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Advances in Agriculture, Food Science and Forestry

Vol. 3 (3), pp. 29 - 33, June, 2015
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An investigation on the milk delivered by chosen Black Bengal Goat raised in semi-concentrated System

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Abstract

This study was conducted to investigate the milk production performance of Black Bengal goats in different parities reared in a semi-intensive system. The 112 female Black Bengal goats were selected on the basis of their phenotypic characteristics and ancestral history from Goat Farm, Mohanpur, Nadia, West Bengal, India. Milk production records of the Black Bengal goat were recorded in the 9th week of kidding from September, 2007 to August, 2008. The overall milk production of 112 goats in the 9th week was within the range of 0.240 to 1.73 kg. On an average, the initial yield, peak yield, average peak yield, days to attain peak yield, total milk yield and daily milk yield was 0.250 kg, 0.380 kg, 0.310 kg, 11.35 days, 7.21 kg and 0.210 kg, respectively. The milk production increased in the fourth week of lactation and then decreased afterwards. Milk production of those goats which gave birth to more than three kids was highest, followed by those that gave birth to two and one kids. Milk production performance of Black Bengal goat in the third parity was better than that of the first and second parities. In conclusion, Black Bengal goats tend to have a potentiality of milk production.

Keywords: Black Bengal goat, milk production, parity and litter size.

INTRODUCTION

Goat contributes largely to the livelihoods of the livestock-keeping households of low-and medium-input farmers, many of whom have few resources beyond their smallholdings and livestock. In addition, goats are important to the subsistence needs as they can provide abundant regular supply of meat, milk, fibre and skin. The goat is also being recognized as a significant food source, because it can convert feed dry matter into milk (one hundred and eighty five kg milk per hundred kg of dry matter for goats compared with one hundred and sixty two kg for cows in temperate environment) as efficiently as other ruminants; (Spedding, 1969). The population of goat in the world was approximately 807 millions of which Indian houses of about 25% of the total population by 195 millions (FAOSTAT, 2007). In eastern region of India the concentration of goats is thirty two percent of total goat population in India. The Black Bengal goat is the heritage and pride of eastern India and Bangladesh. It is a prolific and major meat producing animal in West Bengal along with the adjoining part of the Jharkhand, Orissa, Bihar, Tripura states of India (Zeshmarani et al., 2007). This breed is also available in almost all villages of Bangladesh (Rahman et al., 2006). The natural breeding tract of the Black Bengal goat is located in this region. They give birth twice a year or more commonly thrice in 2 years (Zeshmarani et al., 2007) and the number of kids at one time varies from single to quadruplet. Twinning is more frequent (56.32%) and quadruplet is the least frequent (2.11%) litter size (Hassan et al., 2007). The composition of Black Bengal goat milk in terms of total solid, fat, protein, lactose and ash are 14.41, 4.37, 4.0, 5.24 and 1.42%, respectively. (Chowdhury and Faruque, 2001). Besides, goat milk casein and goat milk fat are more easily digested than milk from cow. Goat milk is

valued for the elderly, sick, babies, children with cow milk allergies, patients with ulcers and even preferred for raising orphan foals or puppies. This indigenous breed of Black Bengal goat has advantages reputed for their prolificacy, fertility, early sexual maturity and adaptability to hot humid conditions. Therefore, it is significant to improve the performance of milk production of Black Bengal goat. Unfortunately, very little work is done on estimating the milk production performance of this Black Bengal Goat. Though, Black Bengal breed is a meat breed but this study was made to ascertain the different milk production performances under semi intensive system of management in University livestock farm at Mohanpur, Nadia district of West Bengal. It is also of preliminary investigation to enlighten the understanding about milk production performance of Black Bengal goat.

MATERIALS AND METHODS

Study area

The research work was carried out from September, 2007 to August 2008 at University farm (ICBP shed no. 4) at Haringhata block in the Nadia district of West Bengal state which is under New Alluvial zone of Lower Gangetic Plain region of India. The farm is situated at latitude of 23.5°N and longitude of 89°E, and an altitude of 9.75 m above the mean sea level located close to the tropic of cancer.

Management

All the 112 animals utilized for the experimental study were reared under semi intensive system of management. Vaccination against PPR, goat pox and FMD was done every year. Animals were clinically checked routinely and dewormed regularly. Animal's sheds were cleaned regularly and were given dips from time to time to protect them from ecto-parasites. Regular grooming of the animals had been practiced. Other health care and treatment was given whenever needed. All the animals were allowed for grazing on natural pasture from 8 A.M. to 3 P.M. in winter. During summer and monsoon, animals were grazed in two shifts from 7 to 10.30 A.M. and 2.30 to 5.30 P.M.

Recording of milk production

All the 112 goats were milked by hand and daily milk yield of individual goats was recorded. Three days after kidding, newly born kids were kept with their mother for 24 h except the grazing time. After 3 days, kids had free access to their mother's milk from 8.00 A.M to 5.00 P M. Milking was done at 7.30 A.M. The amount of milk suckled by kids cannot be measured. Milk yield was recorded from three days after parturition until the goats refused the kid to suck the milk.

Milk production traits

Average weekly milk production (kg) in the 9 weeks of kidding, initial yield (Kg/Day), peak yield (Kg/Day), days to attain peak yield, total yield (Kg) and average daily yield (kg) according to different litter size and parity were recorded for further analysis.

Statistical methodology

Data on different milk production traits of Black Bengal goats mentioned in Tables 1 and 2 were recorded during this study period. The data were analysed with the help of computer system available at this farm complex of West Bengal University of animal and fishery sciences. All statistical analysis were done by using the SPSS package available at this University. The effect of litter size and parity on different milk production traits were analyzed by least square analysis of variance technique. The mean and standard error of the different economic traits under the study were calculated and all tests for significance were done by following standard methods described by Snedecor and Cochran (1994). In order to determine the effect of litter size and parity on different milk production traits, the following linear model was applied:

$$Y_{ijk} = \mu + L_i + P_j + e_{ijk}$$

Where: Y_{ijk} =Data pertaining to k^{th} animal of the j^{th} Parity of the i^{th} litter size.

μ = overall mean

P_j = Effect of j^{th} Parity(j = 1 to 3) L_i = Effect of i^{th} litter size (i = 1 to 3)

e_{ijk} = Random error on observation distributed NID (0, $\sigma 2e$)

RESULTS AND DISCUSSION

The overall milk production of 112 goats in the 9th week was within the range of 0.240 to 1.73 kg (Table 1). The milk production was increased in the 4th week of lactation and then decreased. It was observed from this present investigation that on an average, milk production of those goats was 0.90, 1.10, 1.58, 1.83, 1.12, 0.86, 0.59, 0.35 and 0.24 kg in 1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th and 9th week of lactation. The highest milk yield was observed in the 4th week while the lowest was observed in 9th week of lactation. The milk yield for single, twin and triplet kidding was 1.43, 1.77 and 2.24 Kg in the 4th week of lactation, whereas, the respective estimate was 0.23, 0.26 and 0.26 Kg in 9th week of lactation. It was observed from this present investigation that on average, milk production of those goats who gave birth to more than three kids was highest followed by those that gave birth to two and one kids. An increasing trend of milk production may be due to more physiological development with the advancement of litter size.

The other milk production traits like initial yield, peak yield, average peak yield, days to attain peak yield, total yield and daily yield were presented in Table 2. It was observed from this present investigation that on an average, the initial yield, peak yield, average peak yield, days to attain peak yield, total milk yield and daily milk yield of 112 goats in the 9th week was 0.250 kg, 0.380 kg, 0.310 kg, 11.35 days, 7.21 kg and 0.210 kg, respectively. It was found from this present investigation that initial milk yield in the first, second and third parity was 0.250, 0.270 and 0.280 Kg, respectively while total milk yield in first, second and third parity were 5.56, 6.89 and 8.14 kg, respectively. This study is in agreement with

Table 1. Mean along with standard error of weekly milk production (Kg) of Black Bengal goat.

Weeks			1st	2nd	3rd	4th	5th	6th	
Overall		Observation 112	0.90± 0.35	1.10± 0.23	1.58± 0.37	1.73± 0.23	1.12± 0.19	0.86± 0.12	0.59
	1	45	0.48± 0.43^{a}	0.57± 0.29^{a}	1.00±0.26^{a}	1.43± 0.17^{a}	0.86± 0.29^{a}	0.57 ± 0.15^{a}	0.46
	2	48	0.82± 0.25^{b}	1.21± 0.13^{b}	1.54± 0.15^{b}	1.77± 0.30^{b}	0.95± 0.22^{a}	0.73±0.35^{a}	0.46
Litter size	3	19	1.32± 0.22^{c}	1.66± 0.58^{c}	2.27± 0.35^{c}	2.24± 0.40^{c}	1.77± 0.12^{b}	0.98± 0.26^{b}	0.60
	Level of significant		**	**	**	**	*	*	
	1	52	0.85± 0.58^{a}	1.32± 0.26^{a}	1.51± 0.26^{a}	1.53± 0.26^{a}	1.19± 0.26^{a}	0.55± 0.58^{a}	0.42
	2	43	1.15± 0.58^{b}	1.41± 0.26^{a}	1.87± 0.26^{b}	1.86± 0.26^{b}	1.44± 0.26^{b}	0.58± 0.58^{a}	0.43
Parity	3	17	1.21± 0.58^{b}	1.71± 0.26^{b}	2.19± 0.26^{c}	1.96± 0.26b	1.47± 0.26^{b}	0.73± 0.58^{b}	0.62
	Level of significant		**	*	**	*	*	*	

*P<0.05 **P<0.01.

Table 2. Mean along with standard errors the different Milk Yield Parameters of the base stock of Black Bengal goat.

Overall	Observation 112		Initial yield (Kg/Day)	Peak yield (Kg/Day)	Average peak yield (Kg/Day)	Days to attain peak Yield	Total (k
			0.25± 0.01	0.38±0.10	0.31± 0.03	11.35± 2.89	7.21±
	1	45	0.23± 0.03	0.26± 0.05^{a}	0.27± 0.04	6.25± 4.32^{b}	5.27±
	2	48	0.25± 0.04	0.30± 0.04^{a}	0.30± 0.03	8.81± 6.44^{b}	7.61±
Litter size	3	19	0.28± 0.03	0.58± 0.02^{b}	0.36± 0.04	19.01± 5.20^{c}	8.72±
	Level of significant		NS	*	NS	**	**
	1	52	0.25± 0.04	0.33± 0.06^{a}	0.29± 0.02	8.18± 3.99^{a}	5.56±
	2	43	0.27± 0.02	0.36± 0.03^{a}	0.30± 0.05	8.83± 2.28^{a}	6.89±
Parity	3	17	0.28± 0.05	0.50± 0.08^{b}	0.38± 0.04	12.38± 4.32^{b}	8.14±
	Level of significant		NS	*	NS	*	**

*P<0.05 **P<0.01.

the findings of Singh and Rai (2006) who had also opined that the Black Bengal goats are poor milkers and yield 26.24± 1.03 kg milk in a lactation of ninety six days. Choudhury et al. (2002) from Bangladesh reported that the milk yield increased from 26 kg at low level of feeding to 46 kg at higher level of feeding and lactation yield was and positively correlated with nutrition, age, genotype season. It was observed that peak milk yield of Black Bengal goat in first, second and third parity was0.330, 0.360 and 0.500 Kg, respectively and reached in peak yield at 8.18, 8.83 and 12.38 days, respectively. The average peak yield in the first, second and third parity was 0.290, 0.300 and 0.380 Kg, respectively. An average daily milk yield was 0.200, 0.230 and 0.270 Kg in first, second and third parity. A study was conducted by

Hossain et al. (2004) in Bangladesh to investigatmilk production performance of Black Bengal goats in different parity reared in semi-intensive system. They observed that total milk yield per day in the first, second and third parity was 275, 312 and 332 g, respectively while milk yield per lactation in respective parity was 16.37, 20.86 and 21.8 kg, which was higher than this present finding. Prasad et al. (2005) determined milk production of thirty two Beetal goat, sixteen Beetal × Jamunapari goat, thirty one Beetal × Barbari goat and nineteen Beetal × Black Bengal goats in early, middle and late lactation at Raja Balwant Singh College, Agra, India under similar management and were recorded that milk production was highest in the Beetal goat (1.20 ± 0.05 kg) and lowest (0.75 ± 0.07 kg) in Beetal × Black Bengal goat, while Beetal × Jamunapari goat (1.01 ± 0.07 kg) and Beetal × Barbari goat (1.17 ± 0.05 kg) were intermediate. They also observed that breed, stage of lactation, season of kidding and parity significantly affected both the milk yield and composition. According to Hassan et al. (2007) the average milk production in crossbred goat was 1.05±.50 L/day, whereas, Black Bengal goats produced milk which only nourished its kids and their differences were highly significant ($P<0.01$). They also observed that lactation period of crossbred goats and Black Bengal goats were 99.25±10 and 65.50±7.5 days respectively and differences were statistically significant ($P<0.05$). It can be concluded from this finding that milk yield performance of Black Bengal goats was better in third parity than that of first and second parity which is in agreement with the finding of Hossain et al. (2004) in Black Bengal goat.

Conclusion

The results obtained from this study showed that Black Bengal goats tended to have a potentiality of milk production. Black Bengal goats with three kids have better performance for milk yield in comparison to those with two or one kid. Milk production performance of Black Bengal goat in the 3rd parity was also better than that of the 1st and 2nd parity; as such, it has an increasing trend with the advancement of parity number.

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