
UNIT 4 MILCH BREEDS

Structure

- 4.0 Objectives
- 4.1 Introduction
- 4.2 Milch Breeds of Cattle
 - 2/21 Indigenous Milch and Dual-purpose Breed
 - 2/21 Exotic Dairy Cattle Breeds
 - 2/21 Synthetic Crossbred Cattle Strains
 - 2/21 Breed Improvement in Cattle
- 4.3 Milch Breeds of Buffaloes
 - 2/21 Breed Improvement in Buffaloes
- 4.4 Milch Breeds of Goats
 - 2/21 Indigenous Goat breeds
 - 2/21 Exotic Dairy Goat Breeds
 - 2/21 Breed Improvement in Goats
- 4.5 Let Us Sum Up
- 4.6 Key Words
- 4.7 Some Useful Books
- 4.8 Answers to check your Progress

4.0 OBJECTIVES

After reading this unit, we shall be able to:

- 2/21 enumerate the names of different milch breeds of cattle, buffalo and goat;
- 2/21 state the distribution of these breeds in their respective home tracts;
- 2/21 describe the physical characteristics of these breeds;
- 2/21 performance of these breeds;
- 2/21 specify the reproduction and production; and
- 2/21 indicate the concept of breed improvement.

4.1 INTRODUCTION

Cattle, buffalo and goats constituting 404.1 million population are three major domestic animal species, which contribute over 91.0 million tonnes milk in the country. The buffaloes contribute maximum (52%) to total milk production followed by cattle (45%) and goats (3%). There are large number of well descript breeds of cattle, buffalo and goats which are widely distributed under different agro-climatic regions. Besides these, there is large population of non-descript animals. A breed is a group of inter-breeding domestic animals of a species. It shows similarity among its individuals in certain distinguishable characteristics (colour, shape, size of body parts). The breeds have been developed as a result of selection and breeding based on the needs of mankind as well as adaptation to agro-climatic conditions of their native home tracts.

4.2 MILCH BREEDS OF CATTLE

There are 30 well-defined indigenous cattle breeds. These breeds can be classified into three categories based on their utility. These are (1) Milch breeds, (2) Dual purpose breeds and (3) Draft purpose breeds. The cows of milch breeds are

relatively high milk producer, but their bullocks are generally of poor quality draft. The animals of dairy breeds are generally heavy built with capacious udder, pendulous dewlap, sheath and loose skin. The important breeds of this group are Sahiwal, Red Sindhi, Gir, Tharparkar, and Rathi.

i. Indigenous Milch and Dual-purpose Breeds

i. Sahiwal: This is one of the best indigenous dairy cattle breeds. The Sahiwal cows have their native home tract in Montgomery district and adjoining places in Pakistan. The Sahiwal cows are also found in Ferozepur, Amritsar, Gurdaspur districts of Punjab in India. There are quite a good number of breeding herds in Punjab, Haryana, Uttar Pradesh, Chhatisgarh and Madhya Pradesh. The cows are red and light brown in colour, but some animals with white patches are also found. The animals have long head with medium sized forehead. The horns are short and thick emerging laterally from the polls. The cows are with long, deep, fleshy and symmetrical body with short legs, loose skin, medium sized ears, heavy and large dewlap, straight hump and capacious udder. The cows are good milk yielders and cows under village conditions yield about 1350 kg in a lactation of 305 days. Well-bred cows on institutional farms yield an average of 2000-2500 Kg/lactation. The average age at first calving is about 36.0 months which ranges from 29 to 52 months. The average calving interval, service period and dry period of Sahiwal cow are 415, 148 and 156 days, respectively. The average fat and SNF content of the milk is around 5.0 and 9.2 per cent.

Sahiwal Cow

ii. Red Sindhi: The Red Sindhi cattle have somewhat similarity in breed characteristics to that of Sahiwal but are smaller in size with compact body frame. The native habitat of this breed is Karachi and Hyderabad districts of Sindh province of Pakistan. It is an important dairy cattle breed in Indian sub-continent. Red Sindhi cattle are maintained on few organized Government farms in India. The breed has red colour, which has shades from dark to dim yellow, with white patches on some animals. Head is well proportioned with an occasional bulge on the forehead. The horns are thick at the base and emerge laterally and curve upwards. The ears are of moderate size and drooping. Dewlap and sheath are pendulous. Udder is capacious and pendulous. The cows are high milk yielders and produce milk on an average 1800 kg ranging from 1500 to 2200 kg. in a lactation of 305 days. The average age

at first calving is 42 months and ranges from 32 to 50 months. The calving interval, service period and dry period ranges from 425 to 540 days, 105 to 293 days and 112 to 179 days, respectively.

Red Sindhi Cow

iii. Gir: The cattle are found in Junagarh, Bhavnagar, and Amreli districts of Gujarat. This is one of best Indian dairy cattle breed. The Gir cattle are also widely distributed in adjoining states of Rajasthan, Madhya Pradesh and northern parts of Maharashtra. There are quite a large number of organized farms and *gaushalas* maintaining the Gir cattle. Most of the Gir cattle are purely red in colour and some are with patches of red, black and red & black on white skin. The Gir cattle have medium size and well-proportioned body with massive heads, extremely bulging foreheads, long pendulous, curling and drooping ears with notches at the tips. The

horns are thick, medium size, curve backwards, upwards and forward ending in an inward sweep. The cows have good-shaped udder with well-placed teats. The cows are very good milk yielders with an average of 1400 kg ranging from 1200 to 2000 kg in lactation. Certain outstanding cows with 26-27 kg peak milk yield in a day and lactation milk yield more than 4500 kg indicate high genetic potential for milk production. The age at first calving varies from 40 to 60 months and inter calving period from 430 to 490 days.

iv. Tharparkar: An important cattle breed raised primarily for its milking potential. The home tract of this breed is in the Tharparkar district of southeast Sind in Pakistan. In India, these animals are now found along the Indo-Pak border covering western Rajasthan and up to Rann of Kutch in Gujarat. Animals with typical characteristic of breed are found in Jodhpur, Barmer, Jaisalmer districts of Rajasthan and Kutch region of Gujarat. Animals are white or light grey. Face and extremities are of a darker shade than the body. In bulls neck, hump and fore and hind-quarters are also dark. Head is of medium size. Forehead is broad and flat or slightly convex above eyes. Face is lean, fine and slightly dished to muzzle. Ears are somewhat long, broad and slightly pendulous. Horns are set well apart curving gradually upward and outward. Dewlap is loose and flexible but not voluminous. Tail is thin and hangs loosely with black switch. Udder is large and well developed with prominent veins. Teats are long, uniform in thickness and set at even distances. Tharparkar cows calve for the first time at an average age of about 41 months (range 37 to 52 months). The average milk yield is 1,750 kg (range 900 to 2,150 kg), lactation length is 285 days (range 240 to 380 days), dry period is 140 days (range 115 to 190 days), service period is 128 days (range 108 to 190 days) and calving interval of 430 days (range 408 to 572 days). Milk fat is about 4.88 % (range 4.72 to 4.90%) and SNF 9.2 % (range 8.9 to 9.7%).

Tharparkar Cow

v. Rathi: The cattle take their name from a pastoral tribe of Rajasthan called Raths. Rathi cattle have been developed as a result of admixture of inheritance of Sahiwal, Red Sindhi and Tharparkar cattle breeds with high proportion of blood from Sahiwal breed. These are concentrated in the Bikaner district of Rajasthan.

This is a medium sized breed with symmetrical body. The animals have brown colour with white patches and some animals with complete brown or black coal

colour with white patches are also found in the tract. Horns are short to medium curving outwards, upwards and inwards, ears are of medium size, voluminous dewlap and large naval flap. Skin is loose with fine short hair. Udder and teat are well developed. The cows are docile in nature. The average lactation milk yield of Rathi cows is 1500 kg, which ranges from 1050 kg to 2000 kg. The average age at first calving ranges from 36 to 52 months and inter calving period ranges from 450 to 620 day.

Rathi Cow

vi. Deoni: This is a very popular dual-purpose breed in Marathwada region of Maharashtra state and adjoining parts of Karnataka and Andhra Pradesh states. It is also found in Parbhani, Nanded and Osmanabad districts of Maharashtra and Bidar district of Karnataka. The body colour is usually white and animals are also

black and white spotted. The ears are grey-white or complete white with black pinna. The ears are drooping and the forehead is prominent and slightly bulged similar to that of the Gir cattle. This breed is considered to have admixture of Gir, Dangi and local cattle blood. The horns emerge from the side of the poll in outwards and upwards direction, slightly backward and again curving upward. The dewlap and sheath are of medium size. The switch of the tail is black and white reaching below hock joint. Udder is moderately developed. The animals are docile and calm. The Deoni bullocks are preferred for heavy work. The age at first calving ranges from 30 to 51 months with an average of 45.5 months. The milk yield in Deoni cows ranges from 650 to 1,250 kg with an average of 950 kg. Lactation length ranges from 170 to 475 days with an average of 300 days. Calving interval averages 450 days. Milk contains 4.3% fat, 9.7% SNF and 14.0% total solids.

vii. Haryana: The Haryana is a prominent dual-purpose breed of northern India. Its native breeding tract encompasses parts of Rohtak, Sonapat, Bhiwani, Hisar, Jind and Gurgaon districts of Haryana. These animals are also reared in Jodhpur, Alwar, and Bharatpur districts of Rajasthan and Meerut, Bulandshahr and Aligarh districts of Western Uttar Pradesh. The Haryana cattle are white or light grey in colour. They have compact and proportionately built body. A long and narrow face, flat forehead and a well-marked bony prominence at the centre of the poll characterize them. They have small stumpy horns. Muzzle is usually black. Eyes are large and prominent. The legs are moderately long and lean with small, hard and well shaped feet. The udder is capacious with well-developed milk vein. The teats are well developed, proportionate and medium sized. The tail is short, thin and tapering with black switch. The age at first calving ranges from 35 to 60 months with an average of 52 months. Average milk yield is around 1000 kg with a range of 690 to 1750 kg. Lactation length is about 270 days ranging from 240 to 330 days. Average service period is 230 days (range 125 to 305 days), dry period is 255 days (range 135 to 270 days) and calving interval is 480 days (range 415 to 560 days). Milk fat ranges from 4.3 to 5.3%, with an average of about 4.5% and SNF is around 9.1%.

Haryana Cow

viii. Kankrej: The Kankrej is one of the heaviest breeds of cattle in India and is found in southeast Rann of Kutch comprising Mehsana, Kutch, Ahmedabad, Kaira, Sabarkantha and Banaskantha districts of Gujarat, and Barmer and Jodhpur districts of Rajasthan. The colour of the animal varies from silver-grey to iron-grey or steel-

black. The forequarters, hindquarters and hump are slightly darker than the rest of the body in males. The forehead is broad and slightly dished in the centre. The face is short and nose slightly upturned. Ears are large, pendulous and open. The horns are large, strong, and curved outwards and upwards in a lyre-shaped fashion. The polls, forequarters and hindquarters are rusty red in newborn calves, but the colour disappears later on. The hump is well developed. The dewlap is thin and pendulous. The average age at first calving is 47.3 months (range 34 to 56 months). The average milk yield is around 1750 kg (range 1100 to 3200 kg.). The lactation length averages 295 days (range 275 to 350 days) and calving interval is around 490 days (range 410 to 640 days). The milk fat is around 4.8% (range 4.66 to 4.99%).

Kankrej Cow

ix. Ongole: The home tract of Ongole breed is Ongole region in Andhra Pradesh which extends all along the coast from Nellore to Vizianagaram and Chittoor,

Kurnool, Cuddapah, Anantapur, Nalgonda, Mehbubnagar and Khammam districts of Andhra Pradesh. The Ongole cattle have a glossy white coat. These cattle are large and heavy animals with loosely knit frames, great muscularity and long limbs. They have a majestic gait. The forehead is broad between eyes and slightly prominent. The face moderately long and coffin shaped. The horns are short and stumpy, growing outward and backward from the outer angles of the poll. The dewlap is large and slightly pendulous, and hanging in folds. The switch is black. The udder is well-placed with well-developed teats. The age at first calving ranges from 35 to 60 months (average 48 months). The average milk yield is 690 kg (range 475 to 1,000 kg) in a lactation period of about 230 days (range 160 to 270 days). The average dry period is 260 days (range 145 to 400 days), average service period of 190 days (range 128 to 310 days), average calving interval is 500 days (range 420 to 720 days) and average milk fat is 4.2% (range 4.1 to 4.8%).

ii. Exotic Dairy Cattle Breeds

Military dairy farms were the first to introduce crossbreeding in the country using high milk producing exotic cattle breeds like Holstein Friesian, Jersey, Brown Swiss and Red Dane for improving the milk production potential of indigenous cows. The breed characteristics of some important exotic cattle breeds have been described below.

i. Holstein Friesian: This breed was developed in the province of Friesland in Netherlands. This is the best dairy breed and is most widely distributed breed of dairy cattle in the world. Holstein cattle are heavily built and possess large udders. They are the largest dairy breed and mature cows body weight are as much as 700 kg. They have typical markings of black and white that make them easily distinguishable. The average milk production of cow is 8,000 to 10,000 kg per lactation in developed countries. However, the fat content (3.0 - 3.5 per cent) in their milk is low.

Holstein Friesian Bull

ii. Jersey: This breed originated in the Island of Jersey, one of the Channel Islands between France and England. Jersey breed is also widely distributed in Europe and America. The typical body colour of Jersey cattle is reddish brown. In India, this breed has acclimatized well and is widely used in cross-breeding with indigenous

cows in hilly areas. Jersey is relatively a smaller dairy breed and hence is more suited for cross-breeding with zebu cattle. Mature Jersey cows weigh around 450 kg. Heifers grow rapidly and mature early and calve at the age of 26 - 30 months. They have compact and angular body. The average milk production of Jersey cows is 5,000 to 8,000 kg with a fat content of 5.0 per cent.

Jersey Cow

iii. Brown Swiss: This breed originated in the mountainous region of Switzerland. The animals are quite docile and easily manageable. The colour of Brown Swiss varies from light to dark brown. Brown Swiss heifers are rather slow maturing. In India, crossbred cattle have been developed by crossing this breed with recognized Indian breeds of cattle and non-descript cattle on institutional farms and village conditions. The average production per cow is about 6000-8000 litres with an average fat content of 4 per cent.

iv. Red Dane: This breed has its home tract in Denmark. The typical body colour of this breed is red, reddish brown or even dark brown. It is also a heavy breed. The mature males weigh up to 950 kg and mature females to 600 kg. Lactation yield varies from 5,000 to 7,000 kg with a fat content of about 4 per cent.

iii. Synthetic Crossbred Cattle Strains

For bringing rapid improvement, particularly in non-descript zebu cattle, the crossbreeding of indigenous cattle using frozen semen of bulls of exotic dairy cattle breeds (Holstein Friesian, Brown Swiss, Jersey, Red Dane and Ayrshire) resulted in developing various synthetic crossbred cattle strains. Karan Swiss, Karan Fries, Frieswal, Sunandini are some of high producing synthetic crossbred cattle strains developed at organized farms and under village conditions in India.

i. Karan Swiss: A crossbred cattle strain has been developed at NDRI, Karnal by crossing Brown Swiss bulls with Sahiwal and Red Sindhi zebu cows. The frozen semen of superior Brown Swiss Bulls used for crossbreeding was imported from USA. The average age at first calving of Karan Swiss cows is 32 to 34 months (2 to 3 months less than that of Sahiwal/Red Sindhi cows). Average lactation milk yield in 305 days or less was about 3350 kg and outstanding cows with record of 305 days best lactation milk yield of 7096 kg. The average service period, dry period

and inter-calving period are 117, 85 and 404 days, respectively. The average fat and SNF content in milk is 4.16% and 9.20%

Karan Swiss Cow

ii. Karan Fries: Crossbred cattle have been developed at NDRI Karnal by crossing Tharparkar cows with the frozen semen of superior Holstein Friesian bulls. The Karan Fries cows calve for the first time at the age of 30 to 32 months and yield 3400 to 3600 kg milk in 305 days lactation. The average service period, dry period and inter-calving period are 123, 104 and 401 days, respectively. Outstanding cows yield up to peak milk yield of 46.5 kg in a day and 8338 kg in 305 days best lactation milk yield have been recorded and used for production of bulls for future breeding on institutional farms and farmers' animals. The average fat and SNF content of milk is 4.10% and 8.92%.

iii. Frieswal: This cattle breed is developed by crossing Holstein Friesian with Sahiwal cows at Military Dairy Farms in technical collaboration with Project Directorate on Cattle (ICAR), Meerut (UP). The breeding programme using imported semen of superior Holstein Friesian bulls and crossbred bulls has been designed in such a way that the cows are produced with 62.5 per cent inheritance of Holstein Friesian. The average age at first calving of Frieswal cows is 30 to 33 months. Average lactation milk yield in 300 days lactation ranges from 3000 to 3400 kg. The average service period, dry period and inter-calving period are 160, 115 and 425 days respectively. The fat content of milk ranges from 3.5 to 4.5%.

iv. Sunandini: As a result of crossbreeding programme launched under Indo-Swiss Project using frozen semen of Brown Swiss bulls on non-descript local or graded Red Sindhi or Sahiwal cows of rural households in Kerala, a high yielding crossbred cattle strain named Sunandini was developed. The crossbred cattle strain was further improved through introduction of exotic inheritance of Jersey and Holstein Friesian cattle breeds. Attempts were made to retain 50 to 62.5% of exotic cattle inheritance. The average production performance of recorded crossbreds in the village herds has been ranging from 1400 to 1800 kg depending upon managerial and agro-climatic condition. Age at first calving is around 35 months and calving interval averages about 450 days. *Inter-se* mated Sunandini crossbred cows are further being improved through selective breeding using superior breeding Sunandini bulls identified on the basis of their daughters' performance under field conditions.

iv. Breed Improvement in Cattle

The genetic improvement in dairy and dual purpose breeds of cattle for improving milk production can be brought about by selective breeding. Selective breeding means mating of the best males with best females. The best female means the cows yielding higher milk than the average of the population. The best male means the bull which has higher dam's milk yield, paternal grand dam's milk yield and daughters' yield compared to other bulls. Initially, the young male calves with better growth, true breed characteristics and reproductive performance can be selected as superior progenies of elite dams. The young bulls subsequently are evaluated on the basis of performance of their progenies. The females should be selected on the basis of their own growth, reproductive and productive performance.

The low producing non-descript cattle constituting about seventy-five percent ($\frac{3}{4}$) of the total cattle population can be improved through **grading up**. Grading up means breeding of the non-descript females with the semen of the bulls belonging to high producing, superior indigenous dairy breeds like Sahiwal, Tharparkar, Gir, Deoni, etc. In 5-6 generations of grading up, the non-descript animals become like pure-bred indigenous breed. The grading up can be practiced in the regions with scarce availability of feed and fodder resources particularly in rain-fed conditions.

The non-descript cattle under irrigated regions with adequate feed and fodder resources can be improved through crossbreeding with exotic dairy cattle breeds like Holstein-Friesian and Jersey. Subsequently, the crossbred cattle can be improved using progeny- tested high genetic merit crossbred bulls from different farms maintaining synthetic crossbred cattle strains.

Check Your Progress 1

- 1) Define breed and describe the general characteristics of dairy cattle breeds.

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- 2) Write the home tracts of Sahiwal, Tharparkar, Gir and Ongole breeds of cattle.
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- 3) Give the productive performance of Sahiwal, Tharparkar, Gir, Ongole and Haryana breeds of cattle.
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- 4) List the names of crossbred cattle strains developed in India. Also give the names of the exotic and Indian breeds crossed for their development.
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- 5) How can we improve the milk production in local non-descript (Desi) cattle?
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4.3 MILCH BREEDS OF BUFFALO

India is considered as the home-tract for some of the best buffalo breeds. There are seven well-defined milch breeds of buffaloes namely Murrah, Nili-Ravi, Bhadawari, Jaffarabadi, Surti, Mehsana and Nagpuri. There are a few other lesser known breeds like Toda in Nilgiris, Parlakhemundi, Jerangi, Manda in Orissa and Pandharpuri and Marathwada in Maharashtra state. The population of these breeds is very small, and they are only found in isolated pockets but are distinct because of their morphological traits.

Apart from providing milk, the buffaloes are also used for carting, ploughing and other agricultural operations. The buffaloes are also used as meat animal. The characteristics of important buffalo breeds used as dairy animals have been discussed below.

i. Murrah: The breeding tract of Murrah breed is Rohtak, Hisar and Jind districts of Haryana state and Nabha and Patiala districts of Punjab state. The breed characteristics are massive body, neck and head comparatively long, horns short and tightly curved, udder well developed, hips broad, and drooping fore and hind quarters. The tail is long reaching up to the fetlocks. The colour is usually jet black with white switch of tail. The bullocks are good draft animals though slow but powerful. The average milk yield per lactation is 1,500 to 2,500 kg. The age at first calving is 45 to 50 months in villages but in good herds it is 36 to 40 months. The intercalving period is 450 to 500 days. The milk fat and SNF percentages are 7.0 and 9.5 respectively.

Murrah Buffalo

ii. Bhadawari: This breed is found in Bhadawar Tehsil in Agra district and Etawah district of Uttar Pradesh and Gwalior district of Madhya Pradesh. The animals have wedge shape body and are of medium size. The head is comparatively small, the legs are short and stout, the hooves are black, and the hindquarters are uniform and higher than the forequarters. The tail is long, thin and flexible with black and white or pure white markings reaching up to fetlock. The body is usually light or copper coloured which is peculiar to this breed. The bullocks are reputed as good draft animals with heat tolerance. The ears are horizontal and medium in size. The age at first calving is around 50-55 months. The average milk production is 800 to 1,000 kg in a lactation period of 275-300 days. The average calving interval is 480 days (390-600 days). The breed is well known for its higher percent fat content in milk ranging from 6.5 to 12.5 per cent.

iii. Jaffarabadi: The breeding tract of this breed is Junagarh, Bhavnagar and Amreli districts of Gujarat State. This is the heaviest breed of buffaloes. The body is long and massive. The dewlap in females is somewhat loose and the udder is well developed. The head and neck are massive. The forehead is very prominent, broad and convex. The horns are heavy, inclined to droop at each side of the neck and then turning up at points, but less tightly curved than in the case of the Murrah breed. The colour is usually black. The average milk yield is around 1800 kg (1400 – 2300 kg) in a lactation period of 300 – 315 days. These animals are mostly maintained by traditional breeders called Maldharis, who are nomads. The bullocks are heavy and are used for ploughing and carting. The age at first calving is around 50-55 months and calving interval is 450 days. The average fat percentage is around 6.5 – 7.5.

Jaffarabadi Buffalo

iv. Surti: The breeding tract of this breed is Kaira, Bharuch, Vadodara and Surat districts of Gujarat. The body is well proportioned and medium sized. The barrel is wedge shaped. The head is long. The back is straight. The eyes are prominent. The horns are sickle shaped, moderately long and flat. The tail is fairly long. The colour is black or brown. The peculiarity of the breed is that there are two white bands, one round the jaw and the other at the brisket. The bullocks are good for light work. The milk yield ranges from 900 to 1300 kg. The age at first calving is 40 to 50 months with an intercalving period of 400 to 500 days. The Surti buffaloes have high fat percentage in milk (7.5 to 8.5 per cent).

Surti Buffalo

v. Mehsana: The breeding tract of this breed is Mehsana, Sabarkantha and Banaskantha districts of Gujarat state. This is considered to have been evolved out of crossbreeding between the Surti and the Murrah. The body is longer than in Murrah and the limbs lighter. The head is longer and heavier. The horns usually are less curved at the end compared to Murrah breed but are longer and could be of irregular shape. The udder is well shaped. The horns usually are less curved at the end as compared to Murrah breed but are longer and could be of irregular shape. The udder is well shaped. The colour is usually black to grey, with white markings often on face, legs or tail-tips. The bullocks are good for heavy work but rather slow. The age at first calving is around 42-48 months. The milk yield is 1,400 to 1800 kg in a lactation period of 290- 310 days. The intercalving period ranges between 450 and 550 days. The milk fat averages around 7.0 to 8.0 per cent.

Mehsana Buffalo

vi. Nagpuri: The breeding tract of this breed is Nagpur, Akola and Amravati districts of Maharashtra. This is also called as Ellichpuri or Barari. The horns are long, flat and curved, bending backwards on each side of the back almost to shoulders. The face is long and thin. The neck is somewhat long, the limbs are light. The tail is comparatively short reaching a little below hocks. The bullocks are good for heavy trotting work but slow in movement. The milk yield is 700 to 1,200 kg per lactation. The age at first calving is 45 to 50 months and intercalving period is 450 to 550 days. The milk fat averages around 7.0 to 8.5 per cent.

vii. Nili-Ravi: The breed is found along with the Basins of Sutlej River in Ferozepur and of Ravi River in Amritsar districts of Punjab state and in adjoining areas of Pakistan. The head is elongate, bulging at the top and depressed between the eyes. The frame is medium sized. The peculiarity of the breed is the wall eyes. The horns are small and coiled tightly. The neck is long, thin and fine. The naval is very small. The udder is well developed. Usually the colour is black with white markings on forehead, face, muzzle, tail and legs (Panch Kalyani). The bullocks are good for heavy trotting work. The milk yield is 1700 to 2100 kg per lactation. The intercalving period is 500 to 550 days. The age at first calving is 42 to 48 months. The milk fat averages around 6.5 to 8.0 per cent.

Nili-Ravi Buffalo

Breed Improvement in Buffaloes

The genetic improvement in the buffaloes for improving milk production should be brought through selective breeding. The young male calves (future breeding bulls) with better growth, true breed confirmation and reproductive characteristics can initially be selected as superior progenies of elite dams with best lactation milk yield more than 2500 kg. The young bulls subsequently are evaluated on the basis of performance of their progenies. The females should be selected on the basis of their own growth, reproductive and productive performance.

The low producing non-descript buffaloes nearly constituting about sixty-seven percent (2/3rd) of the total buffalo population can be improved through grading up using genetically superior progeny tested bulls of pure-bred improver breeds of buffaloes.

Check Your Progress 2

1. Describe the uses of buffaloes and enumerate the important breeds of buffaloes available in India.

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2. Write the home tract of Nili-Ravi, Jaffarabadi, Bhadawari and Surti breeds.

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3. Describe the breed characteristics of famous buffalo breed of Haryana.

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4. Give the average productive and reproductive performance of Murrah, Jaffarabadi and Surti buffalo breeds.

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5. How can we improve the milk production in local non-descript buffaloes?

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4.4 MILCH BREEDS OF GOAT

Goat is regarded as “poor man’s cow.” The goats are adaptable to varying environmental conditions and have tremendous ability to survive on sparse vegetation unsuitable for feeding of other livestock. Goats are the source of income and occupation for a large number of rural people, specially the economically and socially backward classes of the society in India. The goat is mainly a meat animal in India and a few breeds are milch breeds which provide small quantity of milk. India possesses 22 well established breeds of goat apart from non-descript local goats. The important dairy goats are Jamunapari, Beetal, Jhakrana, Zalawadi and Surti. A few exotic dairy breeds like Alpine, Saanen, Toggenburg and Anglo-Nubian have been used in crossbreeding with local breeds of goats to improve the milk production.

i. Indigenous Goat Breeds

i. Jamunapari: This breed is found in Etawah, Agra and Mathura districts of U.P. and the tracts lying between of the Chambal and Jamuna rivers. The goats of this breed are the largest in size, tall and leggy. The breed has no uniform colour but animals having a white coat with markings of tan are common. Long pendulous ears and highly convex nose with a tuft of hair (Roman nose) are peculiar characteristics of this breed. They are dual purpose goats giving both milk and meat. The body weight of an adult male (buck) and female (doe) ranges from 50-85 and 40-60 kg respectively. The average body length and height of an adult buck and doe is 127 and 116 cm and 91 and 77 cm respectively. The average age at first kidding is 20-25 months. The kidding is once in a year with a single or twins. These goats are bred from July to October and kid from November to February. The average milk yield is around 1-2 kg per day with a maximum of 350-550 kg in a lactation period of 250 days. The lactation length varies between 210-275 days. The good animals yield 2.5-3.5 kg milk per day.

Jamunapari Goat

ii. Beetal: This breed is found mainly in Gurdaspur and Amritsar districts of Punjab. The adult buck and doe weigh around 40-70 and 35-50 kg, respectively. An adult Beetal buck measures 125 cm in body length and 90 cm in body height. The corresponding values for a doe are 105 cm and 75 cm respectively. The average age at first kidding is 20-22 months. The kidding is once in a year with a single or twins and rarely triplets. These goats are mostly bred from July to October and kid from November to February. The gestation period is five months. The ears are long and pendulous hanging like beetal leaf on both sides. The Beetal goats also have Roman nose indicating a common ancestry with Jamunapari. The bucks generally possess tuft of hair under the chin called beard. The milk yield is around 1-1.5 kg per day. The lactation length varies between 160-200 days. The maximum milk yield of 834 kg in a lactation period of 287 days has been recorded in this breed.

iii. Zalawadi: This breed is found in Zalawad district of Kathiawad. It is also found in western Mehsana and Radhanpur in Gujarat. The Zalawadi are generally large sized goats with straight screw shaped horns. The neck is long and usually two lobular appendages are found in the throat region. The coat colour is black with white spots. The skin colour is pinkish blue with black lustrous hair on the body measuring about 10-15 cm long. The average age at first kidding is 23-25 months. The kidding is once in a year with a single or twins. The adult animal weighs around 50-65 kg. This goat is a good milker and kids only once in a year. The good animals yield around 2-3 kg milk per day with an average of 200 kg in 150 days.

Zalawadi Goat

iv. Jhakrana: This breed is distributed mainly in Jhakrana and in surrounding villages near Behror in Alwar district of Rajasthan. Jhakrana goats are large-sized animals.

The breed is quite similar to Beetal goats in physical characteristics, but is comparatively larger in size. Coat colour is predominantly black with white spots on ears and muzzle. The forehead is slightly bulged. The body weights of adult goats are 58 and 44 kg for male and female, respectively. The average age at first kidding is 21-25 months. The kidding is once in a year with a single or twins. This goat breed is known for its milk production. The average lactation milk yield is about 120-135 kg in a lactation period of 110-125 days.

v. Surti: This breed is distributed in Surat and Baroda districts of Gujarat and Nasik and Mumbai areas of Maharashtra. The coat colour is predominantly white but often black and brown hair found in different parts of the body. This is a medium-sized white goat having well-developed udder. The ears are medium and horns are small directed backwards and slightly curved. The average body length and height is 65 and 74 cm in bucks and 60 and 70 cm in does respectively. The average age at first kidding is 21 months. The kidding is once in a year with a single or twins. The adult weight in bucks and does is around 35 and 31 kg. This is a good milch breed yielding around 1.5-2.0 kg of milk per day with a lactation yield of 120-170 kg in around 115-150 days.

Surti Goat

ii. Exotic Dairy Goat Breeds

i. Alpine: This milch breed has originated in the Alps in France. Its coat colour varies from black, fawn to white. The preferred colour is black with white markings on each side of the belly and face with white legs below the knees. The fore quarters are proportionately higher than the hind quarters. Alpine females are excellent milkers. The average body weight is 65-85 kg in the bucks and 50-65 kg in the does. The average body length of a mature buck and doe is around 88 and 72 cm while the height is around 76 and 70 cm respectively. The average daily milk yield is around 2.5 kg with an average lactation yield of 720 kg in 245 days. The good milkers yield 3-5 kg milk per day. The highest recorded milk yield is 2316 kg in 300 days. The milk butterfat is in range of 3-5 percent.

ii. Saanen: This breed has its home tract in Saanen Valley of Switzerland. It is regarded as the “milk queen” of goat world. Its coat colour is white or sometimes cream or grey and fawn at the spine. The face is straight or slightly dished. The

ears point upward and forward. The breed is normally hornless but occasionally horns do appear. The udders are usually shapely and well huge. A mature doe and a buck weigh around 55-65 kg and 70-95 kg respectively. The daily average yield is 2-5 kg per day during a lactation period of 8-10 months. The world lactation record in goats (305 days) is held by a Saanen goat in Australia with a yield of 3,084 kg milk with 3.3% fat.

iii. Toggenburg: This hardy milch breed originated in Toggenburg valley of Switzerland. The coat colour varies from deep chocolate to pale-drab. There are light fawn or white markings down on each side of the face and from the knees or hocks to the feet, around tails, rump and thighs. The ears are small and pricked. The animals are usually hornless and are very gentle and quiet in temperament. The average yield is 2.0 kg with 3.4 per cent butter fat. The lactation yield is 400 kg in 200 days. The adult female (doe) weighs around 40-50 kg and adult male (buck) weighs around 55-65 kg. The highest recorded milk yield was 2614 kg in a lactation period of 305 days in USA.

iv. Anglo-Nubian: The Anglo-Nubian breed has been evolved by crossing of Nubian of Egypt, Jamunapari of India and old English type goats. The Anglo-Nubian is usually a big animal with fine skin, glossy coat, long pendulous ears and Roman nose. There is no fixed colour. The udder is capacious but pendulous and teats are large. They are consistent milkers with higher fat (5 per cent) compared to other breeds. This breed is known as the “Jersey of goat world.” On an average, they yield one kg milk per day. The lactation yield is about 300 kg in 300 days. The mature females weigh around 45-60 kg and males weigh approximately 55-80 kg. The record milk of 2124 kg was produced in 305 days by an Anglo-Nubian female in California.

iii. Breed Improvement in Goats

The best approach for bringing about genetic improvement in different dairy breeds of goats is through selective breeding i.e. mating of best females with best males for milk production. The high producing elite females (does) and elite males (progeny of elite females) can be identified in the field and retained at central nucleus farm with each animal performance recorded. Further selection can be made at the Central farm. The farm-bred males can be re-distributed in the field for improving the farmers’ goats. The experiences of crossbreeding of indigenous goat breeds with Alpine and Saanen breeds of exotic goats did not yield the desired results under field condition.

Check Your Progress 3

- 1) Write the home tract of Jamunapari, Beetal, Surti and Jhakrana breeds of goat.

- 2) Describe the breed characteristics of famous dairy breed of Punjab.

- 3) Give the average productive performance of Surti, Jamunapari and Beetal goats.

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- 4) Describe the breed characteristics of two exotic dairy goat breeds which have been used for crossbreeding of goats in the country.

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4.5 LET US SUM UP

There are large number of well-descript breeds in cattle, buffalo and goats which are widely distributed under different agro-climatic regions of the country. Among milch cattle population, the Sahiwal, Red Sindhi, Gir and Tharparkar are prominent indigenous cattle breeds. Apart from these indigenous milch cattle breeds, Karan Swiss, Karan Fries, Frieswal, Sunandini are newly developed high yielding crossbred cattle strains resulting in fast spread of large crossbred cattle populations in different pockets of the country also significantly contribute to the total milk production. The animals of dairy breeds in general are heavy built with capacious udder, pendulous dewlap, sheath and loose skin. The average lactation milk yield of well-bred cows of important indigenous dairy cattle breeds ranges from 1500-2500 kg on institutional farms and 1350-1800 kg under village conditions. The average lactation milk production of different crossbred cattle strains is almost double. But the milk fat and SNF content in crossbred cattle are lower than that of indigenous cattle breeds. The crossbred cows have about 6-8 months lower age at first calving as compared to indigenous cows. Among buffaloes, Murrah, Nili-Ravi, Jaffarabadi, Surti and Mehsana are prominent dairy breeds. The most preferred breed among buffaloes is Murrah which yields about 1500-2000 kg milk in lactation of 305 days. The fat and SNF content in buffalo milk are highest. The goat though is regarded as poor man's cow, but it contributes very meagerly to the total milk production. The main utility of goat is meat production. The important dairy breeds of goat are Jamunapari, Beetal and Jhakrana. The genetic improvement in milch breeds of cattle, buffalo and goat for improving milk production can be brought about by selective breeding. The low producing non-descript cattle, buffalo and goats constituting a large proportion of their population can be improved through grading up. The non-descript cattle particularly under resource rich areas with adequate feed and green fodder availability can be improved through crossbreeding with exotic dairy cattle breeds.

4.6 KEY WORDS

- Dewlap** : A fold of loose skin hanging from the throat of an animal.
- Exotic breed** : A breed having not its natural origin to the area/ country. It is introduced in the given area from other country /area.
- Grading-up** : Breeding of an inferior breed or non-descript animals with a superior, usually an indigenous improver breed to improve specific characteristics, e.g. milk production.
- Indigenous breed** : A breed which naturally originates in the area or which has occupied that area over a long period.

Kidding interval	: The number of days between two successive kiddings (Delivery of kids).
Nondescript	: An animal usually of inferior quality that cannot be distinguished as belonging to a specific well defined breed.
Selection	: The process that makes choice of which animals in given population become parents, how many offspring they produce and how long they remain in breeding population.
Breed	: A group of inter breeding animals of a species which have a common origin and similar identifying characteristics that distinguish them as belonging to a breeding group.
Zebu cattle	: Humped cattle are called zebu.
Crossbred	: An animal produced by crossing two or more pure breeds.
Crossbreeding	: Mating systems in which hereditary material from two or more pure breeds is combined.
Dam	: Female parent, the mother of an animal.
Progeny	: Offspring of given individuals.
Progeny testing	: A basis of selection of an animal whose genetic worth is estimated on the performance of its progenies.
Trait	: Trait is observable or measurable characteristic of an individual. Coat colour, body weight, milk production of animal is trait.
Breeding value	: The genetic worth of an animal for a specific trait.
Habitat	: Habitat of the breed is the physical environment in which it is originated and developed.

4.7 SOME USEFUL BOOKS

Singh Harbans and Moore Earl N. (1982). *Livestock and Poultry Production*, Prentice Hall of India Private Limited, New Delhi -110001.

Sastry N S R, Thomas C K, and Singh R A (1982). *Farm Animal Management and Poultry Production*, Vikas Publishing House Private Limited, New Delhi -110002.

Animal Genetic Resources in India by Bhat P N, Bhat P P, Khan B U, Goswami O B and Singh B. IVRI, Izatnagar – 243122

Handbook of Animal Husbandry. Publications and Information Division, Indian Council of Agricultural Research (2002), Krishi Anusandhan Bhawan, Pusa, New Delhi 110012.

4.8 ANSWERS TO CHECK YOUR PROGRESS EXERCISES

Your answers should include following points:

Check Your Progress 1

- 1) i. Give the definition of a breed as a group of inter-breeding individuals of a species having many common characteristics.

- ii. Cows of dairy breeds are high milk producers.
 - iii. The male of dairy breeds are poor work animals.
 - iv. These are heavily built animals with capacious udder, pendulous dewlap, sheath and loose skin.
2.
 - i. Sahiwal - Montgomery district now in Pakistan and Amritsar, Gurdaspur and Ferozpur districts of Punjab in India.
 - ii. Tharparker – Tharparker district now in Pakistan and along Indo-Pak border regions in western Rajasthan particularly in Barmer, Jaisalmer and Jodhpur districts.
 - iii. Gir - found in Junagarh, Bhavnagar, and Amreli districts of Gujarat
 - iv. Ongole – Ongole region in Andhra Pradesh.
 3. Write the average lactation milk production, lactation length, dry period and the fat and solids-not-fat percentage in the milk of these breeds.
 4.
 - i. Important crossbred strain developed in India are Karan-Swiss, Karan Fries, Frieswal and Sunandini
 - ii. Karan Swiss was developed by crossing Brown Swiss bulls with Sahiwal and Red Sindhi zebu cows
 - iii. Karan Fries was developed by crossing Tharparker cows with the frozen semen of superior Holstein Friesian bulls.
 - iv. Frieswal was developed by crossing Holstein Friesian with Sahiwal cows at Military Dairy Farms
 - v. Sunandini was developed using frozen semen of Brown Swiss bulls on non-descript local or graded Red Sindhi or Sahiwal cows of rural households in Kerala
 5.
 - i. By grading up low producing local non-descript cows.
 - ii. Explain grading up as breeding of the non-descript females with the semen of the bulls belonging to high producing, superior indigenous dairy breeds like Sahiwal, Tharparker, Gir, Deoni etc
 - iii. In 5-6 generations of grading up, the non-descript animals become like pure-bred indigenous breed.
 - iv. The non-descript cattle under irrigated regions with adequate feed and fodder resources can be improved through crossbreeding with exotic dairy cattle breeds like Holstein-Friesian and Jersey.

Check Your Progress 2

1.
 - i. Buffalo being a triple purpose animal used for milk, meat and draft.
 - ii. Give the names of 6 important breeds of buffaloes.
2.
 - i. Nili-Ravi – Basins of Sutlej River in Ferozpur and of Ravi River in Amritsar districts of Punjab and in adjoining areas of Pakistan.
 - ii. Jaffarabadi – Junagarh, Bhavnagar and Amreli districts of Gujarat.
 - iii. Bhadawari – Bhadawar Tehsil in Agra district and Etawah district of Uttar Pradesh and Gwalior district of Madhya Pradesh.
 - iv. Surti - Kaira, Bharuch, Vadodara and Surat districts of Gujarat.
3.
 - i. Massive body, neck and head comparatively long, horns short and tightly curved, udder well developed, hips broad, and fore and hind quarters drooping.
 - ii. The tail is long reaching up to the fetlocks.
 - iii. The colour is usually jet black with white switch of tail.
 - iv. The average milk yield per lactation is 1,500 to 2,500 kg with 7.0 % fat.
4.
 - i. Give the productive performance of these breeds in terms of average

lactation milk production, lactation length, dry period and fat & SNF % in milk.

- ii. Give the reproductive performance of these breeds in terms of Age at first calving, service period and calving interval.
5. The low producing non-descript buffaloes can be improved through grading up using genetically superior progeny tested bulls of pure-bred improver breeds Such as Murrah, Mehsana or Surti.

Check Your Progress 3

1.
 - i. Jamunapari –Etawah, Agra and Mathura districts of U.P. and the tracts lying between of the Chambal and Jamuna rivers.
 - ii. Beetal –Gurdaspur and Amritsar districts of Punjab.
 - iii. Surti –Surat and Baroda districts of Gujarat and Nasik and Mumbai areas of Maharashtra.
 - iv. Jakhrana - Jhakrana and in surrounding villages near Behror in Alwar district of Rajasthan.
2.
 - i. The ears are long and pendulous hanging like beetal leaf on both sides.
 - ii. The Beetal goats have Roman nose indicating a common ancestry with Jamunapari.
 - iii. The bucks generally possess tuft of hair under the chin called beard.
 - iv. The kidding is once in a year with a single or twins and rarely triplets
 - v. The milk yield is around 1-1.5 kg per day. The lactation length varies between 160-200 days.
3.
 - i. Give the daily and lactation milk production of these breeds
 - ii. Give the lactation length of these breeds.
4.
 - i. Alpine and Saanen are the most extensively used exotic breeds of goat in India.
 - ii. Give the name of place of origin, body characteristics and productive performance of Alpine and Saanen breeds.