

SEMEN CHARACTERISTICS IN YOUNG AND ADULT SURTI BUCK

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Present study was conducted to study the effect of age on semen parameters in Surti buck. Age was significantly influenced on majority of the semen parameters in Surti bucks. Adult bucks significantly ($P < 0.01$) performed better in terms of semen quantitative parameters viz., semen density (3.91 ± 0.03 vs 3.79 ± 0.03), volume (1.01 ± 0.03 vs 0.86 ± 0.03 mL), sperm concentration (2564.22 ± 87.27 vs 1978.13 ± 60.79 million/mL), total sperm count (2483.83 ± 115.22 vs 1546.93 ± 62.96 million) and semen index (1737.19 ± 78.10 vs 1104.39 ± 47.29 million). However, semen qualitative parameters viz., initial progressive motility (93.75 ± 0.22 vs 93.72 ± 0.21 %), live sperm count (75.36 ± 0.93 vs 75.93 ± 0.74 %), sperms with physically intact plasma membrane (85.28 ± 0.27 vs 85.31 ± 0.19 %), progressive motility at various intervals and morphologically normal spermatozoa were at par in adult as well as in young Surti bucks.

Key words: AV method, Semen ejaculates, Semen parameters, Surti buck

The conception rate is chiefly depends upon quality of the semen determined by various qualitative and quantitative semen parameters. These semen parameters are influenced by age of the bucks. Surti goat is a medium sized dual purpose breed, confined to small towns and cities situated on the western coastal belt of the South Gujarat. Reports are available on effect of

age on semen parameters in different breed of goats; however, no such report is available on Surti bucks. Hence, the experiment was conducted to study the influence of age on Surti buck semen parameters.

Total nine apparently healthy Surti bucks maintained under All India Coordinated Research Project (AICRP) on Goat,

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Livestock Research Station, Navsari Agricultural University, Navsari were selected and divided in to two groups based on their age *viz.*, adult bucks (22 to 26 months, n=4) and young bucks (14 to 15 months, n=5). The semen was collected regularly by artificial vagina method twice a week from each buck up to 16 weeks (160 ejaculates from young bucks and 128 ejaculates from adult bucks). The samples were evaluated by standard laboratory procedures available in literature. Additionally, total sperm count per ejaculate was calculated by multiplying sperm concentration/mL by the volume of the ejaculate. While, semen index ($\times 10^6$) was calculated by multiplying semen volume, sperm concentration/mL, live sperm count and progressive motility (Barkawi *et al.*, 2006). Moreover, the motility degeneration rate at different intervals was calculated as per the formula given by Campos *et al.* (2004). The data pertaining to various aspects were suitably tabulated and analyzed using IBM SPSS statistics (version 20) software by t-test.

The influence of age on various semen parameters is presented in Table 1. In present experiment, mean density was significantly ($P < 0.01$) higher in adult (3.91 ± 0.03) bucks compared to young (3.79 ± 0.03) bucks. Similarly, the mean semen volume (mL) was significantly ($P < 0.01$) higher in adult (1.01 ± 0.03) than young (0.86 ± 0.03) bucks which was

comparable with Mia *et al.* (2013). While, Parmar *et al.* (2011) obtained similar amount of semen volume (0.84 ± 0.02 mL) in 12-18 months old Mehsana bucks, which was at par with present value of volume (0.86 ± 0.03 mL) in young bucks. Compared to present study, Thakur *et al.* (2005) obtained quit low amount of semen volume (0.47 ± 0.03 mL) from 1.5 to 2.5 years old Chegu Pashmina bucks.

The mass activity was non-significantly differed between two groups (4.73 ± 0.04 vs 4.66 ± 0.04) in present study which was in accordance with Mia *et al.* (2013), while, Gogoi *et al.* (2008) reported gradually increased mass activity with increased age. Further, the observed value of mass activity in present study was almost similar to those reported by Thakur *et al.* (2005) and quit higher than reported by Suyadi (2012), Kalyani *et al.* (2015) and Siddiqua *et al.* (2016).

The average initial progressive motility (%) was non-significantly differed between young (93.72 ± 0.21) and adult (93.75 ± 0.22) bucks. Akpa *et al.* (2013) also observed non-significant difference in motility between different age groups of Red Soketo bucks. Whereas, the initial motility observed in present investigation was comparatively higher than reported by Apu *et al.* (2008), Kerketta *et al.* (2014), Kalyani *et al.* (2015) and Siddiqua *et al.* (2016), while, Gogoi *et al.* (2008) recorded gradually increased overall initial sperm

Table 1. Semen parameters (Mean±SE) in Surti bucks

Semen Parameters	Young (n=160)	Adult (n=128)	t value	P value
Density	3.79±0.03	3.91±0.03	2.57**	0.01
Volume (mL)	0.86±0.03	1.01±0.03	3.56**	0.00
Mass activity	4.66±0.04	4.73±0.04	1.24 ^{NS}	0.22
Initial progressive motility (%)	93.72±0.21	93.75±0.22	0.10 ^{NS}	0.92
Sperm concentration (Million/mL)	1978.13±60.79	2564.22±87.27	5.66**	0.00
Total sperm count (Million)	1546.93±62.96	2483.83±115.22	7.51**	0.00
Live sperm (%)	75.93±0.74	75.36±0.93	-0.48 ^{NS}	0.63
HOS Reacted sperm (%)	85.31±0.19	85.28±0.27	0.08 ^{NS}	0.94
Semen Index	1104.39±47.29	1737.19±78.10	7.23**	0.00

**Significant at P<0.01; NS: Non-significant

Table 2. Progressive motility (%) and motility degeneration rate (MDR) at 30 min. intervals (Mean±SE) in Surti bucks

Time Interval	Young (n=160)	Adult (n=128)	t value	P value
Progressive motility (%)				
30 min.	87.41±0.35	87.54±0.35	0.27 ^{NS}	0.79
60 min.	80.28±0.43	80.98±0.48	1.08 ^{NS}	0.28
90 min.	73.22±0.57	74.61±0.57	1.70 ^{NS}	0.09
120 min.	65.97±0.67	66.88±0.79	0.88 ^{NS}	0.38
Motility degeneration rate (%)				
30 min.	6.77±0.25	6.65±0.24	-0.35 ^{NS}	0.73
60 min.	14.39±0.36	13.67±0.42	-1.32 ^{NS}	0.19
90 min.	21.96±0.54	20.48±0.53	-1.94*	0.05
120 min.	29.71±0.67	28.77±0.79	-0.92 ^{NS}	0.36

*Significant at P<0.05, NS: Non-significant

Table 3. Sperm morphological parameters (Mean±SE) in Surti bucks

Parameters (%)	Young (n=160)	Adult (n=128)	t value	P value
Normal sperm	97.43±0.12	97.41±0.19	-0.08 ^{NS}	0.94
Head abnormality	0.41±0.05	0.39±0.08	-0.17 ^{NS}	0.86
Mid-piece abnormality	0.96±0.10	0.83±0.11	-0.90 ^{NS}	0.37
Tail abnormality	0.78±0.09	0.95±0.16	0.95 ^{NS}	0.34
Cytoplasmic droplets	0.06±0.03	0.03±0.02	-0.82 ^{NS}	0.41
Total abnormality	2.57±0.12	2.59±0.19	-0.08 ^{NS}	0.94

NS: Non-significant

motility with increased in the age of bucks.

The average sperm concentration (million/mL) estimated by haemocytometer method was significantly ($P<0.01$) higher in adult (2564.22 ± 87.27) bucks than young (1978.13 ± 60.79) bucks which was in accordance with Suyadi (2012) and Mia *et al.* (2013). However, the mean values were lower than the observation of Jadav *et al.* (2008), Parmar *et al.* (2011) and Kerketta *et al.* (2014). The mean total sperm count in present experiment was 1546.93 ± 62.96 and 2483.83 ± 115.22 millions per millimeter in young and adult bucks, respectively. The difference between them was highly ($P<0.01$) significant.

The average live sperm count (%) was 75.93 ± 0.74 in young and 75.36 ± 0.93 in adult bucks. Gogoi *et al.* (2008) observed increased live sperm count with increased in the age of bucks, while, Thakur *et al.* (2005) obtained lower live sperm count than the present findings. Almost similar mean HOS reacted spermatozoa (%) were observed in young (85.31 ± 0.19) and adult (85.28 ± 0.27) bucks which was in accordance with the reporting of Kalyani *et al.* (2015).

The semen index was significantly ($P<0.01$) higher in adult (1737.19 ± 78.10) bucks compared to young (1104.39 ± 47.29) bucks. The average progressive motility (%) at 30 min, 60 min, 90 min and 120 min was non-significantly higher in adult (87.54 ± 0.35 , 80.98 ± 0.48 , 74.61 ± 0.57 and 66.88 ± 0.79)

bucks than young (87.41 ± 0.35 , 80.28 ± 0.43 , 73.22 ± 0.57 and 65.97 ± 0.67) bucks, respectively (Table 2). While, average motility degeneration rate (%) at 30 min, 60 min and 120 min was non-significantly higher in young (6.77 ± 0.25 , 14.39 ± 0.36 and 29.71 ± 0.67) bucks than adult (6.65 ± 0.24 , 13.67 ± 0.42 and 28.77 ± 0.79) bucks, respectively. It was significantly ($P<0.05$) higher at 90 min in young (21.96 ± 0.54) bucks compared to adult (20.48 ± 0.53) bucks.

The mean total sperm abnormalities (%) differed non-significantly between young (2.57 ± 0.12) and adult (2.59 ± 0.19) bucks (Table 3). Similarly, Suyadi (2012) also observed non-significant difference in abnormal spermatozoa between different age groups of bucks, while, Jadav *et al.* (2008), Parmar *et al.* (2011) and Kalyani *et al.* (2015) observed higher percentage of total abnormalities compared to present study.

From the present experiment it was concluded that as the adult Surti bucks significantly performed better compared to young bucks in terms of semen quantitative parameters they should be preferred over young bucks for breeding purpose.

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