INFLUENCE OF SOME NON GENETIC FACTORS ON BIRTH WEIGHT OF TEDDY GOAT KIDS

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ABSTRACT

Data on birth weight of Teddy goats maintained at the Livestock Production Research Institute, Bahadurnagar, were collected. A total of 1666 kidding records spread over a period of 25 years were available. Overall least square mean for birth weight was 1.44 ± 0.06 kg. The variation in birth weight due to year and season of birth was significant. The winter born kids were heavier (1.46 ± 0.06 kg) than summer born kids (1.42 ± 0.06 kg). Least square mean for birth weight of male kids was 1.49 ± 0.06 kg and this value was higher than that for female kids (1.40 ± 0.06 kg). Birth weight was significantly ($P<0.01$) affected due to birth type and single born kids were the heaviest (1.75 ± 0.05 kg) amongst different birth types. Birth weight significantly decreased with an increase in number of kids born. Twin, triplet and quadruplet born kids weighed 1.55 ± 0.05, 1.46 ± 0.05 and 1.03 ± 0.13 kg, respectively. Parity had no effect on birth weight. The least square means for different parities ranged from 1.40 ± 0.03 to 1.47 ± 0.061 kg.

Key words: Teddy Goats, Environmental effects, Birth weight.

INTRODUCTION

The Teddy breed of goats has unique characteristics of high prolificacy, fast growth, early maturity and adaptation to varying sets of environment. Some animals of Bangali goat found in the hills of Chatagang in Bangladesh were brought in Pakistan some where in 1950s and were named Teddy goats due to their small stature. The breed rapidly multiplied in different areas of Punjab and at present its population is around 10.18 million heads in Pakistan (Anonymous, 1997).

Birth weight is an important indicator of subsequent growth and is influenced by several maternal and environmental factors (Koul *et al.*, 1996; Bula *et al.*, 1998). The heritability estimates for birth weight ranging from low to moderate have been reported by various workers (Mukundan *et al.*, 1981; Naik *et al.*, 1985; Bula *et al.*, 1998; Mourad and Anous, 1998) which suggest that most of the variation in birth weight is due to non genetic influences. The present study was designed to estimate the effect of sex, birth type, parity, year and season of birth on the birth weight of the Teddy goat kids.

MATERIALS AND METHODS

Data on birth weight of Teddy goats maintained at the Livestock Production Research Institute, Bahadurnagar, Okara during the period 1975-1999 were used. Data on individual kid for identity, date of birth, sex, birth type and parity of the dam were collected. Pedigree and performance records of kids were collected from the relevant registers. History sheets of does were also used to match these records. In addition to basic edits of consistency, checks for dates and animal identities, records for goats that had aborted, missed a period due to sickness or other reasons were eliminated. The records out side ± 3 phenotypic standard deviation from the mean were also excluded.

Data were analyzed to evaluate the influence of year of birth, season of birth, birth type, sex of kid and the parity. The year of birth was divided into two seasons i.e. summer (April to September); and winter (October-March). The Statistical model assumed was:

$$Y_{ij} = \mu + F_i + e_{ij}$$

Where,

Y_{ij} = measurement of a particular trait

μ = population mean

F_i = the effect of all fixed effects with the restriction that $\Sigma F_i = 0$

e_{ij} = the random error associated with j^{th} observation on i^{th} effect.

These analyses were performed using Harvey's Mixed Model Least Squares and Maximum Likelihood Computer Program (Harvey, 1990).

RESULTS AND DISCUSSION

A total of 1666 kidding records with 129 base animals on 441 dams sired by 30 male goats and 262 grand dams sired by 38 grand sires were available. The average birth weight of the Teddy goats was 1.44 ± 0.06 kg in the flock.
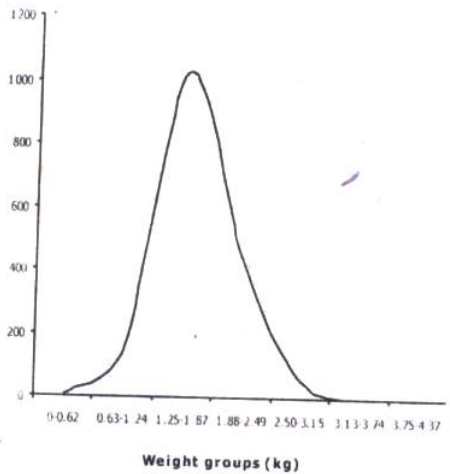
Fig 1: Frequency distribution of birth weights of Teddy kids
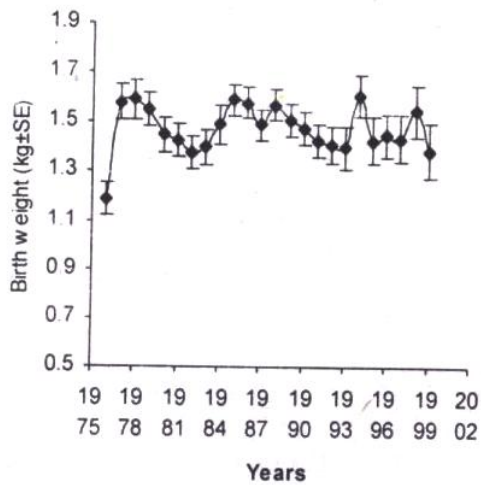
Fig 2: Least square means for effect of year of birth on birth weights in Teddy goats
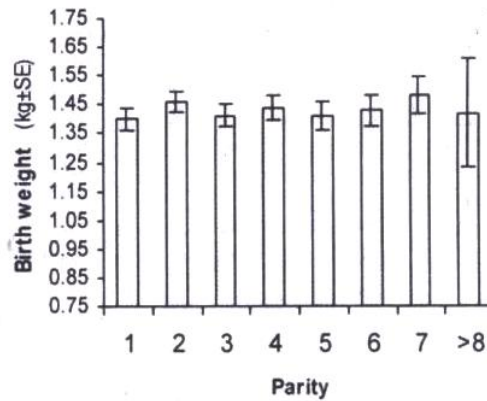
Fig 3: Least square means for the effect of parity on birth weights in Teddy goats

The influence of various environmental factors on birth weight was analyzed as the trait showed wide variation under varying sets of conditions (Fig. 1).

The Least squares analysis of variance for the evaluation of influence of season of birth, year of birth, sex of kid, parity of the dam and birth type of kid has been presented in Table 1. The analysis of the data indicated all effects were significant (P<0.01) except for parity that did not influence birth weight of Teddy kids.

The least square means along with standard error for birth weight of Teddy goats for different years, seasons, parities, sexes and birth types are presented in Table 2, Fig. 2 and Fig. 3. The maximum least square mean for birth weight was observed for the year 1994 (1.61 ± 0.08) and minimum least square mean for birth weight was calculated in the 1st year of the flock at Livestock Production Research Institute, Bahadurnagar, Okara which may be due to change of environment i.e. migration of goats from their home tract to the institute. The analysis of variance further showed the significant effect of season of kidding on birth weight as is evident from Table 1. The birth weight was higher in winter born kids. In the same fashion the male kids were heavier (P<0.01), while effect of parity was non significant. The type of birth was also proved to be the significant (P<0.01) source of variation while partitioning the variation. The single born kids were the heaviest with least squares mean of 1.74 ± 0.05 Kg and

least squares means for twins, triplets and quadruplets were 1.55 ± 0.05, 1.46 ± 0.06 and 1.03 ± 0.13 Kg, respectively.

Significant influence of year of birth on birth weight of kids has also been reported by Nagpal and Chawla (1984) and Bula *et al.* (1998), while the results of the present study are contradictory to the findings of Mukandan *et al.* (1981) and Koul *et al.* (1996), who reported non-significant influence of year of birth on birth weight of goats. Season of birth as significant factor while partitioning the variation in birth weights of goats, is also reported by Mittal (1979), Mukundan *et al.* (1981), Naik *et al.* (1985) and Bula *et al.* (1998) while the results of this study are not in agreement with Koul *et al.* (1996) who was of the opinion that season of birth had no influence on birth weight of goats. Sex of the kid is also reported as significant source of

Mavrogenis *et al.* (1984) and Naik *et al.* (1985) while many research workers have reported it as a significant source of variation while partitioning the variation in the birth weight of kids (Nagpal and Chawla, 1984; Nagpal and Chawla, 1985; Bula *et al.*, 1998). Single born kids being heavier than twins or multiple born kids was also reported by Mukundan *et al.* (1981), Ozekin and Ackapinar (1983), Garcia *et al.* (1986) and Bula *et al.* (1998) while Nath and Chawla (1978) were of opposite opinion.

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Table 1: Least squares analysis of variance for evaluation of environmental influences on birth weight of Teddy goats

Source of variation	Df	Mean squares	F-Ratio
Season of birth	1	0.6518	5.646*
Year of birth	24	0.7049	6.105**
Sex of animal	1	3.1406	27.201**
Parity	7	0.2733	2.367 NS
Birth type	3	6.0699	52.571**
Remainder	1629	0.1150	

*Significant (p<0.05), **Significant (p<0.01), NS non significant

Table 2: Least square means and their standard error for birth weight of Teddy goats for different environmental factors

Factors	Birth weight (kg)
Season	
Summer	1.42 ± 0.057
Winter	1.46 ± 0.058
Birth type	
Single	1.75 ± 0.049
Twin	1.55 ± 0.048
Triplet	1.46 ± 0.055
Quadruplet	1.03 ± 0.134
Sex	
Male	1.49 ± 0.057
Female	1.40 ± 0.058

variation by Nath and Chawala (1978), Mukundan *et al.* (1981), Naik *et al.* (1985) and Bula *et al.* (1998) while the results of the studies made by Mittal and Pandey (1978), Gupta *et al.* (1989), Koul *et al.* (1996) and Mourad and Anous (1998) are in contradiction to the findings of the present study. Parity is not a source of variation is also reported by Patro and Medill (1982),

LITERATURE CITED

Anonymous. 1997. Agriculture statistics of Pakistan 1996-97. Government of Pakistan, Food, Agriculture and Livestock Division, Islamabad.

Bula, D., T. C. Rov, R.N. Goswami, A. Saleque and B. Das. 1998. Factors affecting birth weight in Assam Local and Beetal × Assam Local (F1) kids. Indian J. Small Ruminants, 4(2): 83-86.

Garcia, F. X., S. J. C. Magofke, C. P. Azocar, O. M. Aylwin and P. Dela. 1986. Non-genetic effects as sources of variation for growth of Criollo kids in the Mediterranean arid zone of Chile. Adv. Anim. Prod., 11(1-2): 87-93.

Gupta, R. D., A. K. Pyne, R. Singha, and S. K. Roy. 1989. Birth weight and body weight gain in Black Bengal goats. Indian J. Anim. Prod. Mgt., 5(4): 169-171.

Harvey, W. R. 1990. User's Guide for LSMLMW and MIXMDL PC-2 version, Mixed Model Least Squares and Maximum Likelihood Computer Program.

Koul, G. L., G. S. Bisht, J. C. Biswas and B. D. Gupta. 1996. Studies on pre- and post-weaning body weights in Cheghu breed of pashmina producing goats. Indian J. Anim. Hlth., 35(1): 1-5.

Mavrogenis, A. P., A. Constantinou and A. Louca. 1984. Environmental and genetic causes of variation in production traits of Damascus goats. I. Pre-weaning and post-weaning growth. Anim. Prod., 38(1): 91- 97.

Mittal, J.P., 1979. A study on birth weight of Barbari and Jamnapari kids. Indian J., Anim. Sci., 49(1): 45-47.

Mittal, J. P. and M. D. Pandey. 1978. A study on growth rate in Barbari kids. Indian Vet. J., 55(6): 470-474.

Mourad, M. and M. R. Anous. 1998. Estimates of genetic and phenotypic parameters of some growth traits in common African and Alpine crossbred goats. Small Ruminant Res., 27(3): 197-202.

Mukundan, G., P. N. Bhat and B. U. Khan. 1981. Genetic analysis of birth weight in Malabari breed of goat and its half-breds. Indian J. Anim. Sci., 51(6): 630-634.

Nagpal, S. and D. S. Chawla. 1985. Non-genetic factors affecting body weights in crossbred goats. Indian J. Anim. Sci., 55(3): 203-207.

Nagpal, S. and D. S. Chawla. 1984. Non-genetic factors affecting body weights in Beetal and Alpine goats. Indian J. Anim. Res., 18(2): 99-104.

Naik, P. K., B. N. Patro and P. K. Mishra. 1985. Some factors affecting the body weight at different ages in Ganjam goats. Indian J. Anim. Sci., 55 (3): 213-214.

Nath, I. and D. S. Chawla. 1978. A study on birth weights of Beetal, Alpine and Beetal X exotic crossbred kids. Indian Vet. J., 55(4): 306-309.

Ozekin, N. C. and H. Akcapinar. 1983. Some factors affecting growth in Angora goat kids. Ankara Universitesi Veteriner Fakultesi Dergisi. 30(2): 317-327. (Anim. Breed. Abstr, 52: 6669: 1984).

Patro, B. N. and U. C. Madell. 1982. Effect of sex and sequence of kidding on body weight of Ganjam goats. Livestock Adviser, 7(8): 17-19.