INTRODUCTION

The livestock sector plays an important role in economic, social and cultural life of people especially those living in rural areas. Among livestock species, goat was the earliest ruminant to be domesticated by man in around 6700 BC. The excavations of Mohan Jo Daro and Harappa revealed the association of goats with the then civilization through depictions of goat figures on recovered seals. Goats are one of the most important livestock species of our agrarian country for its economy particularly in arid, semi-arid, hilly and tribal areas where they are mainly raised on zero-cost inputs under extensive system of grazing on natural herbage, crop stubbles and residues. In arid to semi arid, draught prone and desert areas, goat production plays a pivotal role in rural socio economic structure of the society through eradicating poverty by providing livelihood to millions of small and marginal farmers, landless labours, educated unemployed youth and rural housewives. It aids to the family income, in addition to providing food security to the goat owners as well as to the nation. Other merits of goats are better adoptability to harsh condition of desert and greater efficiency of utilization of shrubs and bushes. India, with a goat population of 120.6 million heads (FAO 1997) stands first among the countries of world. Goat contribute about 3.4% of the total milk production of India (3.1 million tons, 1997), 36.8% of the total meat production, excluding poultry meat (0.46 million tons, FAO 1997), 0.12 million tons of skin, 50 tons of Pushmina, 85,000 tons of manure and other by products. Goat production is a potential employment generator too. According to an estimate, 5.36% of the total agricultural income (about Rs. 80,000 million) comes from sheep and goats. Out of it, Rs. 15,210 million come from goats alone.

The age-old controversy over goat being responsible for deforestation, rangeland destruction and degradation of soil was the root cause for the neglect of goats. There exists serious lack of understanding about feeding behaviour of goats and their role in agro-ecosystem. Administrators dealing with forestry, environment and soil conservation have labelled the goats with all the blames as the enemy of plant and soil which is contrary to the published facts and for all such evils for which goat is not responsible has thus become a ‘Scape goat’. It is only recently, goat has attracted the attention not only in India, but world over and research to augment the productivity of goats launched in order to acquire increased profits to the poor beneficiaries. The inherent capability of goats for fast multiplication and to adapt and live in harsh, adverse and diversified conditions, extracting the nutrients from degraded lands which are unsuitable to sustain agricultural operations and raising of other livestock species, has made its existence so viable that, in spite of heavy slaughter rate, its population is increasing year after year at the rate of 2.5% per annum.
**Table No. 1**

<table>
<thead>
<tr>
<th>Temperate</th>
<th>North-western</th>
<th>Southern</th>
<th>Eastern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gaddi</td>
<td>Jamunapari, Beetal, Jakhrana, Barbari, Sirohi, Kutchi, Marwari, Mehsana, Zalawadi, Gohilwadi, Surti</td>
<td>Sangamneri, Osmanabadi, Kanni Adu, Malabari</td>
<td>Ganjam, Black, Bengal</td>
</tr>
<tr>
<td>Chegu</td>
<td>Changthangi</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Classification of Goat Breeds**

Goat breeds of the country can be classified on the basis of their body size and their production type.

<table>
<thead>
<tr>
<th>Large Size</th>
<th>Medium Size</th>
<th>Small Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jamunapari, Beetal, Jakhrana, Sirohi</td>
<td>Marwari, Kutchi, Surti, Barbari, Mehsana, Gohilwadi, Kanni Adu, Malabari, Sangamneri, Osmanabadi, Ganjam, Changthangi, Chegu, Gaddi.</td>
<td>Black Bengal</td>
</tr>
<tr>
<td>Milk/Meat</td>
<td>Meat and Milk</td>
<td>Meat</td>
</tr>
<tr>
<td>Jakhrana, Jamunapari, Beetal, Barbari, Sirohi.</td>
<td>Sangamneri, Kutchi, Zalawadi, Gohilwadi, Mehsana, Osmanabadi</td>
<td>Black Bengal, Ganjam, Malabari, Kanni Adu.</td>
</tr>
<tr>
<td>Fibre &amp; Meat</td>
<td></td>
<td>Gaddi, Changthangi, Chegu, Marwari</td>
</tr>
</tbody>
</table>

**Goat Breeds Of North Western Region**

The North Western region includes the state of Rajasthan, Haryana, Punjab, Gujarat, Western parts of Uttar Pradesh and part of Madhya Pradesh and Maharashtra. About 43% of the total goat population is found in this region and Rajasthan alone had about 11.4%. Sirohi, Marwari, Jakhrana, Kutchi, Surti, Mehsana, Beetal, Barbari and Jamunapari goat breeds are mainly found in this region. The flock size in Rajasthan is on an average 60 goats and range from 10-200 goats, whereas in other parts of the region flock size is low and range from 5-20 goats.

**Table No. 2**

<table>
<thead>
<tr>
<th>S. No</th>
<th>States</th>
<th>Population</th>
<th>% of goats</th>
<th>Goats/Sq. Km.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gujarat</td>
<td>4241</td>
<td>3.68</td>
<td>21.63</td>
</tr>
<tr>
<td>2</td>
<td>Haryana</td>
<td>799</td>
<td>0.70</td>
<td>18.06</td>
</tr>
<tr>
<td>3</td>
<td>Madhya Pradesh</td>
<td>8370</td>
<td>7.26</td>
<td>18.90</td>
</tr>
<tr>
<td>4</td>
<td>Maharashtra</td>
<td>9941</td>
<td>8.62</td>
<td>32.30</td>
</tr>
<tr>
<td>5</td>
<td>Punjab</td>
<td>544</td>
<td>0.47</td>
<td>10.80</td>
</tr>
<tr>
<td>6</td>
<td>Rajasthan</td>
<td>15308</td>
<td>13.28</td>
<td>44.73</td>
</tr>
<tr>
<td>7</td>
<td>Uttar Pradesh</td>
<td>13109</td>
<td>11.37</td>
<td>44.52</td>
</tr>
<tr>
<td>8</td>
<td>India (Total)</td>
<td>115278</td>
<td>-</td>
<td>36.48</td>
</tr>
</tbody>
</table>

**Source:** Livestock Census Report (1992)

**Breeds Of Region**

The goats found in this region vary in body size and from medium to large type and in utility is for milk although male kids are normally used for meat purpose.

**Sirohi**

The Sirohi breed is native of Sirohi district in Rajasthan from where it derives its name. It is distributed over a wider area of Ajmer, Bhiwara, Tonk, Jaipur districts and nearby areas in Rajasthan and also adjoining region in Northern Gujarat. The flock size varies from place to place and ranges from 10 to 200 goats. Sirohi is very potent breed and many large flocks are seen in central Uttar Pradesh also which are raised for sale of milk by traditional shepherds who are in this business over generations. It is a medium to large sized breed having compact body and strong legs. The coat colour is predominantly brown with dark brown or tan patches of different shapes and sizes all over the body. Face profile is straight or slightly raised. Ears are medium in length, leafy and drooping. Both sexes have horns, which are curved upward and backward with pointed
tip. Some have wattles. Sirohi are good milkers and udder is well developed and round with long conical teats. The average body weight of an adult male and female is 50.4±2.52 and 22.5±0.17 kg respectively. The average body length, body height and heart girth are 80.0±1.02, 85.6±1.40 and 80.3±1.00 cm in males and 60.3±0.20, 68.4±0.20 and 62.4±0.20 cm in females respectively. The average age at first kidding and kidding interval are 661 and 469 days respectively with twinning as 12.5%. The average lactation yield is 122.30±4.61 kg in a lactation period of 198 days. The mortality under field conditions is very less ranging from 2 to 5% in young kids and 1 to 3% in adult goats.

- **Jakhrana**

The breed derives its name from the name of a village "Jakhrana" where it is found in the most pure form. The breed is distributed in the area around Jakhrana village near Behror in Alwar districts of Rajasthan. The population of the breed is small which is localized in few villages only. According to a rough estimate the number of goats is not more than 6000. Most of the flocks are small in size having 1-25 goats but few flocks having 100-200 goats are also found.

It is a large sized breed with compact body and long legs. The coat colour is predominantly black with a typical white speckles on the ears. The coat is short and lustrous. Face is straight and forehead is narrow and raised. Both sexes have strong and thick stumpy horns. Ears are of medium length and drooping. Wattles are found in some animals. Udder is large and well developed with long conical teats. The average body weight of adult male and female is 43.50±1.16 and 39.29±0.40 kg, respectively. The average body length, body height and heart girth are 84.1±2.11, 90.4±1.61 and 86.0±1.91 cm., respectively in males and 77.7±79.1, 79.1±0.29 and 79.1±0.31 cm., respectively in females. Average age at first kidding and kidding interval are 574 and 319 days, respectively with a twinning rate of 41.0%. Triplets are 2-3%. This breed is famous for its milk production potential and used at many places as an improver breed for increasing the milk production. The lactation yield is 121.8±8.8 kg in a lactation period of 115 days. The lactation period is 196 days. The overall flock mortality under field conditions is very low and ranged from 3.3% in kids (0-3 months) to 4.1% in kids (3-12 month). The adult mortality is 3.5%. The smaller flocks are stationary but the migration of larger flocks is the routine practice during the lean period. They start migrating in the month of March-April in many directions through their well-established routes year after year and return back to their dwellings in the month of July.

- **Zalawadi**

Zalawadi is one of the major goat breeds in Gujarat. Traditional breeder's community known locally as 'Rabaris’ and ‘Bharwads’ in the semi-arid area of Saurashtra region of the state where rainfall is erratic and low rears goats of this breed. It is believed that this breed originated in the erstwhile Zalawad region now known as Surendranagar district and part of Zalawad falling in Rajkot district. It has spread in the adjoining area of Jamnagar and Ahemadabad districts. Out of the total goat population of the state, Zalawadi alone constitutes 27.85% as per the Bulletin of Animal Husbandry, poultry and dairying statistics of Gujarat (1997-98). Flock size ranges from 15-200.

It is a medium to large sized breed of dual utility with long legs. The coat is predominantly black with lustrous, long shining hairs. Some animals have black and white mixed coats. Face is slightly raised. Both males and females have twisted corkscrew type horns directed upward and backward with pointed tips. Ears are long, leafy and drooping and are invariably white speckled. The ears are so wide, loose and leafy that the shepherds traditionally trim the ears and sometimes split the ears to avoid injuries from thorny bushes while browsing. Udder is large and well developed with long conical teats. The average body weight of adult male and female is 46.6±2.63 and 30.0±0.25 kg respectively. The body length, body height and heart girth are 70.9±1.65, 74.74±1.61 and 71.68±1.41 cm in adult males and 63.51±0.44, 69.29±0.22 and 68.60 cm in adult females, respectively. The average age at first kidding and kidding interval are 563.1±17.1 and 375.5±11.1 days, respectively. Twinning varies from 10 to 13.4%. The milk yield is 110.03±5.66 kg in a lactation period of 196 days. The overall flock mortality under field conditions is very low and ranged from 3.3% in kids (0-3 months) to 4.1% in kids (3-12 month). The adult mortality is 3.5%. The smaller flocks are stationary but the migration of larger flocks is the routine practice during the lean period. They start migrating in the month of March-April in many directions through their well-established routes year after year and return back to their dwellings in the month of July.

- **Marwari**

Breed derives its name after the region "Marwar" which is the natural habitat of the breed. It is found in an extensive area of Western Rajasthan comprising of Barmer, Bikaner, Jaisalmer, Jalore, Jodhpur, Nagaur and Pali districts. The breed can also be seen in adjoining areas of northern Gujarat. The total goat population of this region is 3.53 million and Marwari breed alone accounts for 28% of the total goat population of the state (Livestock census 1988). The flock size varies from few goats (2 to 5) to larger flocks (100 to 500) but the migratory flocks are always larger. The flock holding depends on the resources available to the owner besides his financial capabilities.

Marwari is a medium sized breed with compact body and strong legs. Coat colour is predominantly black but animals with brown and white markings are also found. The coat is shaggy and dull in appearance and contains long hairs. The ears are long, flappy and drooping. Both the sexes possess horns, which are medium in length, directed upward and backward and pointed at tips. Males have longer and stronger horns than the females. Wattles are present in some animals. One third of the goats possess beard. The average weight of adult male and female is 46.6±2.63 and 30.0±0.25 kg respectively. The body length, body height and heart girth are 70.9±1.65, 74.74±1.61 and 71.68±1.41 cm in adult males and 63.51±0.44, 69.29±0.22 and 68.60 cm in adult females, respectively. The average age at first kidding and kidding interval are 563.1±17.1 and 375.5±11.1 days, respectively. Twinning varies from 10 to 13.4%. The milk yield is 110.03±5.66 kg in a lactation period of 196 days. The overall flock mortality under field conditions is very low and ranged from 3.3% in kids (0-3 months) to 4.1% in kids (3-12 month). The adult mortality is 3.5%. The smaller flocks are stationary but the migration of larger flocks is the routine practice during the lean period. They start migrating in the month of March-April in many directions through their well-established routes year after year and return back to their dwellings in the month of July.
respectively. The average daily milk yield is 1.75 kg ranging from 1.5 to 2.0 kg. Goat produces 154 kg of milk in a lactation period of 150 days under village conditions. The prolificacy is high with 55% twinning and 2% triplets. The mortality is high in young kids and low in adults. Flocks are stationary except few flocks, which migrate to Ahmadabad and Khera districts in summer and return back in rainy season.

### Gohilwadi

The breed is a native of Gujarat state and found in the districts of Bhavnagar, Amreli and Junagadh in its pure form. It is also distributed thinly in neighboring districts. The flock size ranges from 5 to 80 goats.

It is medium to large in size and body is covered with white hairs. The coat colour is predominantly black with white markings on the ears. The face is long and slightly convex. The ears are leafy and drooping. Both sexes have long-slightly twisted horns directed upward and backward with pointed tips. Hairs are long and thick. The body weight of adult male and female is 37.10±1.42 and 36.03±0.38 kg, respectively. The average body length, body height and heart girth are 73.4±1.3, 81.2±1.2 and 74.7±0.9 cm in adult males and 72.4±0.3, 79.5±0.3 and 75.2±0.2 cm in adult females respectively. The age at first kidding ranges from 650 to 700 days with twinning of 15 to 20% under village conditions. The udder is well developed with long conical teats. The average daily milk yield is 1.71±0.145 kg. The mortality is very low and ranges from 6 to 10% in kids and 4 to 5% in adult goats. Mostly flocks are stationary and reared under village conditions.

### Mehsana

Breed derives its name from the place called 'Mehsana' in Gujarat where it is found in its most pure form. It is widely distributed in Banaskantha, Palanpur, Gandhi Nagar, Ahmadabad and nearby areas in varying intensity. The flock size varies from 15 to 300. Few smaller flocks of 2-5 goats are also found.

The breed is large in size with convex face profile. The coat colour is grayish black with long and coarse hairs. Ears are white with black markings, leafy and drooping. Both sexes are horned which have one or two twists and curved upward and backward with pointed tips. Usually they possess beard. They are good milkers and udder is well developed and capacious with long conical teats. Tail is short and kept upward. The average body weight of adult male and female is 37.14±1.51 and 32.39±0.38 kg, respectively. The average body length, body height and heart girth measured as 71.2±1.0, 80.4±1.2 and 76.9±1.2 cm in males and 68.0±0.30, 74.3±0.20 and 73.0±0.30 cm in females, respectively. The age at first kidding varies from 600 to 650 days. Twinning is low and ranges from 10 to 15%. The average daily milk yield is 1.32±0.13 kg. Mortality in young kids ranged from 10-15% and in adults 4-5% under village conditions.

### Surti

The breed derives its name from the place called, Surat' in Gujarat where it is found in most pure form. It is widely distributed in adjoining areas around Surat and Nasik in Maharashtra. It is very popular in Bombay area due to its dairy potential. It is believed that Surti breed is derived from Arabian milch goats. The Surti goats are very popular and maintained in small flocks ranging from 2 to 15 goats. The breed is most suitable and performs well under stall fed conditions.

It is a small to medium sized goat with compact body. The coat colour is predominantly white having short and lustrous hairs. Ears are medium sized and kept drooping. Face profile is slightly raised and forehead prominent. Both sexes have horns of medium size directed upward. Udder is well developed with long conical teats. The average body weight of adult male and female is ranging from 25-30 kg and 22-25 kg respectively. The age at kidding varies from 400-500 days. The average daily milk yield varies from 1.2 - 2.0 kg under village conditions. They are maintained on extensive grazing but small holdings are seen kept under intensive conditions and fed in stall. Tethering is common with the farmers who keep one or two goats.

### Kutchi

The breed derives its name after the region 'Kutch' in Gujarat, which is the natural habitat of the breed. It is found in Kutch region of northern Gujarat and spread in the adjoining areas of southern Rajasthan. The flock size ranges from small to large having 5 to 300 goats.

Kutchi is a medium sized goat of dual utility (Milk & Meat) with a compact body and long legs. The coat colour is predominantly black, few animals with white markings are also found. Ears are medium in size, flappy and drooping with typical white markings. Coat is shaggy and dull in appearance and contains medium to long coarse hairs. Both the sexes have horns, males have long cork screw horn, while the females have flat and weak horns. Face is slightly raised. Udder is reasonably developed with well placed long and conical teats. The average adult body weight of male and female is 43.50±1.16 and 39.29±0.40 kg respectively. The average body length, body height and heart girth are 77.5±1.16, 86.4±0.70 and 78.4±0.70 cm in males and 75.0±0.30, 82.4±0.30 and 76.1±0.20 cm in females respectively. Age at first kidding varies from 400-500 days. Twinning is 10%. The lactational milk yield is 112.56±5.65 kg in a lactation period of 202 days under farm conditions. The annual mortality in young kids varies from 5 to 15% however the mortality in adult flock averages 5% under village conditions. Most of the flocks are stationary but they migrate for a limited period to adjoining areas during the period of scarcity.
Barbari

The breed is found in Etah, Aligarh, Agra and Mathura districts of Uttar Pradesh and adjoining district of Bharatpur in Rajasthan. This has been adopted and extensively used in many states of the country under their goat development programmes and also for commercial raising.

Barbari is medium in size with stout and compact body. They look very alert and attractive. The coat colour is white with light to dark brown spots of different sizes and shapes all over the body. The orbital bone is prominent and eyes appear as protruding. Ears are short and erect. Both sexes have twisted horns directed upward, backward and outward. Males have longer and stronger horns than the females. Males have beard. Some of the animals have wattle. Udder is well set and round with conical teats of good length. The breed is very versatile and popular in cities because of its size and adaptability to stall-feeding. They are very prolific breeders and usually kid twice in 14 to 16 months with a high rate of prolificacy. The average body weight of adult male and female is 37.85±1.96 and 22.56±0.32 kg, respectively. The carcass weight ranges from 8 to 10 kg when the kids are reared under intensive feeding and slaughtered at the age of 9 months with a dressing percent of 55.15 on empty live weight basis. Average body length, body height and heart girth are 70.5±1.43, 70.7±0.74 and 75.5±1.25 cm in adult males and 58.9±0.38, 56.2±0.37 and 64.3±0.40 cm in adult females, respectively. The average age at first kidding and kidding interval are 491 and 290 days, respectively with 52% twins and 4% triplets. A lactation yield of 82.2±3.16 kg is recorded in a lactation period of 130 days.

Jamunapari

The breed derives its name from the location of its native habitat in the area across the river Jamuna (Jamuna Par) in the Etawah district of Uttar Pradesh. The breed is mainly found in the Chakernagar block comprising of the villages Nagla Kathori, Nagla Jor, Jagtoli, Kola, Rampura, Aheria and Neemdera etc of Etawah district where it is found in its most pure form. Breed is also spread in the adjoining districts of Bhind, Murena and Shivpuri in Madhya Pradesh. The population of Jamunapari goats is decreasing over the years and the number is estimated to about 9000 goats and need active consideration and action for the conservation of such a valuable germplasm. The flock size ranges from 2-25 goats.

Jamunapari is a large sized animal with a majestic getup and look. The coat colour is predominantly white with brown patches on the ears and head. The face is convex which is very peculiar to this breed and called Roman nose. The body is long with a tuft of hair on the backside of the thighs. In most of the animals lower jaw is longer giving a parrot mouth appearance. Ears are long and pendulous. Both male and female have horns. The breed is known for its outstanding ability for milk production. The udder is well developed, round with long conical teats. The body weight of adult male and female ranges from 45-60 kg and 35-40 kg, respectively. The average body length, body height and heart girth are 77.4±1.23, 78.2±1.25 and 79.5±1.20 cm respectively in adult males and 75.2±0.46, 75.2±0.38 and 76.1±0.38 cm respectively in adult females. The average age at first kidding and kidding interval are 786 and 390 days, respectively with 30% twinning. A twinning of 55% and 4% triplets was recorded under high plane of feeding. The average lactation yield is 113.57±2.41kg in a lactation period of 148 days under farm conditions. The mortality in village flocks is very low, ranging from 4-6% in young kids and 3- 4% in adult goats. All the flocks are stationary and maintained on extensive grazing. However, supplementary feeding with grains and also with the tree leaves is made to the pregnant and lactating does and breeding bucks. Smaller flocks of 2-3 goats are kept in the house itself where the owner lives.

Beetal

Beetal breed of goat is predominantly found in the districts of Gurdaspur, Amritsar and Firozpur in Punjab in its purest form; however, it has spread in other parts of Punjab and adjoining parts of Haryana. The population of Beetal goats has reduced to a greater extent due to extensive agriculture and shrinkage of grazing land in Punjab. Normally smaller flocks are found and vary from 2-10 goats. Beetal is an outstanding dairy breed and carries easy adaptation capability to varying environmental conditions.

It is a large sized tall breed with well-set body coat colour, which is mainly black or brown with white patches on the head or body. Face profile is convex, long and flat dropping ears. The long ears and Roman nose indicate common ancestry with Jamunapari breed. Both sexes have horns. Males generally carry beard. Udder is large and well set with long conical teats. The body weight of adult male and female is 59.07±2.42 kg and 34.97±0.52 kg respectively. The body length, body height and heart girth are 85.5±1.41, 91.60±1.97 and 86.0±1.20 cm in adult males and 70.4±0.88, 77.13±0.46 and 73.7±0.70 cm, respectively in adult females. The average age at first kidding and kidding interval are 560 and 355 days, respectively. Prolificacy is not different to Jamunapari breed. Both sexes have wattle. Udder is well set and round with conical teats. The body weight of adult male and female is 58.9±0.38, 56.2±0.37 and 64.3±0.40 cm in adult females, respectively. The average age at first kidding and kidding interval are 491 and 290 days, respectively with 52% twins and 4% triplets. A lactation yield of 82.2±3.16 kg is recorded in a lactation period of 130 days.

GOAT BREEDS OF NORTH WESTERN REGION OF INDIA

Habitat & Managemental Practices

Goat prefers drier areas with an annual rainfall of about 250-400mm, where the soil is also light and sandy. The preference for the drier eco-zone is possibly also favoured due to the presence of shrub
and deciduous trees, which though sparse, are nutritious and provide variety in diet to meet the nutritional requirement of energy, nitrogen and minerals. Goats are maintained mainly under extensive management system, but few resourceful farmers adopt semi-intensive system of management. Animals are sent to browse in the typical semi-arid ranges for about 8-10 hours daily, depending upon light hours available in different seasons. These pastures consist of forest trees (Khejri: Prosopis cineraria, Kheri: Acacia senegal, Ardu: Ailanthus excelsa, Baboo: Acacia nilotica, Subbabo: Lucaena leucocephala, Neem: Azadirachta indica, Brij Baboo: Dichrostachys nummularia, Kakera: Gymnosporia spinosa, Orinja: Acacia leucophloea, Siris: Albizia lebbeck, Jungle Jakebi: Pithecellobium dulce, Israel Baboo: Acacia tortilis etc.) - bushes (Ber: Zizyphus mauritiana, Bordi: Zizyphus nummularia etc.) - perennial grasses (Cenchrus ciliaris, Cenchrus setigens, Lasurus indicus, Pennicium antidotale etc.). During summers/lean period, when the condition of pasture deteriorates to a considerable extent, animals are provided with the lopped foliage of forest trees, roadside trees or fodder trees available in the area. In general animals are not supplemented with concentrate except pregnant, lactating females and breeding bucks. The physical composition of concentrate mixture includes locally available ingredients like barley, maize, groundnut cake, wheat bran and molasses, common salt, etc.

For breeding purpose, bucks are always left free with the flock throughout the year. Bucks are used for breeding for 1-2 years and afterwards these are replaced with the new bucks. Farmer generally prefers single kidding in a year as an adjustment to seasonal availability of feed resources. Goat flocks as such do not go on migration for long distances as sheep do. Goat farmers keep 4-5 adult goats in their flock to meet out their milk requirements during migration and these goats are also used as foster mother to orphaned kids.

Farmers don’t provide any specific housing, except Katcha shed, temporary shelter for protection from adverse climatic conditions i.e. extremes of hot/cold/rainy seasons. At night, they restrict animals in open paddocks made from locally available thorny shrubs and bushes, just to provide protection against wild animals. These sheds are covered with thatch during extreme winters/summers to prevent the exposure of animals to adverse climate. Dense leafy trees are planted in and around these sheds to provide shelter & foliage during summer/lean period.

Growth Performance

Kids generally do not grow as fast as lambs mainly because lambs had an inherent ability for accumulation of fat in the body tissue during the process of early growth which however, is not so in kids. Kids grow faster during pre-weaning followed by post-weaning up to 6 month of age. The body weight and average daily gains vary among different breeds. Pre-weaning gain are found to be influenced largely by kidding season, the quality of pasture, supplementary feeding of does and milk production potential of does.

The body weights at birth in Sirohi were highest among all the breeds found in this region and followed by Kutchi. Jamunapari is a large breed, has more multiple births as compared to breeds of Rajasthan, like Sirohi and Marwari, which appears to be influencing factors for comparatively low birth weights. The body weights up to 12 month of age, were higher in Sirohi, Marwari and Kutchi goats as compared to Jamunapari. The pre-weaning growth (0-3M) was higher in all the breeds as compared to post-weaning growth rate in large sized breeds like Jamunapari and Beetal, varied between 57 and 100 g/day (Roy et al. 1989).

Under Indo-Swiss Goat Project in Rajasthan, performance was recorded in farmer flocks and body weight of Sirohi kids was reported for male and female kids as 13.7 and 12.7 kg at 3 months and 19.7 and 18.7 kg at 6 month of age (Krishnamurthi et al. 1992). Body weight and growth rate of Parbatsari and Deogarhi goats spread over a period of 3 years under field conditions of Rajasthan was recorded. The means for Deogarhi and Parbatsari goats are 11.90 and 12.49 at 3 month and 14.91 and 15.54 kg at 6 months and 18.00 and 20.04 kg at 12 months of age (Taparia and Jain 1991).

Very limited work on feed conversion efficiencies in goats had been done in India although this has direct impact on whole economy of production. Research conducted at CSWRI, Avikanagar on feedlot performance of kids showed that adlib supplementation of concentrate, hay and green fodder between 91-180 days of age in addition to browsing for 8 hours a day resulted in an improvement of 40.3% in market weight in Sirohi kids over the control group maintained on browsing alone. Supplementation of concentrate mixture @ 2.0% of body weight in addition to browsing is found to be beneficial in terms of growth, carcass traits and economics (Anil Kumar et al. 2001). Body weight and FCE was also studied at CIRG in Jamunapari and Barbari kids and at CSWRI in Sirohi, Kutchi and Marwari have shown that male kids of these breeds performed better than the females.

Milk Yield

Milk yield is the most important traits in goats, since it influences postnatal kid survivability, pre-weaning growth rate and number of kids weaned per litter. Milk yield vary to a greater extent in Indian goat breeds depending on the breed structure of the goats besides other factor like stage of lactation, parity of animals, feed resources, grazing pattern, age and weight of animals. Mishra (1992) reviewed the milk yield of goat breeds of northwestern region maintained in institutional farms range between 101.5±2.4 in Marwari to 225.9±17.4 in Beetal. The results from a field recording system in Sirohi...
adopted by Indo-Swiss Goat Project, Ramsar has revealed that the mean milk yield in a flock is 272.6±4.4 kg compared to 110.0±5.2 kg, reported from 72 kg to 673 kg indicating the potentiality of the breed (ISGP 1990). Sirohi yielded 122.30 kg as compared to 113.57 kg in a period of 148 days in Jamunapari goats. Milk yield for 90 days was higher in Jamunapari (79.51 kg) as compared to other breeds.

Carcass Quality

Carcass quality depends on carcass size, proportion of different tissues in the carcass, their thickness and distribution through the carcass. Total quality of carcass in relation to live weight is referred as dressing percentage and influenced by gut fill, body conformation and breeds. Carcass studies were undertaken on Sirohi, Marwari and Kutchi kids at CSWRI, Avikanagar and on Barbari at CIRG at Makhdoom maintained under intensive (Stall feeding in confinement) and semi-intensive (Browsing plus concentrate supplementation) systems. Kids reared under intensive feeding system had higher dressing percentage (Pre-slaughter weight) and low bone contents than those raised under semi-intensive feeding system. The study conducted on Marwari kids between 91-180 days of age under different feeding system at CSWRI over a period of three years has revealed that intensive feeding under confinement increase fat content, semi-intensive lean and extensive bone content. Intensive feeding increased 21% more fat deposition in tissue and almost 2 times as caul and kidney fat than those kids reared in semi-intensive system. Kids in confinement feeding on high protein and energy diet result in higher proportion of fat deposition in gut and kidney. It has been found that poor exercise in confinement results in more energy consumption by the kids into fat deposition. This unfavourable fat distribution neither increases the carcass yield nor improves the eating quality of meat. The effect of castration on growth performance of kids has been carried out at several places. Most of the results are contradictory with regard to beneficial effect of castration. Few studies suggest castration of kids at 1 month of age, had beneficial effect in higher body weight gain and superior organoleptic characteristics. The age of goats at slaughter significantly influenced the hot carcass weight, dressing percentage and proportion of loin with flank, rack and fore shank to total carcass weight. Dressing percentage of kids of various breeds of goats slaughtered at different age, have been reviewed by Dhangar et al. (1992). The results revealed that it would be desirable to slaughter kids at 9 months of age to obtain more meat as compared to weight of kids at slaughter.

Reproduction

Goats are varying prolific and have high reproductive rate, which provides more animals for slaughter. The kidding rate has a significant influence on reproductive efficiency. The prolificacy and birth weight together as an index, will furnish an estimate of potential kid production from the female. Litter size is influenced by many factors like breed and other maternal factors. Barbari has a kidding percentage of 158.9% as compared to 112.5% in Sirohi. In general, large breed of Rajasthan had a very low level of prolificacy.

A study on Kutchi goats maintained on accelerated breeding system where bucks are kept with females throughout the year was conducted. The results indicated that goats in semi-arid region of the country are bred round the year but maximum numbers of goats are bred during the month of May (45%) and July (33%) followed by October (7%) and December (6%). Higher rate of multiple births, up to 26% as compared to 3-4% in controlled breeding system were recorded. Maximum multiple births were recorded, in mating of July month. It was observed that goats in these parts of country received sufficient amount of Acacia tortilis and Prosopis cineraria pods during June-July month along with newly sprout ground vegetation, which have flushing effect in bringing the goats into oestrus and improvement of multiple births.

The twinning percentage and conception rate was 83.6% and 87.2% in Kutchi goats reported by Arun et al (2000). The average twinning percentage was observed to be 10.5%, it was highest 14.7% during (1992) and lowest 7.7% during year (1995). Khan et al (1993) reported the twinning percentage 12.5, 13.4 and 9.9% in Sirohi, Marwari and Kutchi breeds, respectively. Higher twin births (53.5%) reported by Tomar et al (1995) for Barbari goats. No incidence of triplets was observed during the whole period of study. In Sirohi goats the litter size was 1.06 with 5.2% twins and one triplet, 3.5% kiddings were terminated as abnormal and the sex ratio was 49.8% in the flock maintained at CSWRI, Avikanagar (Arun et al 2001).

Sex-Ratio & Replacement Rate

The sex ratio expressed as the percentage of male birth among the normal kids born. Arun et al (2001) reported the 49.8 % male birth among 883 normal kids born from 837 normal kidding records of 305 Sirohi goats maintained at CSWRI, Avikanagar during the year 1992 to1999. The sex ratio did not deviate significantly from normal expectation of 50:50. Mishra et al (1980) reported the sex ratio in Sirohi goats as 50.45 %. According to ISGP report (1986-88) the ratio of male and female births were 55:45 in 1986, 52:48 in 1987 and 49:51 in 1988 at Ramsar farm.

The replacement rate was taken as the percentage of young females reached to the milking age to that of the total kids born (TK) as well as to that of the total female kids born (FK). Arun et al (2000) reported that 29% of the total Sirohi female kids born were lost from the flock due to death (16.2%) and culling (12.8%) while rest 71% joined the milking flock. The replacement rate was found to be 35.6% on total...
Literature Reviewed For The Present Paper


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Panchgavya

Panchgavya is the product prepared from five ingredients all taken from indigenous cow: milk, curd, ghee, dung and urine. The product has variously been shown to be effective in human ailments (Chauhan 2001-2007). The cow urine distillate has been found to increase immunity in mice. It also increases the phagocytic activity of macrophages and secretion of interleukin 1 and 2. Recently, the cow urine has also been granted U.S. patent for its synergistic properties with antibiotics and as bio-enhancer. Indian scientists have obtained US patent (No. 6410059 dated 25.6.2002) on a pharmaceutical composition comprising cow urine distillate (Dhama et al.2005). Another US Patent was granted for anti-cancerous properties of cow urine (Patent No. 6896907, dated May 24, 2005).