



## Original Research Article

### Effect of age on Physical Characteristics of Kundhi Buffalo Bull Semen

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#### A B S T R A C T

The study was carried out on 6 buffalo bulls (*Bubalus bubalis*) divided into three age groups i.e (<5 years, 6-8 years and >8 years old) The study was being carried out to determine the effect of age on the physical characteristics of Kundhi buffalo bull semen. Six ejaculations were collected each day from bulls of different age groups. The average mean volume of first age group (B1, B2), second age group (B3, B4) and third age group (B5, B6) was 3.75, 4.61 and 3.96 ml respectively. Ejaculated volume in adult was higher than young followed by older one. The color of fresh bull semen ranged between milky white, creamy white and white. No any significant change was observed. There was no consistent pattern and the semen color of various bulls varied between white, milky white and creamy white between different age groups. The average mean pH of first age group (B1, B2), second age group (B3, B4) and third age group (B5, B6) was 6.39, 6.71 and 6.87 respectively. The pH observed during the present study shows that pH in young age group was lower than adult bulls and older bulls have higher pH. The average mean mass activity of first age group (B1, B2), second age group (B3, B4) and third age group (B5, B6) was 2.49, 3.83 and 2.16 respectively. Mass activity was higher in adults than olders and young. The average mean sperm motility of first age group (B1, B2), second age group (B3, B4) and third age group (B5, B6) was 66.50, 76.5 and 58 % respectively. Sperm motility was lower in old bulls than in young and adult bulls

#### Keywords

Semen,  
bull,  
age,  
physical  
characteristics

#### Introduction

Kundhi breed of Buffalo is found on the both sides of river Indus from Kashmore to Shah Bandar (Sindh). Kundhi buffaloes are found mainly in Hyderabad, Larkana, Nawabshah and Badin province of Sindh. Physical Characteristics of the breed include the massive jet-black body, horns are broad

relatively small. Dewlap is absent. Legs are short and straight. The udder is moderately developed and is well tucked up. The adult body weight of male is 500-600Kg. (Shah *et al.* 1994.). Bulls reach sexual maturity at 2 to 3 years of age. Semen is produced all year round but it is highly affected by heat stress

and low quality feed. The buffalo bull seems to be most fertile in spring when the volume of ejaculate and the sperm concentration is high. The survival rate of the sperms is also much higher in spring than other seasons of the year. Corresponding values are lowest in summer season. Heat stress may have a negative effect on libido.

Semen is a fluid produced by male which carries the sperm to the female often resulting in pregnancy (Wikipedia, 2009). Semen is a whitish fluid containing water and small amount of salt, protein and fructose sugar. It is itself harmless on skin or when solid (Dean, 2006). Semen is secreted by the gonads (sexual glands) and other sexual organs of male or hermaphroditic animals for fertilization of female ova. The process of discharge is called ejaculation. Sperms are produced in the testicles, and most of the fluid in the prostrate. At the time male orgasm semen is ejected from the penis. In another definition semen is a viscous whitish secretion of the male reproductive organs, containing spermatozoa and consisting of secretion of the testis, seminal vesicles, prostrate and bulbourethral gland also called seminal fluid (Salmon and Foxhall, 1998).

Semen quality is examined to access its ability to accomplish fertilization. It is the sperm in the semen that are of importance and therefore semen quality involves both sperm quantity and sperm quality. The volume of bull semen ranges from 2 - 8 ml per ejaculation. Semen quality in bull sires also reflects the degree of normality of the function of their testes, ducti epididymides and genital tract (Barth and Waldner, 2002).

Although buffalo bulls breed the year round, conflicting reports have been published about semen quality and volume at different ages. Saeed (1988), reported the best quality semen at 3-4 years of age. He concluded that

the age of the bull affect semen characteristics but that variations in these parameters do exist even in the same age in different localities.

In view of the significance of semen quality in reproduction, the study carried out to determine the quality of semen as affected by age in Kundhi buffalo bulls.

## **Materials and Methods**

The study was carried out during the year 2013 to evaluate the effect of age on physical characteristics of Kundhi buffalo bull semen. Six bulls were being selected and tagged at the Department Of Animal Reproduction Faculty Of Animal Husbandry And Veterinary Sciences. Bulls were divided into three age groups with two bulls in each age group. The first age group was less than 5 years (B1, B2), second age group was 6-8 years (B3, B4) and third age group was more than 8 years (B5,B6). Three ejaculations were being collected from each bull. Semen was being collected from each bull twice a week. Before collection of semen, sterilization of all glasswares and other materials was done.

### **Semen collection**

Bull semen was collected by artificial vagina. During this procedure all precautions were under consideration to avoid contamination of samples. The semen was collected early in the morning just before sunrise. The temperature of the AV at the time of preparation was maintained around 50°C to 52°C. At the time of collection it was ranged from 42°C -45 °C. Before each collection the temperature of AV was recorded with thermometer. The bulls were sexually stimulated by providing two false mounts and five to ten minutes sexual restraint.

## Evaluation of Semen

The semen samples collected were transferred to water bath whose temperature was already maintained at 37°C. During this process semen physical characteristics such as volume, color, pH, mass activity and sperm motility was determined.

Each ejaculate was analyzed for following parameters:

1. Ejaculated Volume
2. Color
3. pH
4. Mass activity
5. Sperm motility

### Volume

The volume of the semen ejaculated was measured by graduated collecting tube and recorded in ml.

### Color

The color of the semen was determined by examination through naked eye as creamy, milky & milky white.

### pH

The pH was determined by pH meter.

### Mass activity

Mass activity was evaluated by placing a drop of fresh semen on glass slide and without using cover slip, this slide was observed under a compound microscope at 100 X magnification. The grade of mass activity was recorded. Grading rules were as follows:

0=No mass activity

+= upto 20% semen showing progressive motion

++= upto 40% semen showing progressive motion with slow wave

+++= upto 60% semen showing progressive motion with wave more intense

++++= upto 80% semen showing progressive motion with rapid wave wakening eddies

+++++= upto 100% semen showing progressive motion with highly rapid wave wakening eddies

### Sperm motility

The motility was expressed in percentage of sperms moving in forward direction. A drop of diluted semen was placed on glass slide and using cover slip the semen was examined under microscope at magnification 400 X

## Results and Discussion

Fresh semen volume of six Kundhi buffalo bulls was obtained on various dates in a pre-warmed collection tube to study the effect of age on the quantity of ejaculation. The mean ejaculated volume of group 1, 2 and 3 for five collections averaged 3.75, 4.61 and 3.96 ml and respectively.

### Volume

### Color

The fresh semen of Kundhi buffalo bulls was also studied for color. There was no consistent pattern and the semen color of various bulls varied between white, milky white and creamy white.

### pH

The data in table-4 suggests that the average pH of different age groups in ascending order as 6.39, 6.71, 6.87 respectively.

### **Mass activity**

The mass activity of sperms is considered as viability characteristic and is determined through microscope by low magnification. The results (Table-5) showed that on the basis of swirling movement, all the fresh semen sample showed ++ to ++++ mass activity. For statistical interpretation and deriving averages, these were given numerical values. The mean numerical value for mass activity of the sperm collected in June, 2013 was 2.49, 3.83 and 2.16 respectively.

### **Sperm motility**

The sperm motility predicts the fertilizing capacity of bull spermatozoa. The results (Table-6) showed that motility of fresh sperm obtained from three age groups in June, 2013 was 66.5%, 76.5 and 58.5% respectively.

Studies have shown that age has significant effect on various semen characteristics. Present investigation was therefore, carried to study the effect of age on physical characteristics of Kundhi buffalo bull semen.

### **Volume**

Present study showed that the ejaculated volume of 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> age group was 3.75, 4.61 and 3.96 respectively. These results are supported by Javed *et al* (2000) and Younis (1996) who reported that ejaculated volume in adult is higher than young followed by older one. Variation in semen volume may be due to differences in genetics, reproductive health status of bulls, nutrition and age of the bulls. (Nazir, 1988)

### **Color**

The color of the Kundhi buffalo bull semen

was recorded as white to creamy white which was similar as recorded by (Brohi, 1993). There was no consistent pattern and the semen color of various bulls varied between white, milky white and creamy white between different age groups. During present investigations the milky white color of the semen was dominant among all the bulls same as in Swamp buffalo it was milky white (Janinuddin *et al.*, 1992). Buffalo semen generally varies from a milky white to creamy color, with a slight tinge of blue (Vale, 1997). It depends on variations in concentration of spermatozoa, health feeding and environmental conditions.

### **pH**

The semen pH in the present study of 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> age group was 6.39, 6.71 and 6.87 respectively. The pH observed during the present study shows that pH in young age group was lower than adults bulls and older bulls have higher pH. The results was close to Younis (1996), who reported relatively lower pH in the adult bulls. ranges from 6.9 - 7.0. While Anderson, (2005) reported pH in the range  $6.73 \pm 0.02$  which is close to present study. However, pH recorded during the present study for the same breed. The discrepancy might have been due to age of the bull. None of the pH was in the range of lethal level for the sperm cells.

### **Mass activity**

While studying the sperm mass activity, it was recorded as 2.49, 3.83 & 2.16 for three age groups, that resembles to the results of Zubair (2005), Barth and OKo (1989). Younis *et al* (1996) reported mass activity higher in adults than olders. the higher mass activity may be due to high sperm concentration in adult bulls. which varies from current study because mass activity depends upon season and age of the bulls.

**Table-1** Mean Scrotal Circumference (cm) of Kundhi buffalo bulls in different age groups

S.No	Age (years)	Bull no.	Scrotal circumference (cm)	Avg. Mean±SE
1	3.5	B1	24.2	26.05±1.85
2	4.5	B2	27.9	
3	6	B3	28.9	29.30±0.40
4	7.5	B4	29.7	
5	8.25	B5	28.3	28.05±0.25
6	9	B6	27.8	
Overall Mean	-	-	27.8	

**Table-2** Mean Ejaculated Volume (ml) of Kundhi Buffalo Bull Semen of different age groups

Age Groups	Bull no.	Volume (ml)			Mean	Avg. Mean±SE
<b>Bull-1,2</b> (<5 years)	B1	3.8	3.7	3.5	3.67	3.75±0.08
	B2	3.8	3.8	3.9	3.83	
<b>Bull-3,4</b> (6-8 years)	B3	4.5	4.3	4.8	4.53	4.61±0.08
	B4	4.7	4.4	5.0	4.70	
<b>Bull 5,6</b> (>8 years)	B5	4.2	4.0	3.9	4.03	3.96±0.06
	B6	4.0	4.1	3.6	3.90	

**Table-3** Semen color of Kundhi buffalo bull semen in different age groups.

Age Groups	Bull no.	Color		
<b>Bull-1,2</b> (<5 years)	B1	White	Milky White	White
	B2	Milky white	Milky white	White
<b>Bull-3,4</b> (6-8 years)	B3	Milky white	Milky white	Creamy white
	B4	Creamy white	Milky white	Milky white
<b>Bull 5,6</b> (>8 years)	B5	Milky white	Creamy white	Creamy white
	B6	Creamy white	Milky white	Creamy white

**Table-4** Mean pH of Kundhi Buffalo Bull Semen in different age groups.

Age Groups	Bull no.	pH			Mean	Avg. Mean±SE
<b>Bull-1,2</b> (<5 years)	B1	6.41	6.50	6.49	6.46	6.39±0.93
	B2	6.05	6.25	6.38	6.32	
<b>Bull-3,4</b> (6-8 years)	B3	6.45	6.67	6.83	6.68	6.71±0.035
	B4	6.56	6.73	6.64	6.75	
<b>Bull 5,6</b> (>8 years)	B5	6.89	6.93	6.80	6.87	6.87±0.005
	B6	6.83	6.88	6.95	6.88	

**Table-5** Mean mass activity of Kundhi Buffalo Bull Semen in different age groups

Age Groups	Bull no.	Mass activity			Mean	Avg. Mean±SE
<b>Bull-1,2</b> (<5 years)	B1	3	2	3	2.66	2.49±0.16
	B2	2	3	2	2.33	
<b>Bull-3,4</b> (6-8 years)	B3	4	4	3	3.66	3.83±0.17
	B4	4	4	4	4.00	
<b>Bull 5,6</b> (>8 years)	B5	2	2	3	2.33	2.16±0.16
	B6	2	2	2	2.00	

**Table-6** Mean sperm motility (%) of Kundhi buffalo bull semen in different age groups.

Age Groups	Bull no.	Mass activity			Mean	Avg. Mean±SE
<b>Bull-1,2</b> (<5 years)	B1	68	67	69	68	66.5±1.5
	B2	66	65	64	65	
<b>Bull-3,4</b> (6-8 years)	B3	75	78	80	77	76.5±0.5
	B4	79	77	72	76	
<b>Bull 5,6</b> (>8 years)	B5	56	60	61	59	58.5±0.5
	B6	58	57	59	58	

## Sperm motility

In the recent study sperm Motility for group 1 (< 5 years), group 2 (6- 8 years) and for group 3 (> 8 years) was 66.5, 76.5 and 58.5 % respectively. This result is also supported by Brohi et al. (1993), who reported sperm motility 65-70% in adult Kundhi Buffalo Bulls. Younis (1996) also reported low sperm motility in old bulls than in young and adult bulls. Koonjaenak et al (2007) reported that sperm motility in bull semen ranges from 72-75.2% in adult bulls. Jainuddin et al (1992) reported sperm motility in bull as 70.7% which vary because sperm motility is associated with environmental temperature, nutritional management and type of breed also.

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