



Influence of non-genetic factors on body weights of Jakhrana kids

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ABSTRACT

Data on 789 Jakhrana kids born from 2007–2012 at the Institute were recorded to study the influence of various non-genetic factors on body weights of Jakhrana kids. The overall least squares means for body weights at birth, 3, 6, 9 and 12 months age were 2.77 ± 0.06 , 8.61 ± 0.23 , 12.33 ± 0.26 , 16.45 ± 0.57 and 20.42 ± 0.46 kg, respectively. Sex of kids, year of kidding and season of kidding had highly significant influence on all the body weights except significant effect of season on 6 month- body weights and nonsignificant influence on 9 month weights. The effect of parity and type of kidding was nonsignificant on all the body weights except highly significant effect of type of birth on birth weight, significant influence of parity on birth weight and significant effect on 3 month weight. Comparison of body weight means of kids indicated that male kids gained more weights than female kids, respectively, at birth, 3, 6, 9 and 12 month age. Kids born during second season (summer) showed significantly higher body weights at all ages except 3 month weight than those born during first season (winter). Year of kidding did not show any definite trend for kids body weights. Maximum growth of kids was recorded during 0–3 month (pre-weaning) age followed by 6–9, 9–12 and 3–6 age groups.

Key words: Body weight of kids, Jakhrana goat, Non-genetic factors, Parity of dam

Jakhrana, a dual purpose goat, is important for meat as well as milk production. Its breeding tract is very limited and pure animals are found in and around Jakhrana village of Alwar district of Rajasthan. In addition to this the animals are famous for good adaptability to semi-arid region. In goat husbandry, the growth rate of the kids is most important factor that reflects the economics of the goat keepers because out of total the 70% income is achieved only from sale of animals. Evaluation of growth of kids at birth and subsequent ages is important to know the growth rate at particular age, which helps in deciding the continuation of particular animal in the flock to minimize the rearing cost. Any breed improvement programme for economic traits firstly requires to have the knowledge about phenotypic parameters of these traits. This study was therefore, conducted to assess the impact of sex, year of kidding, season of kidding, parity of does and type of birth on body weights of Jakhrana kids at various growth stages.

MATERIALS AND METHODS

Data on Jakhrana kids (789) born during the years 2007–2012 (6 years) at the Institute were utilized for this investigation. The animals were maintained under the research project entitled “Genetic improvement of Jakhrana goats for meat and milk production”. The kids were weaned at 3 months of age and after weaning these were maintained

under semi intensive feeding system, in which they were provided 100– 300g growth ration (concentrate) during various growth stages with some dry and green fodder and 5–6 h grazing daily. The concentrate was containing 72% TDN and 16% DCP prepared from maize (15%), barley (20%), groundnut cake (35%), wheat bran (20%), molasses (7%), mineral mixture (1.5%) and salt (1.5%). Breeding bucks were selected based on their 9 month body weight and 90 days milk yield of their mothers. Culling up to 5% was regularly carried out of those kids which showed stunted growth, off colour and not responded to treatment. All the animals were timely vaccinated for important diseases and drenched for internal parasites.

The data were recorded for buck number, sex of kid, year of kidding, season of kidding, parity of does, type of birth, dams’ weight at kidding and body weights of kids at birth, 3, 6, 9 and 12 months of age. Season of kidding was classified as winter or season-I (October to January) and summer or season-II (February to September). Type of birth of kids was classified into 3 types, viz. single, twins and triplet. The statistical analysis was carried out using LSMLMW computer programme (Harvey 1990) to assess the influence of sex, year of kidding, season of kidding, parity of dams and type of birth on body weights of kids at various growth stages.

RESULTS AND DISCUSSION

Body weights: Overall least squares means of body weights at birth, 3, 6, 9 and 12 month age are given in Table

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1. In contrast to present findings, Mandal *et al.* (2003) reported higher 3 and 12 month weights and lower birth, weight, 6 and 9 month weights in Jakhrana breed, and Rai and Singh (2005) observed lower birth weight and higher 3, 6 and 12 month weights than this study in the same breed. Singh *et al.* (2009) found higher birth, 3, 6, 9 and 12 months weights in Jamunapari kids than that in present findings. Jakhrana kids showed weaning effect as the body weight gain was low (3.72 kg) during 3–6 month age as compared to 6–9 month age group (4.15 kg). In addition to weaning effect, diarrhea might also have played an important role in creating the variations in the body weights of kids in different years.

Sex of kids: The body weights of male kids were significantly higher ($P<0.01$) than female kids at birth, 3, 6, 9 and 12 month age. The higher body weights in males than females might be due to differences of sex hormones in 2 sexes. On comparison, male kids showed percent superiority of 9.43, 10.12, 12.79, 10.63 and 18.28 over female kids at respective ages. Similar results were also observed by Singh *et al.* (1983) and Das *et al.* (1989) for birth weight in Jamunapari and Barbari kids. Abegaz *et al.* (2002) and Viroji Rao *et al.* (2004) reported that the growth trait was significantly affected by sex in sheep. Kuchtik and Sedlakova (2005) also reported that intensity of growth was significantly higher in males than in females ($P<0.01$)

in kids of brown short-haired breed. Dadi *et al.* (2008) reported that sex of kids significantly influenced ($P<0.001$) all growth traits of Arsi-Bale goats except for the 3–to 6–months growth rate.

Year of kidding: Year of kidding showed highly significant ($P<0.01$) influence on all the body weights of kids. Similar to present findings Das *et al.* (1995) also reported highly significant effect of year of kidding on body weights of Barbari kids. Comparison of body weights of kids in different years did not show any definite trend might be due to variations in the availability of grazing materials in the pasture and health condition of kids. The highest birth weight was recorded in year 2008, 3 and 6 month weights in year 2011 and 9 and 12 month body weights in year 2010. These weights were lowest in year 2011, 2008, 2009, 2009 and 2007, respectively.

Season of kidding: Least square means of birth, 3, 6, and 12 month weights of Jakhrana kids born during summer (season 2) were significantly higher than those born during winter (season 1). In consonance to present findings, Paul *et al.* (1990) and Dadi *et al.* (2008) reported significant ($P<0.05$) effect of season of kidding on 3 months weights of kids in Arsi-Bale goats. On comparison, it was recorded that the kids born during summer gained 4.79, 11.02, 12.0 and 7.09% higher weights than winter born kids, respectively at birth, 3, 6 and 12 month age. On contrary to

Table 1. Least squares means of body weights (kg) in Jakhrana kids

	Birth	3M	6M	9M	12M
Overall mean	2.77±0.06 (789)	8.61±0.23 (686)	12.33±0.26 (443)	16.45±0.57 (414)	20.42±0.46 (363)
Sex	**	**	**	**	**
Male	2.90±0.07 (417)	9.03±0.24 (363)	12.96±0.29 (236)	17.28±0.63 (223)	22.13±0.50 (193)
Female	2.65±0.07 (372)	8.20±0.23 (323)	11.49±0.29 (207)	15.62±0.62 (191)	18.71±0.49 (170)
Year	**	**	**	**	**
2007	2.79±0.08 (157)	8.75±0.27 (136)	12.39±0.35 (94)	16.14±0.74 (99)	17.84±0.57 (88)
2008	3.00±0.08 (104)	7.57±0.30 (80)	12.61±0.91 (8)	15.15±1.91 (8)	18.47±1.52 (6)
2009	2.77±0.08 (127)	8.41±0.27 (116)	10.96±0.31 (95)	14.73±0.68 (89)	18.70±0.52 (85)
2010	2.71±0.08 (82)	8.37±0.30 (75)	11.75±0.38 (55)	17.99±0.84 (49)	22.91±0.64 (44)
2011	2.64±0.08 (107)	9.35±0.29 (98)	13.59±0.33 (95)	16.93±0.72 (90)	20.21±0.55 (86)
2012	2.74±0.07 (135)	8.16±0.26 (113)	11.29±0.42 (53)	15.91±1.13 (27)	21.11±0.99 (16)
Season	**	**	*	NS	**
Season 1	2.71±0.07 (348)	8.16±0.24 (306)	12.59±0.31 (189)	16.68±0.67 (195)	19.72±0.53 (169)
Season 2	2.84±0.07 (441)	9.06±0.23 (380)	11.87±0.28 (254)	16.22±0.62 (219)	21.12±0.49 (194)
Parity	*	NS	NS	NS	NS
1	2.63±0.04 (163)	8.40±0.15(135)	12.15±0.27 (98)	15.97±0.62 (86)	20.95±0.47 (79)
2	2.76±0.04 (176)	8.85±0.14 (152)	12.51±0.26 (103)	16.18±0.59 (92)	21.23±0.46 (79)
3	2.77±0.04 (170)	9.05±0.15 (156)	12.87±0.27 (114)	17.46±0.59 (109)	21.18±0.46 (93)
4	2.73±0.05 (128)	8.50±0.17 (112)	12.68±0.34 (65)	16.25±0.72 (57)	21.06±0.54 (48)
5	2.86±0.06 (78)	8.75±0.22 (67)	13.05±0.43 (37)	15.81±0.90 (38)	20.77±0.67 (34)
6	2.59±0.07 (50)	8.32±0.27 (44)	11.60±0.54 (23)	15.31±1.16 (22)	19.66±0.81 (22)
Type of birth	**	*	NS	NS	NS
Single	2.87±0.03 (267)	9.03±0.13 (234)	12.71±0.21 (155)	16.61±0.45 (143)	21.04±0.40 (124)
Twin	2.69±0.02 (483)	8.60±0.09 (417)	12.36±0.17 (266)	16.58±0.34 (251)	20.47±0.30 (221)
Triplet	2.46±0.08 (39)	8.65±0.33 (35)	12.70±0.58 (22)	15.66±1.20 (20)	20.42±1.06 (18)

** Significant ($P<0.01$); * significant ($P<0.05$); NS, nonsignificant. Figures in parentheses are number of observations.

present findings, Das *et al.* (1995) reported higher birth weight of kids born during winter (October-February) than kids born during summer (March-September) in Barbari goats. In another finding, Mittal (1979) reported that winter born kids were superior to summer born kids for body weight at different ages in Barbari and Jamunapari goats.

Parity of does: Parity of does showed nonsignificant effect on all the body weights of Jakhrana kids except significant ($P < 0.05$) influence of parity on birth weights. Similar to present results, Marai *et al.* (2006) also reported significant ($P < 0.05$) effect of parity on litter size and litter weight at birth in Egyptian Nubian (Zaraibi) crossbred. In present findings, birth weight of the kids was recorded highest in fifth parity followed by third, second and first parity. There was no definite trend of body weights of kids in different parities, however, body weights of kids belonging to second, third, fourth and fifth parities gained slightly higher than first and sixth parities. Similar results were also reported by Prakash and Singh (1985) in crosses with Alpine and Saanen breeds and Pandev and Kanaujia (1988) in Beetal goats. On the contrary, Zahraddeen *et al.* (2008) observed that body weights of kids increased from the first to succeeding lactations, where kids from younger goats had the lowest weights as compared to those kids born from older does of local goats in Nigeria.

Type of birth: The body weights of kids born as single were significantly higher at birth and 3 month age which might be due to availability of more nutrients to singles as compared to twins and triplets during gestation and also more suckling after birth to weaning age. The superiority of single born kids was estimated to be 6.69, 5.0, 2.83, 0.18, 2.78 and 16.67, 4.39, 0.08, 6.06, 3.04% over twins and triplet kids, respectively. The growth patterns of singles, twins and triplets did not show any definite trend from birth to 12 month age as twin kids gained higher weights at birth and 9 month than triplet kids by 9.35 and 5.87%, respectively, and lower in weights by 0.58, 2.68 and 0.24% at 3, 6 and 12 month age. Present findings indicated that litter size had highly significant ($P < 0.01$) effect on birth weight and significant ($P < 0.05$) influence on 3 month body weight which were in agreement with the results reported by Rai *et al.* (2003) in Jakhrana goats and Yadav *et al.* (2003) in Kutchi goats, however, Mittal (1979) observed that the difference between single and twin born kids was nonsignificant in Barbari and Jamunapari kids. Zahraddeen *et al.* (2008) observed that single kids were heavier and had higher average daily live weight gains compared to twins in local goats in Nigeria. Dadi *et al.* (2008) reported that the effect of type of birth was on 3, 6 and 12 month body weights and single born kids were heavier at 3, 6 and 12 months of age in Arsi-Bale goats.

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