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Effect of different weaning age on morphometric measurements of Sirohi goat kids

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Abstract

The present research work entitled “Effect of different weaning age on morphometric measurements of goat kids” was carried out to study the effect of different weaning age on morphometric characters in terms of Sirohi goat kids. Twenty four Sirohi kids of one month of age were randomly selected and divided into three groups of each having eight kids at the goat farm of S.K.N. College of Agriculture, Jobner. Group T1 weaned at 60 days of age, T2 at 75 days and T3 at 90 days. The concentrate supplement given @ 1.5% of body weight and Mungbean straw *ad-libitum* to all kids during whole experimental period. Other management practices were similar for each group. Morphometric characters viz., body length, height at withers, heart girth, punch girth and loin girth of kids was recorded fortnightly. The overall increase in body length was 10.41, 9.97 and 10.13 cm, wither height was 10.13, 9.75 and 9.91 cm, punch girth was 12.09, 10.78 and 11.98 cm, heart girth was 11.74, 11 and 11.56 cm and loin width was 3.9, 3.7 and 3.69 cm in T1, T2 and T3 groups, respectively. The overall increase in body length, wither height, heart girth, punch girth and loin width was highest in group T1 followed by T3 and T2. The difference between groups for average body length, wither height, heart girth, punch girth and loin width was non-significant.

Keywords: characters, concentrates, morphometric, Sirohi goat kids

Introduction

Small ruminants are the major economically important livestock in India. They provide milk, meat, skin, fiber, pashmina, mohair, hair and manure for cash, gifts, security, medicine and value of milk etc. The role of small ruminants is more prominent in the arid and semi-arid region of country because of the uncertainty of crop production due to many reasons. Goat is a most important species in the small ruminant and second largest species of milk producing livestock after bovine. The goat is a browsing type animal and its feed containing of young leaves of trees and bushes. Farmers usually practice browsing and grazing for these animals without supplementing concentrates (Ghodake *et al.*, 2012) [5]. Animal growth is the function of cell multiplication and its rate depends on balanced supply of protein and energy for optimized growth performance. At a younger age protein deposition favoured due to muscular development hence higher levels of dietary protein is required, while at maturity fat deposition takes place thus protein need reduces and energy requirement increases. Growth traits are extremely important in goat husbandry. Kids that grow faster reach market weight at an early age, which generally means that they need a shorter feeding period, have less risk of death loss and provide quicker returns. Faster growth potential of kid has high requirement of nutrients, especially with regards to protein for skeleton and tissue growth. Creep and supplemental feeding of kids are practiced to maintain high early growth and to attain early marketable weight. Improved livestock production could be achieved through cultivation of high quality forage (leguminous and non leguminous) adapted to local conditions as well as feeding concentrate. Concentrate feeds promote the fast growth of goat and contributing to higher overall efficiency of utilization of dietary energy as well as protein for body weight gains (Mandevbu and Galbraith, 1999) [8]. Morphometric measurements are used to estimate several characteristics of animals. These measurements provide information for growth of the animal and the properties that change with environmental condition and feeding factors (Mule *et al.*, 2014) [9]. In addition, body measurements are useful data sources in terms of reflecting the breed standards and are also important in giving information about the morphological structure and growth ability of the animals in field conditions (Thiruvankadan, 2009). Morphological measurements differ according to the factors such as breed, gender and age.

Live weight provides important evidence in determining several characteristics of the farm animals especially for those having higher economic importance. Morphological measurements at high correlation with body weight can be taken into consideration in selecting animals for genetic improvement. The time of weaning is an important phase for rearing kids, which is followed by a decrease or whole stagnation of weight gain. The force and extent of upset at weaning depend on several factors, mainly on the age and body condition of kids at the time of weaning, as well as on their nutrition previous to weaning. The weaning body weight gives the idea about the future performance of the young one. It also helps to goat growers in computing the nutrient requirement, proper age for breeding, doses of medicine, optimum slaughter age, dressing percentage etc (Bhagat and Burte, 2015)^[1].

Materials and Methods

The experiment was conducted at goat farm, S.K.N. college

of Agriculture, S.K.N. Agriculture University Jobner, District Jaipur, (Rajasthan, India). Geographically Jobner is located 45.0 km west of Jaipur at 26° 05' North altitudes, 75° 28' East longitudes and at an altitude of 427 meter above sea level. Twenty four clinically healthy Sirohi goat kids of either sex approximately uniform weight or age group (one month) were selected. These kids were divided into three equal groups containing eight kids (N=8) in each group and the study was carried out for a period of twelve weeks. Groups T₁, T₂ and T₃ weaned at 60, 75 and 90 days, respectively. The experiment was conducted using randomized block design. Animals were penned in well-ventilated enclosures for the experiment in three pens. The experimental groups were randomly allotted to three weaning age. The dry fodder of Mungbean straw (*Vigna radiata*) was offered to all treatment groups ad-libitum and the concentrate feeding at rate of 1.5 per cent of body weight was started at the age of three weeks. The details of weaning age and concentrate supplementation to different treatments are given below.

Table 1: Weaning age and concentrate supplementation to different treatments

Treatment	Weaning age days)	Level of concentrate of body weight (%)	Dry fodder (Mung bean)
T ₁	60	1.5	<i>Ad-libitum</i>
T ₂	75	1.5	”
T ₃	90	1.5	”

Feeding Schedule

Concentrate and roughages were fed separately to each kid of all treatment groups. The concentrate was fed once in a day at 10:00 AM. Whereas the roughage (Mungbean straw) was offered at 10:30 AM and 4:00 PM to all treatment groups. Fresh and clean drinking water was available round the clock to all groups of kids.

Table 2: Distribution of Sirohi goat kids at the starting of experiment

Treatments	No. of animals	Average body weight (in kg)
T ₁	8	10.60±0.053
T ₂	8	11.15±0.092
T ₃	8	11.18±0.092

Table 3: Chemical composition (dry matter basis) of concentrate mixture

Name of nutrient	Percent of nutrient
Total Digestible Nutrient (TDN)	75
Crude Protein (CP)	18
Crude fiber (CF)	10
Common Salt	1.0
Mineral Mixture (MM)	2.0

Body morphometric measurements

The body morphometric measurements of the kids were recorded at fortnightly interval, before feeding, by using a measuring tape (cm) up to 12 weeks from the commencement of the experiment. Linear body dimensions viz. wither height, heart girth, punch girth, length and width of loin were recorded. Height was recorded from the surface of the platform (on which the animal stands) to the height at withers with the help of meter scale. Heart girth is a circumferential measure taken around the chest just behind the forelegs (elbow joint) and withers. Punch girth is circumferential

measure taken around the stomach just before the hind legs. Length was recorded from the base of the ear to the base of the tail head (pin bone) and the width was measured at last point of loin.

Statistical Analysis

Statistical analysis was carried out by standard statistical methods RBD and the calculation of ANOVA was done. This formula was given by Fisher and Yates (1950)^[4]. Superscripts are used for significantly difference in means by DMRT method. Duncan's new multiple range test (DMRT) is a multiple comparison procedure developed by David B. Duncan in (1955)^[3].

Result and Discussion

Body Length (BL)

The observations on body length (cm) of T₁, T₂ and T₃ groups of Sirohi kids from one to four months of age are presented in Table 4. It is observed that the average initial body length of the kids was 35.70 cm in group T₁, 35.64cm in T₂ and 35.61 cm in T₃ and after 12 weeks of experiment BL was found to be 46.14 cm in T₁, 45.61 cm in T₂ and 46.14 cm in T₃ group. A result shows that the increase in body length was lowest at 75 days in T₁, 90 days in T₂ and 105 days in T₃ groups.

Although there was non-significant difference in body length of kids within groups during the experiment, but the kids (T₁) showed more increase in body length as compared to kids from T₃ and T₂ groups. The results of the present study are in agreement with the findings of Rathod *et al.* (2011)^[11] who reported that body length of Osmanabadi kids ranging from 51.10±0.33 to 58.39±3.05 cm. Patil *et al.* (2013)^[10] reported the body length of sangamneri goat kids of one and three months age as 35.24±0.10 and 42.55±0.10 cm which are similar with present investigation.

Table 4: Average fortnightly body length (cm) of Sirohi kids from different experimental groups

Age of Kids (Days)	T ₁ (Mean±SE)	T ₂ (Mean±SE)	T ₃ (Mean±SE)	Total (Mean±SE)	P-Value
30	35.70±0.033	35.64±0.046	35.61±0.041	35.65±0.023	0.777
45	37.24±0.041	37.48±0.030	37.98±0.050	37.56±0.023	0.288
60	39.36±0.019	39.15±0.023	39.34±0.049	39.28±0.011	0.548
75	40.49±0.042	41.20±0.029	41.45±0.041	41.05±0.025	0.167
90	42.66±0.048	42.46±0.040	43.60±0.047	42.91±0.023	0.317
105	44.78±0.049	44.73±0.043	44.15±0.042	44.55±0.014	0.818
120	46.11±0.058	45.61±0.036	45.74±0.065	45.82±0.027	0.651

Non-significant at 5% level

Wither height (WH)

The observations on wither height (cm) of T₁, T₂ and T₃ groups of Sirohi kids from one to four months of age are presented in Table 5. It is observed that the average initial wither height of the kids was 41.10 cm in group T₁, 41.18 cm in T₂ and 41.10 cm in T₃ and after 12 weeks of experiment

WH was found 51.14 cm in T₁, 50.93 cm in T₂ and 51.24 cm in T₃. The increase in wither height was lowest at 75 days in T₁, 90 days in T₂ and 105 days in T₃ group and showing same trend as in increase of body weight. The results of the present study are in agreement with Dereje *et al.* (2013)^[2], they found same result in Haraghe highland goat kids

Table 5: Average fortnightly wither height (cm) of Sirohi kids from different experimental groups

Age of kids (Days)	T ₁ (Mean±SE)	T ₂ (Mean±SE)	T ₃ (Mean±SE)	Total (Mean±SE)	P-Value
30	41.10±0.022	41.18±0.030	41.10±0.030	41.13±0.016	0.349
45	42.46±0.024	42.55±0.028	42.49±0.027	42.50±0.016	0.139
60	44.94±0.035	44.46±0.023	44.16±0.036	44.52±0.017	0.694
75	45.46±0.033	46.19±0.026	46.45±0.021	46.00±0.016	0.702
90	47.61±0.036	47.36±0.040	48.50±0.032	47.83±0.019	0.155
105	49.63±0.043	49.21±0.044	50.36±0.052	49.73±0.024	0.126
120	51.23±0.056	50.93±0.036	51.01±0.051	51.05±0.017	0.414

Non-significant at 5% level

Punch Girth (PG)

Table 6 present the observations on average punch girth of Sirohi kids for various groups from 1 to 6 fortnights which shows linear increase with advancement in age. The initial observations of punch girth for kids of group T₁, T₂ and T₃ were 43.21, 43.25 and 43.06 cm and final 56.11, 54.03 and 55.04 cm respectively at end of experiment. The statistical analysis of the observations on fortnightly punch girth

revealed that punch girth of Sirohi kids did not differ significantly between kids weaned at different age. The results obtained revealed that maximum punch girth was found in T₁ than T₃ and T₂ group. Statistically the differences in fortnightly gain in punch girth of kids between groups were non-significant. Kharkar *et al.* (2014)^[7] reported higher figures for punch girth in Berari kids at 3 months of age than present study.

Table 6: Average fortnightly punch girth (cm) of Sirohi kids from different experimental groups

Age of kids (Days)	T ₁ (Mean±SE)	T ₂ (Mean±SE)	T ₃ (Mean±SE)	Total (Mean±SE)	P-Value
30	43.21±0.036	43.25±0.055	43.06±0.050	43.18±0.026	0.800
45	45.96±0.023	45.69±0.047	45.60±0.050	45.75±0.023	0.684
60	47.95±0.032	47.91±0.046	47.76±0.049	47.85±0.018	0.913
75	49.08±0.058	49.88±0.029	49.68±0.061	49.49±0.036	0.598
90	52.13±0.032	51.31±0.044	50.69±0.047	51.38±0.013	0.911
105	54.29±0.048	53.00±0.055	51.96±0.053	53.08±0.016	0.773
120	56.11±0.064	54.03±0.038	55.04±0.055	55.06±0.025	0.529

Non-significant at 5% level

Heart girth (HG)

The results of average fortnightly heart girth (cm) of Sirohi kids are shown in Table 7. The initial heart girth of kids recorded for T₁, T₂ and T₃ groups was 42.50, 42.56 and 42.54 cm at an age of one month which was increased 54.11, 53.56 and 54.21 cm at four months of age respectively. The heart girth of kids increase in all groups was found to be

linear later on. However the difference in heart girth was found non-significant between the groups at different fortnights but the increase in heart girth was more in T₁ group followed by T₃ and T₂. The present finding of heart girth was similar to the finding of Kharkar *et al.* (2014)^[7] in Berari goat kids of native tract.

Table 7: Average fortnightly heart girth (cm) of Sirohi kids from different experimental groups

Age of kids (Days)	T ₁ (Mean±SE)	T ₂ (Mean±SE)	T ₃ (Mean±SE)	Total (Mean±SE)	P-Value
30	42.50±0.051	42.56±0.066	42.54±0.057	42.53±0.029	0.917
45	44.86±0.039	44.93±0.059	44.84±0.057	44.88±0.027	0.890
60	46.35±0.040	46.28±0.072	46.64±0.052	46.42±0.028	0.926
75	48.19±0.033	48.39±0.039	48.99±0.081	48.52±0.029	0.559
90	50.61±0.047	49.95±0.051	51.88±0.049	50.81±0.032	0.468
105	52.71±0.051	51.81±0.053	52.66±0.046	52.40±0.028	0.502
120	54.24±0.063	53.56±0.031	54.09±0.056	53.96±0.029	0.628

Non-significant at 5% level

Loin width (LW)

The initial loin width was 6.98, 6.96 and 7.06 cm and the final loin width was 11.21, 10.63 and 10.76 cm in group T₁, T₂ and T₃, respectively as shown in Table 8. The highest increase in loin width was found in T₁ than T₃ and T₂ group. The result

indicates that the highest increase in loin width was found in T₁ than T₃ and T₂ group. The difference in loin width between groups was non-significant. Karim *et al.* (2007)^[6] and Zaharia *et al.* (2012)^[12] also reported that there was an increase in loin width with increase in level of growth.

Table 8: Average fortnightly loin width (cm) of Sirohi kids from different experimental groups

Age of kids (Days)	T ₁ (Mean±SE)	T ₂ (Mean±SE)	T ₃ (Mean±SE)	Total (Mean±SE)	P-Value
30	6.98±0.050	6.96±0.047	7.06±0.057	7.00±0.029	0.726
45	7.45±0.048	7.44±0.058	7.41±0.057	7.43±0.027	0.754
60	8.15±0.045	8.01±0.051	8.04±0.055	8.05±0.031	0.179
75	8.51±0.032	8.78±0.051	8.88±0.074	8.72±0.032	0.519
90	9.41±0.071	9.19±0.046	9.44±0.076	9.35±0.044	0.201
105	10.14±0.45	9.80±0.062	10.06±0.070	10.00±0.044	0.394
120	10.88±0.067	10.66±0.040	10.75±0.052	10.73±0.033	0.908

Non-significant at 5% level

Conclusion

Initial fortnightly body length of the kids in T₁, T₂ and T₃ groups was 35.70±0.033, 35.64±0.046 and 35.61±0.041 cm and at the end of the experiment 46.11±0.058, 45.61±0.036 and 45.74±0.065 cm, respectively which were non-significantly different from each other. On the basis of the present investigation, it may be concluded that the initial wither height of kids was 41.10±0.022, 41.18±0.030 and 41.10±0.030 cm and at the end of the experiment 51.23±0.056, 50.93±0.036 and 51.01±0.051 cm in T₁, T₂ and T₃ groups, respectively. The heart girth of the kids in T₁, T₂ and T₃ groups was 42.50±0.051, 42.56±0.066 and 42.54±0.057 cm, respectively at the 30 days of age and heart girth achieved at the end of the experiment was 54.24±0.063, 53.56±0.031 and 54.09±0.056 cm, respectively which were non-significantly different from each other. The initial punch girth of the kids in group T₁, T₂ and T₃ was 43.21±0.036, 43.25±0.055 and 43.06±0.050 cm, respectively. The final punch girth achieved at the end of the experimental period in group T₁, T₂ and T₃ group was 56.11±0.064, 54.03±0.038 and 55.04±0.055 cm, respectively with non-significant difference. Initial fortnightly loin width of the kids in T₁, T₂ and T₃ groups was 6.98±0.050, 6.96±0.047 and 7.06±0.057 cm and at the end of the experiment 10.88±0.067, 10.66±0.040 and 10.76±0.052, respectively. The difference in loin width was also found statistically non-significant. The correlation coefficient of BL, WH, HG, PG and LW was found 0.997, 0.996, 0.996, 0.998 and 0.994 with body weight. The correlation coefficient with morphometric measurements was highly positive.

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