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

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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 (±MES) age at puberty and age at first kidding was recorded as 370.026±5.435 and 532.14±5.256 days respectively. The mean (±MES) length of estrus cycle, duration of estrus period and post-partum estrus period was observed as 21.03±0.17 days, 24.791±0.097 hrs and 68.21±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° and 28° north latitudes and 66° to 71° 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° (22°45′/25.37917N) north and 68° (22° 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 °C, whereas the nights are cool and breezy. In winter the temperature drops up to 2°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 (FOSTAT, 2011; Macha and Mbaga, 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 foders 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±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-Vazue, 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 (±SEM) age at puberty and first kidding in Kamohri goat managed under traditional management condition.

<table>
<thead>
<tr>
<th>No. of Observation</th>
<th>Mean age at puberty (days)</th>
<th>Mean age at first Kidding (days)</th>
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<tbody>
<tr>
<td></td>
<td>Mean (± SEM)</td>
<td>Range</td>
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<tr>
<td>364</td>
<td>370.26± 5.435</td>
<td>240-510</td>
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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±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 offspring 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±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 Soukouti, 2001; Greyling, 2000; Akusu and Ajala, 2000). They reported the length of estrous cycle as 21.03±0.171 days which range from 18 to 22 days and similar trend was also reported (21.25±1.5 days) in Damascus does (Zarkawi and Soukoufi, 2001). However, the results obtained in the present study (21.03±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-Niekerke, 1990), Dwarf goat does (Khanum et al., 2007) and in Barbari goat breed (Dhara et al., 2001). They reported figure regarding the length of estrus cycles were 19.7±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 luitum of cycle in goat (Pinede and Dooley, 2003). The mean duration of the estrus period was found as 24.791±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-Niekerke, 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).
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 (±SEM) length of post-partum estrus period was recorded as 68.20±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±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±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 21st 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±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 20th 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±4.04 and 95.33±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,

<table>
<thead>
<tr>
<th>No. of goats observed</th>
<th>Length of estrus (hrs)</th>
<th>Length of estrus cycle (days)</th>
<th>Postpartum estrus period (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean(±SEM)</td>
<td>Range</td>
<td>Mean(±SEM)</td>
</tr>
<tr>
<td>364</td>
<td>24.79±0.097</td>
<td>16-32</td>
<td>21.03±0.017</td>
</tr>
</tbody>
</table>

Table-2: The mean (± SEM) length of estrus cycle, duration of estrus and post-partum estrus period in Kamohri goat managed under traditional management conditions.
contribution to food security, poverty community.

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.

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