake and that of milk yield reported by James *et al.* (2005). This could be due to increased requirement of milk by kids as they advance in age (James *et al.*, 2005). More so, milk yield has been shown to generally increased in early lactation while mark decrease was observed towards the end of lactation. This could be as a result of endocrine changes associated with pregnancy stimulating extensive proliferation in the mammary gland that continues into early lactation. The cell population then declines markedly until cessation of involution (Dijkstra *et al.*, 1997)

Finally, the negative and significant correlation coefficient estimated between day of lactation and milk offtake implies that milk offtake decreased as day of lactation increased. The positive and insignificant coefficient between doe live weight and milk offtake is in accordance with the finding of Bemji *et al.* (2006).

CONCLUSION

The study has shown that daily mean offtake was low. Parity and day of lactation significantly influenced milk offtake while litter size did not have any significant effect on milk offtake. Significant correlation was found to exist between day of lactation and milk offtake while insignificant correlation was found to exist between doe live weight, litter size and milk offtake.

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