



**Study on female reproductive performance of Kamohri goat managed under traditional management conditions in district Hyderabad, Sindh, Pakistan**

**Hamzo Khan Kunbhar<sup>1</sup>, A. A. Memon<sup>1</sup>, A. L. Bhutto<sup>4</sup>, Zahid Iqbal Rajput<sup>2</sup>, V. Suthar<sup>5</sup>, Azizullah Memon<sup>3</sup> and R. A. Leghari<sup>4</sup>**

<sup>1</sup>Department of Animal Reproduction,

<sup>2</sup>Central Veterinary Diagnostic Laboratory Tandojam.

<sup>3</sup>Department of Poultry Husbandry

<sup>4</sup>Department of Veterinary Medicine

<sup>5</sup>Department of Statistics

Faculty of Animal Husbandry and Veterinary Sciences,  
Sindh Agriculture University, Tandojam

\*Corresponding author: [drkunbhar@gmail.com](mailto:drkunbhar@gmail.com)

**Abstract**

The study was conducted to investigate the reproductive performance of female Kamohri goat managed under traditional management conditions in district Hyderabad, Sindh, Pakistan. The data were collected on reproductive performance on farm management and utilized for this study. The data were gathered through regular visits of various farms in selected areas of district Hyderabad. The result revealed that the mean ( $\pm$ MES) age at puberty and age at first kidding was recorded as  $370.026 \pm 5.435$  and  $532.14 \pm 5.256$  days respectively. The mean ( $\pm$ MES) length of estrus cycle, duration of estrus period and post-partum estrus period was observed as  $21.03 \pm 0.17$  days,  $24.791 \pm 0.097$  hrs and  $68.21 \pm 0.46$  days respectively in Kamohri goat does. The difference between the parity was found significant for post-partum estrus period and it seems to be an ideal period. It was concluded that reproductive performance of Kamohri goat were suitable and indicating efficient reproductive performance and this breed can be utilized for sustainable goat farming in the home tract area of Kamohri goat breed.

**Keywords:** Kamohri goat, reproductive performance, traditional management.

**Introduction**

Sindh province forms the lower Indus basin and lies between  $23^\circ$  and  $28^\circ$  north latitudes and  $66^\circ$  to  $71^\circ$  east longitudes. Sindh province comprises on five administrative divisions including Hyderabad division. Hyderabad division is comprising on seven districts including district Hyderabad itself. Hyderabad district lies between  $25^\circ$  ( $22^\circ 45' / 25.37917N$ ) north and  $68^\circ$  ( $22^\circ 06' / 68.36833N$ ) east longitudes. The climate of Hyderabad is subtropical; the days are hot and dry. The temperature usually going rise high as above to  $46^\circ C$ , whereas the nights are cool and breezy. In winter

the temperature drops up to  $2^\circ C$  during December and January. Sindh lies between the two monsoons the southwest monsoon from the Indian Ocean and the northeast or retreating monsoon, deflected towards it by the Himalayan Mountains and escapes the influence of both. The averages annual rainfall is about seven inches, mainly during July and August. The maximum rain falls in summer is 286 millimeters (11.3 inches). The humidity falls below 40 percent in Hyderabad during April and it increases after monsoon from July to August (Anonymous, 2011; Khan, 1983).

Hyderabad district is an agricultural based and, its' environment favors the livestock raising. Livestock is an important sub-sector of Agriculture, where majority of population is directly or indirectly engaged in agriculture and livestock raising. It plays a vital role in the rural economy and provides sole source of livelihood for millions of landless and poorer in many countries including Pakistan (Boyazoglu *et al.*, 2005; Qureshi, 2010; Sodiq *et al.*, 2002). Goats play an important role in the economy of traditional pastoralist to small scale resources of poor livestock keeper. Goats are primarily reared for meat and milk purpose, secondary for hairs and skins (FOASTAT, 2011; Macha and Mbagha, 2009; Kioumaris *et al.*, 2011). It serves as a sustainable economic source of income, with good market price assisting to reducing poverty among the poorer families of rural areas (Mahmuod, 2010; Safari *et al.*, 2008; Devendra, 2007). Goats contribute largely to the livelihoods of livestock keeping households of low and medium input farmers (Dassa *et al.*, 2008; Devendra, 2007).

Goats has the ability well adapted to broad range of fluctuating climatic and ecological conditions. It is widely spread all over the world with more concentrated in the tropics and drier zones of developing countries than other any domestic farm animals. There are more than 924 million live goats are found all around the world of which 97.3 % found in the developing countries (FAOSTAT, 2011; Hirst, 2008). The goat population is continuously increasing throughout the world as compared to other ruminants (Boyazoglu *et al.*, 2005). Presently Pakistan has 64.9 million of goats (GOP, 20012-2013) and is the third largest goat producer country after China and India (Zaraimedia, 2013). Kamori is a dairy goat breed found in Bith Shah, Hala, Saeedabad, Matiyari, Hyderabad, Tando Adam, Tandoallahyar, and Dadu, districts of Sindh. The animals of this breed are almost spread all over the Sindh province, including other provinces of Pakistan due to its beauty, high milk yield and heavy body weight. The name 'KAMOHRI' is given to this breed because of choosing, picking and eating with interest the grass named "KAMOOH" (Kunbhar, 2016, Personnel communication). It is one of the heavy breed amongst the other goat breeds of Sindh. The adult body weight is about 70 kg in male and 45-60 kg in female. The female goats produce 2-3 liters of milk per day hence this breed is remembered as "Poor man's cow" though the animals of this breed are reared for dual propose (Devendra, 2007; Issani, 1996; Mahgub *et al.*, 2005; Iqbal, 1994).

Improvement in reproductive performance can be achieved with increasing reproductive rate of the animals (Ice, 2010; Gemiyu, 2009; Hirst, 2008; Wilson and Durkins, 1988). Reproductive efficiency is directly related to viability of off-springs, kidding rate, age at puberty, age at first kidding, kidding interval and length of reproductive cycle (Abecia *et al.*, 2012; Ali, 2006; Kioumaris *et al.*, 2011; Greyling, 2000). The reproduction and production performances of an animal are directly influenced by genetic potential of animal, nutrition, environment and management of farm and staff involved. Delay at any stage causing great economic losses to goat farmers. Goats are kept in different production systems, i.e. intensive and extensive, the latter one is practiced by farmers in rural areas. The structure of goat production is quite different in developing countries where the goat flocks are in the hands of nomads and poor goat keepers. Goat reproduction can be improved with better management practices and the knowledge of normal physiology of reproduction and its' performances of these indigenous goat breeds. There is great need to maintain and improve reproductive performance of our indigenous goat breeds at maximum level to provide adequate animal nutrition for rapidly expanding human population. The study was therefore planned with the aims to know the normal reproductive performances of Kamohri goat managed under traditional management conditions in district Hyderabad.

## Materials and Methods

**Study area:** Study was conducted at Department of Animal Reproduction Faculty of Animal Husbandry and Veterinary Sciences, Sindh Agriculture University, Tandojam, Sindh. The data was collected from the survey of various farms running in private sector in rural areas, where animals were managed under traditional (village) management conditions in district Hyderabad, Sindh.

**Management of animals:** The study area was selected on the basis of goat population, where a large number of goats are reared. The goats were kept in Kacha hut in winter during night to protect them from cold and open yards in hot harsh summer. Flock was allowed for grazing and browse during day time (8.00 a.m. to 4.00 p.m.) in free range grazing areas on pastures nearby villages under the supervision of a herdsman, particularly women or middle age children. On return at home the goats were fed green grasses and/or, green fodders such as Jantar (*Sasanian aculeata*) and Burseem (*Trifolium alexandrianum*) available

according to the season. The concentrate ration was given at the rate of 250 gm/head/day, to productive animals and water was provided in plastic tubs. Deworming was practiced on some farms by farmers at their own and vaccination was carried out mostly by the department of Animal Husbandry, government of Sindh.

**Data collection procedure:** Data on reproductive performance of Kamohri goats breed were obtained through survey of goat farms running under traditional management conditions. Initially goat farms were identified, selected and included in this study, and farms were monitored on regular intervals to collect the required data. The goat farmers having at least 5 years goat husbandry experience, willingness to participate in giving interview were selected and interviewed using a structured questionnaire. The Information on herd size, and reproductive performance were recorded. Before conducting the interview, the first session was used to build confidence with farmers. So they could participate fully without any reservations. The data recorded regarding the birth date of kid, age at puberty, estrus cycle, estrus duration and post-partum estrus period and age at first kidding were analyzed for reproductive performance.

**Breeding:** The natural breeding was practiced at the farms. As only Kamohri goats were maintained at the farms and the doe goats was bred from the bucks of Kamohri breed.

**Statistical Analyzes:** The data were analyzed using SSP of 17.0 of window 2007 and ANOVA to Ascertain the mean and significant different.

## Results and Discussion

Puberty is the point of sexual development at which the animal becomes capable for reproduction and starts sexual activity. Sexual Development is a process of gradual maturation and interaction between the hypothalamus, pituitary and gonads. The direct cause of sexual maturation at puberty is a rise in the output of the pituitary hormones, leading to an increase in size and activity of the gonads (Hunter 1980; Cups, 1991). It is the time when estrus is shown for first time followed by characteristic ovarian activity and ovulation in female and ejaculation of sperm in male (Snyman, 2010; Haliu *et al.*, 2006; Greyling, 2000). At this stage often goats are not fully sexually competent for reproduction (Snyman, 2010). Puberty is generally considered to be related more to growth and body weight rather than age in tropical goats (Bushara and Abu-Nikhaila,

2012, Delgadillo *et al.*, 2007, Zeshmarani *et al.*, 2007; Sodiq *et al.*, 2002). Generally breeding may be delayed until the animal has attained 60 to 70% of its adult body weight (Devendra, 2007; Grayling, 2010).

Age at puberty was reported from 180-540 days (6- 18 months) in different breeds of goats under different ecological and management conditions (Dereje *et al.*, 2015; Baloch, 20014, Zarkawi and Al-Saker, 2013; Jimenez and Roding, 2007; Ali, 2006; Pahanwer, 2005; Greyling 2004; Baiden *et al.*, 2009; Sodiq, 2002). The mean age at puberty was recorded as  $370.26 \pm 5.435$  days in traditional management conditions in Kamohri goat breed (Table-1). The results of present investigations are in close agreements to those reported by Webb and Mamabolo (2005), they reported that the West African Dwarf goat reach puberty age between 330-390 days. The figures reported for age at puberty by Zarkawi and Al-Saker (2013) in Mountains goat were not too much different from the results obtained in the current study.

Whereas similar trend was reported for Sidma, Arsi Negele and Boricha goat breeds. These goat breeds reach puberty age in between 12 and 16 months of age (Samuel, 2005; Wilson and Burkina, 1988). Same trend was reported in Saanen, Red Sokoto and Norwegian goats (Torees-Vazquez *et al.*, 2009; Dadi *et al.*, 2008; Kango, 1989). Most of the goats may often reach puberty without having achieved an adequate physical growth to support reproduction and first ovulation may not necessarily coincide with first estrus depending on nutritional status and breed (Greyling, 2010).

The findings of present study for age at puberty in Kamohri goats were found higher than the results reported by various authors in different breed of goat in various climatic conditions. The average age at puberty in Pakistani indigenous goat breeds were reported higher than European breeds (Lund, 2006; Pahanwer, 2005). Most of the goat breeds attain puberty approximately at eight months of an age (Delgadillo *et al.*, 2007; Chemineau *et al.*, 2004) and reach puberty at relatively younger age i. e. between 5-10 months (Harris and Springer, 2004; Iqbal, 1994) and are usually bred at 7-10 months of an age (Song *et al.*, 2003). The tropical goat breeds reach puberty age at approximately 97 days and sexual maturity at 132 days of age (Payne and Wilson, 1999). Same trend was reported (97 to 216 days) in Mathou goat in China (Moaeen-ud Din *et al.*, 2008). Furthermore, it was reported that the goats reach puberty age at approximately 160-192 days and sexual maturity 240 to 255 days (Madani and Rahal, 1988).The results

obtained in recent study were also higher than those reported in Creole goat breed they reach puberty age between 172 to 250 days (Tesafeye, 2009) and similarity in results (157-191 days) was reported in Boer goat does (Grayling, 2000). The kids weaned during the normal breeding season shown puberty at earlier age of 157.2 days (Grayling and Van Nieckerkeu, 1990). Same trend was reported for age at puberty in Saanen (217.9 days), Angora (240 days), Black Bengal (190.2 days), Assam Hills (264+1.68), Mani-Puri (317+1.7) and Barbari (213 days) goat breeds (Zeshmarani *et al.*, 2007), while African and Ethiopian goat breeds attained an early age and sexual maturity being reached soon as 5-6 months of an age and breeding takes place early (Urgessa *et al.*, 2013; Wilson, 1989). However the goats may not be fully sexually competent at this stage and puberty may often reached before animals were grown enough to physically support the reproduction. In contrast to that the higher age at Puberty was

reported as 24 months in Afar goats (Zeshmarani *et al.*, 2007) which was too far from the findings of current study.

The age at sexual maturity is a controversial point in tropical goats. There are the sequence of the factors that could play a role in the attainment of puberty in the female goat. It is difficult to isolate a single factor involved in the attainment of puberty, as a sequence of events is involved in sexual maturation. The relationship of age and body weight to onset of puberty and attainment of sexual maturity is prerequisites for improvement of reproductive performance. The delayed age at puberty may be due to genetic factor, climate and management practices at the farm; they needs to be improved on scientific line for better reproductive and productive performance of the herd of the Kamohri goat breed flocks and it can be reduced by out crossing within the same goat breeds.

**Table-1: Mean ( $\pm$ SEM) age at puberty and first kidding in Kamohri goat managed under traditional management condition.**

No. of Observation	Mean age at puberty (days)		Mean age at first Kidding (days)	
	Mean ( $\pm$ SEM)	Range	Mean ( $\pm$ SEM)	Range
364	370.26 $\pm$ 5.435	240-510	532.14 $\pm$ 5.356	410 –870

**Age at first kidding:** The age at first kidding is expressed as the age when does produce off-spring for the first time. Age at first kidding is an important indicator in determining of sexual maturity and life time productivity in does, the earlier the doe starts to kid it will produce more kids in life time and longer would be the productive life time period. (Deribe and Taye, 2014). Kidding makes the beginning of production. The age at first kidding was reported in between 387-693 days among the various production patterns and goat breeds (Zarkawi and Abu-Saker, 2013; Lund, 2006; Ali, 2006; Sodiq, 2002; Song *et al.*, 2003; Wilson, 1989). In present study the mean age at first kidding was recorded as 532.14 $\pm$ 5.356 days in Kamohri goat at various farms in district Hyderabad under traditional management conditions (Table-1). The results of Present study falls in close range to those reported as of 480-540 days in goat breed (Webb and Mamabolo 2005; Zarkawi and Abu-Saker, 2013), 504+5.14 days (16.5 months) in Kamohri goat (Baloch, 2014) and between 303 and 556 days for African goat (Wilson and Murry, 1989).

However the results recorded in current study for age at first kidding were higher than the results reported by

Bernet and Frede, (2009) and Chowdhury *et al.* (2002). They reported the age at first kidding was as 408 days in goat. The shorter age at first kidding was because of the flock of Ethiopian goat breed was managed under semi-intensive management system. The mean age at first kidding was reported as 448 days in Abergelle goats (Deribe and Taye, 2014), 387 days in Black Bengal goats (Dhara *et al.*, 2011) and 300-365 days in Korean Native goat does (Song *et al.*, 2006).The reported figures were lower as compared to the result found in the current study for age at first kidding. This variation may be due to slow growth rate and kids born twins with lighter birth weight because of goat flock was managed under traditional management on grazing only. Female kids born in the season with ample feed availability grow faster, attain sexual maturity earlier and produce kid for the first time at its younger age as compared to those born during cool and dry season (Bushara and Abu-Nikhaila, 2012). If goats not gain an optimum weight, breeding should be delayed till the does attained the adult body weight. However, delaying breeding for a long time may decreases the margin of profit by decreasing life time productivity (Mruttu, 2001).



However results obtained in the current study was lower than the reported figures for Arsi Bale goats (Dadi *et al.*, 2008). The goats usually delayed to reach the age of first kidding because they were raised in hot and harsh environmental conditions (Dvendra, 2007; Wilson, 1988), on the other hand Pahanwer, (2005) reported that the indigenous goat breeds producing off-spring at the age of 24 months. The effect of parity of doe born and birth type did not affected the age at first kidding of does (Deribe and Taye, 2014). The kids born single grow faster than those born twins may be due to milk yield of dam and milk received differences and heavy birth weight (Zeshmarani *et al.*, 2007). This implies that twins receive less milk as compared to kids born single and thus affects their growth rate before weaning (Gimenez and Rodning, 2007). After weaning maternal influence decreased twins kid tend to compensate for growth and there is no difference in terms of age at first kidding between twin female kids and those born single (Dadi *et al.*, 2008). The slow growth rate mainly attributed to poor nutrition, management and other non-genetic factors (Gbangboche *et al.*, 2006). Nutrition influences on the onset of puberty, conception rate, health and vigor of new born kid (Gimenez and Rodning, 2007). Age at first kidding is influenced by age at maturity, body weight gain, growth rate, nutritional level, disease control and management of doelling.

**Length of estrus cycle:** Estrus cycle is the period of recurring pattern of changes in physiological behavior of female resulting in repeated period of sexual receptivity in female. It is characterized by appearance of first estrus to coming in next estrus (Pinede and Dooley, 2003). The length of estrus cycle is documented and reported which ranged in between 19-24 days in various breeds of goat (Bukar *et al.*, 2012, Khanum, *et al.*, 2007, Zarkawi and Soukouti, 2001, Greyling 2000). In present study the length of estrus cycle was recorded as  $21.03 \pm 0.171$  in Kamohri goat under traditional management conditions (Table-2). These results are in close agreements to those reported by various authors (Bukar *et al.*, 2012; Zarkawi and Soukoufi, 2001; Greyling, 2000; Akusu and Ajala, 2000). They reported the length of estrous cycle as  $21.03 \pm 0.171$  days which range from 18 to 22 days and similar trend was also reported ( $21.25 \pm 1.5$  days) in Damascus does (Zarkawi and Soukoufi, 2001). However, the results

obtained in the present study ( $21.03 \pm 0.171$  days) for length of the estrous cycle in Kamohri goat were slightly greater than the results reported in Boer goat doe (Greyling and Van-Nieckerkeu, 1990), Dwarf goat does (Khanum *et al.*, 2007) and in Barbari goat breed (Dhara *et al.*, 20011). They reported figure regarding the length of estrus cycles were  $19.7 \pm 1.5$  days which were significantly shorter than the figures found in current study in Kamohri goat doe. The shorter results for length of estrus cycle were may due to moderate climatic conditions as compared to extreme cold-dry and hot-wet weather (Greyling, 2000). Geographical location had also significant on the, length of estrus cycle as reported by Khanum *et al.* (2007) in dwarf goats.

**Duration of estrus period:** Estrus period duration is the onset of appearance of estrus symptoms to disappearance of estrus symptoms in the same estrus and in same animal. During estrus female doe shows typical characteristics of sexual behavior and takes interest in male. This change in physic behavior of female is due to the hormonal influence on reproductive system. The dominant hormones are estrogen in estrus produced by mature follicles and progesterone by developed corpus lutum of cycle in goat (Pinede and Dooley, 2003). The mean duration of the estrus period was found as  $24.791 \pm 0.097$  hrs during the present investigations in Kamohri goat in traditional management conditions (Table-2). The findings of current study for duration of estrus were in accordance with the results reported by Bukar *et al.*, (2012) and Greyling, (2010) in goat. The results reported which ranges from 24-56 hrs and 10 to 36 hrs in Boer goat doe. In some goat breeds it varies from 22 to 60 hrs ((Bukar *et al.*, 2012). In doe, a mounting behavior, switching of tail and bleating were recorded as primary signs were observed in does during estrus in present study in Kamohri goat. The similar of observations were reported by Greyling (2010) in present research in Kamohri goat doe. The estrus period of Angora doe was shorter at the beginning and end of the breeding season. No significant difference was recorded between multiparous, biparous and primiparous does (Greyling and Van-Nieckerkeu, 1990). Breed, body size and weight at maturity were the main factors that had considerable influence in variations of time taken to show first estrus (Greyling, 2000).

**Table-2: The mean ( $\pm$  SEM) length of estrus cycle, duration of estrus and post-partum estrus period in Kamohri goat managed under traditional management conditions.**

No. of goats observed	Length of estrus (hrs)		Length of estrus cycle (days)		Postpartum estrus period (days)	
	Mean( $\pm$ SEM)	Range	Mean( $\pm$ SEM)	Range	Mean( $\pm$ SEM)	Range
364	24.791 $\pm$ 0.097	16-32	21.03 $\pm$ 0.017	18-22	68.201 $\pm$ 0.4599	25-15

**The post-partum estrus period:** Postpartum period start from parturition and lasts until uterine involution is completed and female resumes ovarian activity (Garcia, *et al.* 1993). The interval between parturition and the first post-partum estrus is an important trait which contributes to the productive efficiency of a doe. The involution of the post-partum uterus was one of the economic important limitations in achieving the goal of suitable kidding interval. The mean ( $\pm$ SEM) length of post-partum estrus period was recorded as 68.201 $\pm$ 0.456 days in Kamohri goat managed under traditional management conditions (Table-2).

The findings of current study observed in Kamohri goat are in close agreements to those reported by Greyling (2000). He reported that the mean post-partum estrus period was 55.5 $\pm$ 24.9 days in Boer goat with the period being 53 days for does bearing singletons, 58.5 days for twins and 62 days for does bearing triplets. The increasing trend was observed with increasing the parity with 5 days increased in each parity. The mean interval from parturition to post-partum estrus was recorded as 62.0 $\pm$ 20.2 days. There was no significant difference in the post-partum interval for does gave birth to different numbers of offspring (Fritas *et al.*, 1996). These results are also in agreements with the results observe in current study in Kamohri goat. No significant difference was reported among the goats bearing different numbers of kids. In the present study the findings, was in similar trend to that reported by Husain (1993) and Hossain (2003). They reported the post-partum estrus was noticed which ranged in between 16-136 and 61 days in Black Bengal does. The results of present observation was found in close agreements to those (61 days) reported by Hossain (2013) in Black Bengal goat. Chemineu *et al.*, (2004) reported that in most of the Creole goats first post-partum estrus was observed on day 21<sup>st</sup> following parturition. In contrast to this Angolan-Nubian and Saanan goats did not came in estrus till 200 days after kidding, because these goats were raised in semi-arid region of North-Eastern of Nigeria (Fritas *et al.*, 1996). The first post-partum

estrus period decreased with the body weight of the doe (47.25 kg) and when the goats were older than 3 years of an age (Torres-Vazquez *et al.*, 2009). The post-partum period was reported as 37.3 $\pm$ 12.5 day in does kidding in May (late autumn), which were significantly shorter (60 days), than those goats which kidded in early summer. These reported results were at par with the findings of present study in Kamohri goats. The goat does which kidded in October (early summer) actually 40% reconceived Within 99 days of post-partum (Greyling, 2000). According to Riera (1982) the interval varies among goat breeds, lactation and nutrition status. Suckling stimulus has an important effect in occurrence of the post-partum period to first estrus. Resumption of ovarian cyclic activity in the goat is very susceptible to external factors, such as season, suckling and the presence of the male (Greyling, 2000). Delayed in postpartum period causes longer kidding intervals, which may influence the overall profitability of the animal (Girma, 2000). The mean postpartum period was reported as 83.5 days (51-133 days) in Somali goats (Girma, 2000). Inadequate nutrition delayed the occurrence of postpartum estrus (Dadi *et al.*, 2008). In the Boer goat, macroscopic changes of the post-partum uterus in weight and volume rapidly decline from parturition to approximately by day 20<sup>th</sup> of parturition (Greyling, 2000). Decrease in uterine horn length and diameter, were back to normal by day 28 post-partum. The ovarian activity in most tropical breeds starts after weaning of kid. The goats at earliest parities take longer time than older once to return into reproductive cycle. Postpartum estrus period was 77.00 $\pm$ 4.04 and 95.33 $\pm$ 2.60 days as reported by Sadat (2014) under semi-intensive production are in close with little difference to the present study in Kamohri goats.

The present results indicated that environmental factors such as feeding, housing and management system, improper heat detection and reproductive disorder, under nutrition, inefficient and insufficient management and sickness of the does may influence on production of goat. Nutrition, suckling,

parity, status of kidding and breed had great effect on postpartum period. Apparently better nutrition and management was probably most important contributory factor for early post-partum estrus period observed in the present investigations.

In order to optimize the productive potential of indigenous goat, it is essential that reproductive management program should be implemented for improvement of reproductive aspects of goat. The goats are the source of animal protein to alleviate the need in the developing countries, which helps in the social uplift-meant of the rural poor community. The Kamohri goat however with its extended breeding season, also has great potential and can be reared makes this breed popular at national and international level. It can be concluded from the present findings that the improved feeding with better management may ensure in improvement of reproductive performances of Kamohri goat.

## References

- Abecia J. A., F. Forcada and A. Gonzalez-Bulnes, 2012. Hormonal control of reproduction in small ruminants. *Animal Reproduction Science*, 130(3-4):173-179.
- Akusu, M.O. and O. O. Ajala. 2000. Reproductive Performance of West African Dwarf Goats in humid tropical environmental of Ibadan, Nigeria. *Israel J. Vet. Med.* 55(2):63-68.
- Ali, A. 2006. Genetic Evaluation of Beetal Goats for Performance Traits in Pakistan. PhD thesis, University of Agriculture, Faisalabad.
- Anonymous. 2011. Climatological information for Hyderabad, Pakistan. Hong Kong observatory. Retrieved 2011-05-04.
- Baiden, R. Y. and L. Duncan. 2009. The effect of Health, Nutrition and Management Interventions on the Performance of West African Dwarf Goats in the Dangme West District of the Greater Accra Region of Ghana. *Ghanaian Journal of Animal Science*, 4(1):46-47.
- Baloch S. N., 2014. Study on performance analysis of Kamohri goat flock under semi intensive management at Government Bhagnari Cattle farm Usta Muhammad Baluchistan. M. Sci. Thesis, Sindh Agriculture University Tandojam.
- Barnet, H. and Frederick, S. 2009. Dairy goat Production guide. University of Florida, USA. *Journal of Dairy and Poultry Science*, 67:102-121.
- Boyazoglu, J., Y. Hatziminaoglou and P. Morand-Fehr. 2005. The role of the goat in the society; past, present and perspective for the future. *Small Ruminant Research*. 60(1-2):13-23.
- Bukar, M. M., R. Yusuf, A. W. Haroon, G. K. Dhaliwal, M. A. G. Khan and M. A. Omar. 2012. Estrus response and follicular development in Boer does synchronized with flaxseed acetate and PGF2a or their combination. *Trop. Anim. Health Prod.* 44:1505-1511
- Bushara, I. And M. M. A. A. Abu-Nikhaila. 2012. Productivity performance of Taggar Female Kid under grazing condition. *Journal of Animal Production Advances* 2:74-79.
- Chemineau, P., A. Daveau, Y. Cognie, G. Aumont and D. Chesneau. 2004. Seasonal ovulatory activity exists in tropical creole female goats and black belly ewes' subjected to temperate photoperiod. *BMC Physiol.* 4:12.
- Chowdhury, S. A., M. S. A. Byuiyan, and S. Faruk. 2002. Rearing Black Bengal under semi-intensive management. Physiological and reproductive performance. *Asian Journal of Animal Science*, 15:477-484.
- Cupps, P. T. 1991. Reproduction in Domestic Animals. 4th Ed. Academic Press, Inc., San Diego, New York, Boston.
- Dadi, H., G. Duguma, B. Shelima, T. Fayera, M. Tadese, T. Woldu and T. S. Tucho. 2008. Non-genetic factors influencing post weaning growth and reproductive performance of Arsi- Bale goat. *Livestock Research for Rural Development* 20:1-7.
- Delgadillo, J. A., M. A., Santiago- Miramontes and E. Carrillo. 2007. Season of birth modifies puberty in female and male goats raised under sub-tropical conditions. *Journal of Animal Production*. 1 (6):858-864.
- Dereje, T., U. Mengistu, A. Getachew and M. Yoseph. 2015. Perceptions of households on purpose of keeping, trait preference, and production constraints for selected goat types in Ethiopia. *Tropical Animal Health and Production*, 46:363-370.
- Deribe, B. and M. Taye. 2014. Reproductive performance of Abergelle goats raised under Traditional Management Systems in Sekota District, Ethiopia. *Iranian J. Appl. Anim. Sci.* 4(1):59-63.
- Devendra, C., 2007. Small ruminants in Asia. Contribution to food security, poverty alleviation and opportunities for productivity enhancement. <http://www.mekarn.org/procsr/>.
- Dhara, K. C., P. K. Bhandopadhyay and A. Goswami. 2011. Influence of gastro-intestinal parasite on productive and reproductive performance of Black Bengal goats under field condition. *International Journal of Science and Nature* 2(3):638-647.

- Dossa, L. H., R. Barbara, B. Regina and C. Woolly. 2008. Socio-economic determinants of keeping goats and sheep by rural people in Southern Benin. *Agricultural and Human*, 25:581-592.
- FOASTAT, 2011. World goat population. Food and Agriculture Organization of the United Nation, Italy. <http://foast.foa.org>. 12-105.
- Freitas, V. J. F., G. Baril and J. Saumandel. 1996. Induction and synchronization of estrus in goats. The relative efficiency of one versus two Fluorogestone acetate-impregnated vaginal sponges. *Theriogenology*, 46: 1251-1256.
- Garcia, A., M. K. Near, G. R. Kelly and R. A. Pierson. 1993. Accuracy of ultrasonography in early pregnancy diagnosis in the ewe. *Theriogenology*, 39: 847-861.
- Gbangboche, A. B., M. Adamou-Ndiaye, A. K. I. Youssao, F. Farnir, J. Detilleux, F. S. Abiola and P. L. Leroy. 2006. Non-genetic factors affecting the reproduction performance, lamb growth and productivity indices of Djallonke sheep. *Journal of Small Ruminant Research* 64:133-142.
- Gemiyu, D. 2009 On-farm performance evaluation of indigenous sheep and goats in Alaba, southern Ethiopia. An MSc Thesis, Hawassa University, Ethiopia.
- Gimenez, D. and Rodning, S. 2007. Reproductive management of sheep and goats. [<http://www.ace.edu/pubs/docs/A/ANR-1316>] site visited on 27/2/2012.
- Girma, A. 2000. Studies on Performance Potential of Somali Goats and their crosses with Anglo-Nubian: A Contribution to breed documentation and evaluation. Land wirtschaftlichGärtnerischen Fakultät der Humboldt, Universitätzu Berlin, 151.
- GOP, 2013-14. Pakistan Economic Survey, 2012-13. Government of Pakistan, Livestock Division, Islamabad. Pp: 27-28.
- Greyling, J. P. C. 2010. Applied reproductive Physiology. In: Solaiman.A.G.Ed. Goat Science and Production. 1st. Edition. Iowa, USA: Blackwell Publishing, pp: 139-155.
- Greyling, J. P. C., 2000. Reproductive traits in the Boar goat doe. *Small Rum. Res.* 36(2): 171-177.
- Greyling, J. P. C., 2004. The Induction of puberty in female Boar goat kids. *South African J. Anim. Sci.*, 20:193-200.
- Greyling, J. P. C., and C. H. Van Nieckerkeu, 1990. Puberty and induction of puberty in female Boar goat kids. *South African J. Anim. Sci.*, 20, Pp.193-200.
- Hailu, D., G. Miesu, A. Nigatu, D. Futa and D. Gamada. 2006. The effect of environment factors on pre-weaning survival rate of Borana and Arsi - Bale Kids. *Journal of Small Ruminant Research*, 66:291-294.
- Harris, B. and F. Springer. 2004. Dairy goat production guide. IFAS, Extension, University of Florida. Pp: 01.
- Hirst, K. K. 2008. The History of the domestication of goats. About.com. Accessed August 18, 2008.
- Hossain, S. M. J. 2003. Study on performance and milk production performance of Black Bengal goat under semi-intensive management. M. S. Thesis, Department of Animal Science, Bangladesh Agricultural University, Mymen Singh, pp. 2140.
- Hunter, R. H.F., 1980. Physiology and Technology of Reproduction in female domestic animals. Academic Press, London, New York.
- Husain, S. S. 1993. A study on the productive Performance and genetic potentials of Black Bengal goats. Ph. D. Thesis, Department of Animal Breeding and Genetics, Bangladesh Agricultural University, Mymensingh, pp. 3-108.
- Ince, D. 2010. Reproduction performance of Saanen goats raised under extensive conditions: *African Journal of Biotechnology* 9(48): 8253- 8256.
- Iqbal, M., 1994. A Hand Book of Animal Husbandry. Breeds of Livestock.
- Isani, G.B. and M. N. Baloch, 1996. Sheep and Goat breeds of Pakistan. Press Corporation of Pakistan, Karachi. pp:1-95.
- Khan, 1993. Climate of Pakistan, Rehbar Publication Karachi.
- Khanum, S. A., M. Hussain and R. Kausar. 2007. Assessment of reproductive parameters in female Dwarf goat (*Capra hircus*) on the basis of progesterone profiles. *Anim. Reprod. Sci.* 102(3-4): 267-275.
- Kiango, S. M. 1989. Some factors influencing performance of dairy goats at Magadu dairy farm. Special Project for BSc. Degree at Sokoine University of Agriculture, Morogoro, Tanzania. pp:49.
- Kioumaris, H., Z.S. Yahaya, W.A. Rahaman and P. Chandrawathani. 2011. A new Strategy that can improve commercial productivity of raising Boer goat in Malaysia. *Asian Journal of Animal and Veterinary Advances*. 6:1291-1295.
- Lund, S.K. 2006. Study on performance analysis of Dera Din Panah goat. Rakh Khairay Wali, district Layyah, Punjab. M.Sc. Thesis Deptt. of Livestock Management, Sindh Agriculture University, Tandojam.
- Macha, E. and S. H. Mbagu. 2009. The contribution of small scale dairy farming to households' income: A case of Ilala Municipal, Dares Salaam Region, Tanzania. In: Proceedings of 33rd Annual



- Scientific Conference, BOT Hall, Mwanza, Tanzania, 22-25September, 2009. Pp: 256-275.
- Madani, M.O. and M.S. Rahal. 1988. Puberty in Libyan male goats. *Animal Reproduction Sciences*, 17:207-216.
- Mahout, O., T. K. Isam, E. F. Neil, S. A. Dawood, M. A. Naseeb, S.A. Abdullah and A. Kanthi. 2005. Evaluation of Meskit (*Prosopisjuliflora*) pods as a feed for goats. *Animal Feed Science and Technology*. 121:319-327.
- Mahmoud, A. A. 2010. Present status of the world goat populations and their productivity. *Lohman Information* 45(2):42 -52. [http://www.lohmann-information.com/content/l\\_i\\_45\\_artikel17.pdf](http://www.lohmann-information.com/content/l_i_45_artikel17.pdf).
- Moaeen-ud Din, M., L.G. Yang, S. L. Chen, Z.R. Zhang, T. Z. Xiao, Q. Y. Wen and M. Dai. 2008. Reproductive performance of Matou goat under sub-tropical monsoon climate of central China. *Tropical Animal Health Production*. 40:17-23.
- Mruttu, H. A. 2001. A study on reproductive traits and effect of parent phenotype on post weaning performance of goat kids. Dissertation for Award of M.Sc. Degree at Sokoine University of Agriculture, Morogoro, Tanzania. Pp: 110.
- Odubote, I.1996. Genetic parameters for litter size at birth and kidding interval in West African Dwarf goats. *Small Ruminant Research*, 20(3):261-265.
- Pahanwer, Farzana. 2005. Goat Farming in Sindh. Goat World Conference, 2005.
- Payne W. J. and R.T. Wilson. 1999. *Animals Husbandry in the Tropics*. 5<sup>th</sup> Ed. Oxford, UK. Blackwell Science.
- Pineda, M. H. and M.P. Dooley. 2003. *Veterinary Endocrinology and Reproduction*. McDonalds 5<sup>th</sup>. Ed. Iowa, USA, Iowa State Press. Pp: 597.
- Qureshi, M.A., M.E. Babar, and A. Ali, 2010. Performance of Kajli Sheep in Pakistan: Reproduction as influenced by environment. *Pakistan J. Zool.*, 42:413-417.
- Riera S. 1982. Reproductive efficiency and management in goats. Proc. 3rd Inter. Conf. Goat Prod. Dise. Tucson, Arizona, USA. pp: 162-174.
- Sadat S. 2014. Reproductive performances of Djallonke Sheep in the Northern region of Ghana. A master thesis submitted to University of Sciences and technology, Kumasi.
- Safari, J., J. A. Mtenga, O. L. Eik, F. Sandston and F. H. Johnsen. 2008. Analysis of three goat production systems and their contribution to food security in semiarid areas of Morogoro, Tanzania. *Livestock Research for Rural Development*, 20:1-5.
- Samuel, M. 2005. Characterization of livestock production system. A case study of Yarer watershed, Ada'aLibenWoreda of East Showa, Ethiopia, An MSc Thesis, Alemaya University, Ethiopia, Science 17, 207-216.
- Snyman, M. A. 2010. Factors affecting pre-weaning kid mortality in South African Angora goats. *South Africa Journal of Animal Science*, 40: 54 - 64.
- Sodiq, A. 2004. Doe production of Kacang and PeranakanEtawah goat and factors affecting them in the tropics and sub tropics in Indonesia. *Journal of Agricultural and Rural Development* 78:1-11.
- Sodiq, A., SoeditoAdjisoedarmo and Ezzat, S. Tawfik., 2002. Doe productivity of Kacang and Peranakan Etawah goat in Indonesia and factors affecting them. <http://www.Google.Com./search>.
- Song, H.B., I.H. Jo and H.S. Sol. 2006. Reproductive performance of Korean native goats under natural and intensive conditions. *Small Ruminant Research*, 65(3):284-287.
- Song, H.B., I.K. Choi and T.G. Min. 2003. Reproductive traits in the Korean goat Doe. Jinryang, Kyungsan, Kyungbuk. Pp: 712-714.
- Tesfaye, T. 2009. Characterization of goat production systems and on farm evaluation of the growth performance of grazing goat supplemented with different sources in Motema WORED, Amhara region, Ethiopia. Dissertation for award of M.Sc. Degree at Hamaraya, University. pp:78.
- Torres-Vázquez, J. A., M. Valencia- Posadas, H.Castillo-Juárez and H.H. Montaldo.2009. Genetic and Phenotypic parameters of milk yield, milk composition and age at first kidding in Saanen goat from Mexico. *Livestock Science*. 126:147-153.
- Urgessa, D., B. Duguma, S. Demise and T. Teklemariam, 2013. Breeding practices and reproduction performance of traditionally managed indigenous sheep and goat in Ilu Abba Bora zone of Oromia region state, Ethiopia.
- Webb, E. C. and M. J. Mamabolo. 2005. Production and reproduction characteristics of South African Indigenous goats in communal farming system. *South Africa Journal of Animal Science*.34:236-239.
- Wilson R. T and T. Murray. 1988. Productivity of the small East African goat and its crosses with Anglo Nubian and the Alpine in Rwanda. *Tropical Animal Health and Production*. 20:219-228.
- Wilson, R. T. 1988. The productivity of Sahel goats and sheep under transhumant management in Northern Burkina Faso. *Bulletin of Animal Health and Production in Africa*. 36:348-355
- Wilson, R. T. and J. W. Durkin. 1988. Livestock

Production in Mali. Reproductive components in traditionally managed sheep and goats. *Livestock Production Science*. 19:523-529.

Zaraimedia Team. 2013. December 2013. Livestock. <http://zaraimedia.com/ncategory/livestock>.

Zarkawi, M., and M.B. Al-Saker. 2013. Determination of certain reproductive and productive parameters in female Mountain (Jabali) and crossbred goats during different age stages. *Archivs Zootechnica*. 16(2):15.

Zarkawi, M.I. and A. Soukouti, 2001. Serum progesterone levels using radioimmunoassay during estrous cycle of indigenous Damascus does. *N. Z. J. Agric. Res.* 44:165-169.

Zeshamani, S., K. C. Dhara, A. K. Samanta, R. Samanta and S. C. Majumder, 2007. Reproductive performance of goat in Eastern and North-Eastern India. *Livestock Research for Rural Development*. 19 (8):38-42.

<b>Access this Article in Online</b>	
	<b>Website:</b> <a href="http://www.ijarbs.com">www.ijarbs.com</a>
	<b>Subject:</b> <b>Animal Sciences</b>
<b>Quick Response Code</b>	

**How to cite this article:**

Hamzo Khan Kunbhar, A. A. Memon, A. L. Bhutto, Zahid Iqbal Rajput, V. Suthar, Azizullah Memon and R. A. Leghari. (2016). Study on female reproductive performance of Kamohri goat managed under traditional management conditions in district Hyderabad, Sindh, Pakistan. *Int. J. Adv. Res. Biol. Sci.* 3(3): 251-260.