

Buffalo Genetic Resources of India

# GOJRI

(A UNIQUE BUFFALO FROM SUB HIMALAYAN REGION)

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## PREFACE

*Contribution of buffaloes in national milk production is huge and are considered milch animal in most part of the country, more so North India. Although buffaloes have made a significant contribution to milk production, they also contribute in terms of draught power and meat production. Besides stall feeding management of livestock, migratory pastoralism activity or nomadism is by and large a common practice in western dry land and mountainous Himalayan region. Such systems are based on low input and intensive management and almost all types of livestock are kept under migration, however, the duration and time may vary depending upon the resources of the livestock keepers. One such lesser known buffalo population is known as Gojri, reared by Gujjar community in Himachal Pradesh and Punjab state and sometimes referred as Van Gujjar's of shivalik range and Uttarakhand. These nomadic people of Gujjar community are in the habit of migrating to upper parts of Himalayas along with their buffaloes in summer and back to the sub Himalayan or plain with the onset of winter season. Buffalo husbandry and marketing milk and milk products is known to be their livelihood. These buffaloes are reared on low input pastoral system but little is known regarding their traditional way of livestock keeping and the genetic makeup type of these animals and their performance potential. Moreover, it is difficult to assess their performance potential, due to lack of maintaining any performance records by their keepers.*

*Studies related to characterization and evaluation of buffalo genetic resources so far has been restricted to few well-known buffalo breeds. Therefore, to characterize Gojri buffaloes, an excellent germplasm from Himachal Pradesh and Punjab, and to assess its production and reproduction potential, along with its socio-economic utility. Such an effort may help in designing suitable breeding and conservation strategies for the breed for their overall improvement. Keeping above facts in view, it is imperative to document this valuable germplasm for its wide publicity. This manuscript is a sincere effort to compile the information generated under the ICAR- National Bureau of Animal Genetic Resources project on characterization of Gojri buffaloes.*

*We express our gratitude to our former director, Dr. B.K. Joshi, for inspiring and persuading us to undertake the characterization and documentation project of Gojri buffalo. Authors are thankful to Dr. D.K. Sadana for his support. Authors are also thankful to Director ICAR- NBAGR, for funding this project and publishing the bulletin. Authors hope that this research bulletin will be useful to research scholars, extension workers and scientists working in Animal Science area. In the last but not least authors are thankful to livestock keepers who are rearing and maintaining this valuable buffalo germplasm.*

AUTHORS



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## Introduction

World's buffaloes are classified into two groups – The African Buffalo (*Syncerus*) which are wild and Asian Buffalo (*Bubalus*) which are mostly domesticated. The Asian buffalo consists of three species – the 'anoa' of Celebes, the 'tamaro' of Mindori and the 'arni' or Indian wild buffalo. *Bubalus bubalis* is the name of the domesticated Indian buffalo, previously called *B. arnee*, representatives of which are still found in the jungles of Assam (India). There are two general types of the domesticated buffalo, the river buffalo and the swamp buffalo. The river buffalo has 50 chromosomes and the swamp type has 48, the amount of genetic material is the same in both. They interbreed and produce fertile progeny with 49 chromosomes. The African buffalo is named *Syncerus* with the species *S. caffer*, with a small number of subspecies. The African buffalo has not been domesticated. The *B. bubalis* is widely distributed in Asia, but it has also been introduced to Europe, Near East, China, South America, the former Soviet Union and the Caribbean. Over half (53%) the world's buffalo population is in India which is approximately 105 million animals.

Buffaloes are labour intensive and cost effective. They are the most versatile of all the bovines. Buffaloes are perfectly suited to the hot and humid climate with muddy terrain of India; they have a good coat of soft hair like that of cattle at birth and during early calf hood. The hair on the body becomes sparser and almost devoid of hair as the buffaloes grows. The amount of hair coat retained varies considerably, depending upon the breed, season, and housing practices and because of its exposure to water and mud. Buffaloes have well developed sebaceous glands, with greater secretary activity than cattle. These glands secrete the sebum; a fatty substance emerges on the skin surface and covers with it a lubricant, making it

slippery for water and mud. This greasy sebum, along with the thick hornified top layer of skin, prevents water and the solutes in it from being absorbed into the skin. In this way, the animal is protected from the harmful effects of any deleterious chemical compounds in the water. Moreover, the sebum layer melts during hot weather and becomes glossier to reflect many of the heat rays, thus relieving the animal from the excessive external heat load. Although buffaloes are perfectly suited to their environments, but suffer in the sun, since they exhibit signs of great distress when exposed to direct solar radiation or when working in the sun during hot weather. This is due to that their bodies absorb a great deal of solar radiation because of their dark skin and sparse coat or hair, in addition to that they possess a less efficient evaporative cooling system due to their rather poor sweating ability as compared to cattle. Buffalo's skin has one sixth of the density of sweat glands that cattle skin has, so buffaloes dissipate heat poorly by sweating. Gojri buffalo seems no exception.

Buffalo in the country are third major contributors in the livestock population and largest producer of milk in the country. As per 19<sup>th</sup> census, 21.23% of the livestock population are buffaloes. Till date, 13 buffalo breeds have been identified, characterised and registered by Indian Council of Agricultural Research - National Bureau of Animal Genetic Resources, Karnal (Haryana). Murrah is the predominant buffalo breed in our country and is used as an improver breed, thus almost 40% of the buffaloes in our country are either purebreed or grades of Murrah. Next is Surti, followed by Mehsana and Jaffarabadi. Toda breed is at risk of extinction and their numbers is in few thousands. Besides these well-known 13 breeds, there exists some lesser known buffalo populations in our country, which needs to be characterised namely, Gojri, Godavari, Dharwari, Tarai, Gangli, Jowari buffaloes. About 43% of our total buffalo population is



comprises of un characterized non-descript type of buffaloes. Thus, making it imperative to identify and characterize these breeds/populations of buffaloes. These lesser known populations are having their specific utility, economic importance and are generally better adapted to a local area of their origin. From North India and especially from the sub Himalayan region, there is one such unique and distinct buffalo population called Gojri was identified and studied under the ICAR-NBAGR funded project. These buffaloes are reared by Gujjar community hence the name.

Gojri buffaloes are reared under intensive system with pastoral management. The animals are black to light brown in colour with thick coat of brown hairs. Gojri buffaloes can be identified through their colour, management practices and characteristic horn orientation. These buffaloes generally migrates to hills in Himachal Pradesh, Jammu Kashmir and Uttarakhand during summer season, and return to plains with the onset of winters. These buffaloes are well adapted to hilly terrain and graze for hours on hill tops with sure footing and has little tendency to slip (while grazing) these attributes makes them unique and stand apart from other buffalo breeds. Besides the available fact that Gojri buffaloes are being kept by Gujjars, a scanty information is available regarding their distribution or their physical characteristics, management practices and production potential etc. Nevertheless they are distinct buffalo populations and they play a significant role in sustaining the livelihood security of landless Gujjar pastoralists from sub Himalayan region.

### **Origin of the Gojri buffalo**

Gojri buffalo called so, because they are reared by the Gujjars communities. Gujjars have been living and migrating with their buffaloes for more than 1,000 years now. Majority of the buffalo

rearing Gujjars were Muslims and they travel with their families during their annual migration to highlands in summer season in search of green fodder for their dry buffaloes. It is assumed that due to the following reasons and through the process of domestication the present form of Gojri buffaloes.

1. Geography of the area / native tract
2. Evolution and selection followed by breeding for several generations
3. Absence of artificial insemination / upgrading

However, specific literature regarding how the breed originated is not available, but sufficient literature is available which indicates that since time immemorial buffalo keeping is the primary occupation and source of earning livelihood for the Gujjars.

### **Geographic Distribution and Breeding Tract**

Gojri buffaloes are distributed in north eastern parts of Punjab and Himachal Pradesh and its adjoining areas. A good number of buffaloes are found in Mohali, Roopnagar, Hoshiarpur, Gurdaspur, Sundernagar, Bharoli Kalan of Pathankot districts in Punjab, Nurpur, Jassur, Chawari, Jyot, Sahu, Rakh, Bharmaur and Tissa areas in Kangra, Chamba division and Kullu of Himachal Pradesh. The native tract of Gojri buffalo is distributed over 32° 09' N to 32° 57' N latitude and 75° 27' E to 76° 13' E longitude. In Punjab, the Shiwalik Hills in the north-east are steeply sloping. The Shiwalik hills occupy nearly 2.6 percent area of the Punjab state and cover sizeable area of Gurdaspur, Hoshiarpur, NawanShehar, Rupnagar and S.A.S Nagar districts. In Himachal Shiwalik hills are the outermost foot hills and marks its southern boundary from east to west, stretching for about 70 kms and their average elevation is 1000 meters. It is in these areas

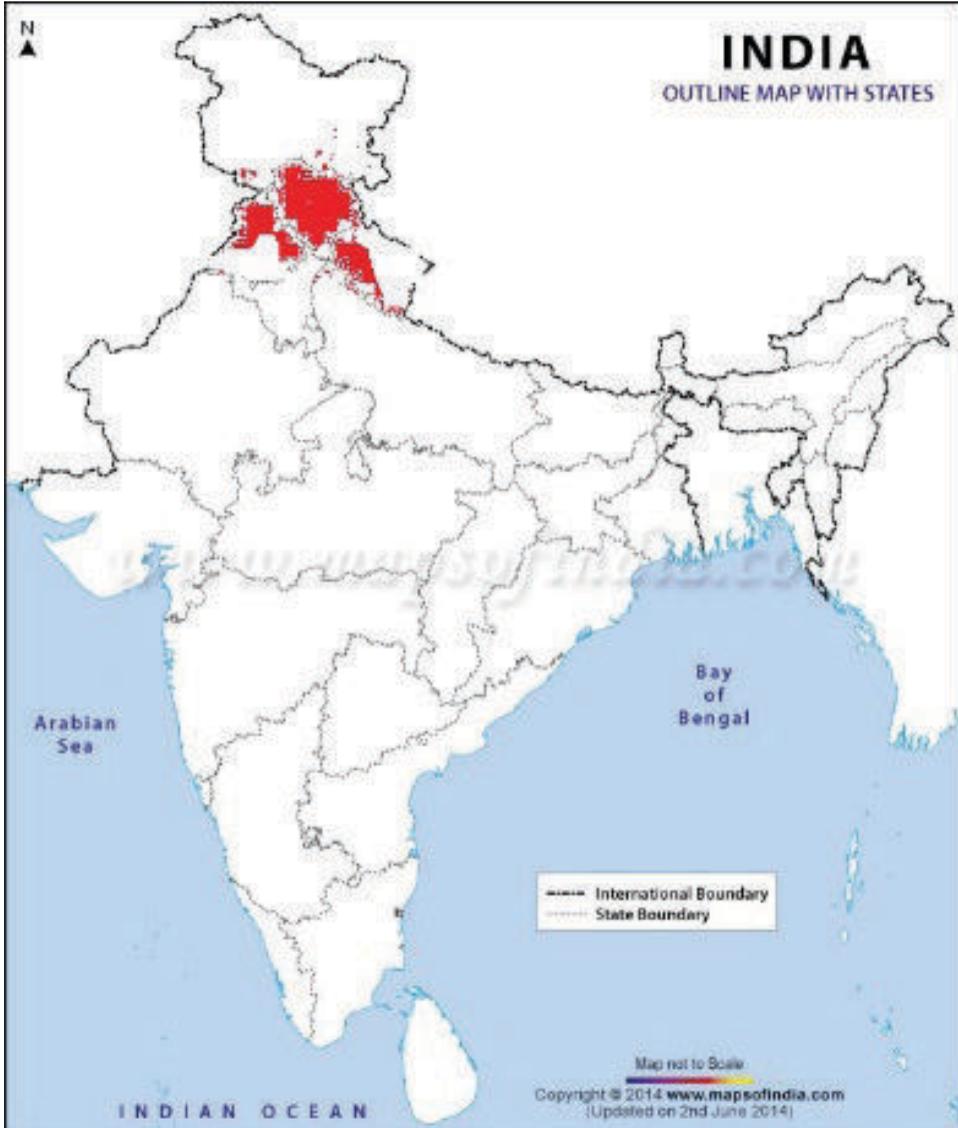


Figure 1: Breeding tract of Gojri buffalo

the annual migration of Gujjars with their buffaloes is common practice. Besides above the Gojri animals can also be seen in large parts of Jammu and Kashmir and Shivalik hills of Uttarakhand state.

### **Status of Gojri Buffalo**

According to 19<sup>th</sup> livestock census report (Anonymous, 2014), there are 4.91 million buffaloes (4.72% of total buffaloes) in Punjab, whereas 0.70 and (0.68%) 0.72 million (0.70%) in Himachal Pradesh and Jammu and Kashmir, respectively. Breed wise census is not available for Gojri buffalo, but a considerable number of animals (~ 20,000) are available in the region. By and large these animals are included for head count and they are listed under *Desi* or non-descript category in the Census report, the reason could be lack of identification and description of this lesser known buffalo population.

Gojri is a lesser known buffalo population of North sub Himalayan region, as the animals lacks recognition and were never evaluated in the past for their production and performance, possible reasons could be lack of organized herd and lack of record keeping by their keeper's. However, based on the study conducted by the Bureau shows that Gojri buffalo could be a separate breed in the Himalayan foot hills. Moreover, Gojri buffalo has its own importance among the resource limited Gujjars of the region, who are aware about the utility of these animals, and they continue to maintain and conserve these buffaloes. In major parts of Punjab and Himachal Pradesh the buffalo breed of choice seems to be Murrah and NiliRavi as these animals give more milk compared to other buffalo breeds. This has led to introduction of Murrah and NiliRavi bulls in Gojri herds, and

hence strict purity of the herd could not be maintained. Nevertheless Gojri buffalo has a definite market, although this may be limited to the foot hills but animals are preferred for ploughing, draught and agricultural operations in the hilly terrains where mechanization is neither cost effective nor the farmers can afford mechanization. Moreover, these buffaloes are considered as sure footed buffaloes while grazing in sub Himalayan region.

Phenotypically the most closely related extant breed with Gojri population seems to be Nili Ravi. But latter is having large body which is heavily built with white coloured eyes and has typical white markings on forehead, face, muzzle, feet and tail switch with jet black smooth skin with high milk production. It was also observed that some Gujjar families in this region do possess Nili Ravi buffaloes in their herd. Generally, few Gojri females are unintentionally naturally covered by Nili Ravi males. The livestock keepers do know about mixing / crossing of Gojri animals, but tends to overlook the fact as their primary interest is milk production rather than conservation and maintaining breed purity.

### **Breed characteristics**

#### **General appearance and Physical characteristics**

Gojri buffaloes have medium built proportionate body with thick skin compared to other extant breeds in the region. Physical appearance includes mix of black and brown coat colour with brown thick and long hairs. Males are brownish to black in colour. Calves are having light coloured skin at the time of birth which progressively becomes darker with the increase in age. Majority of these animals were having black skin. The temperament of these animals is docile.

### Head profile

Gojri buffalo usually possesses straight and broad forehead but in few animals the forehead is slightly convex in shape. Ears are medium to large in size and are horizontal in position. The muzzle is black in colour. A white patch of hairs can be seen on forehead in most of the animals irrespective of their coat colour (black or brown).

### Horn characteristic

Horns are heavy medium sized with curved orientation which moves backwards and then towards front to complete the loop, locally called '*Pattih wale seengh*'.

### Udder characteristic

Udder is small round shaped but well-placed with cylindrical teats pointing towards the ground. Only distended udder possess the shape and post milking it is not visible. Milk vein is less prominent but visible.

### Tail characteristic

Tail is thin and fine mostly reaching up to the hock joint and having grey coloured tail switch in majority of the buffaloes.

### Morphometric Characteristics

Biometric measurements of 33 males and 200 females were recorded. Biometrics estimates for height at withers, body length, chest girth, paunch girth, face length, face width, horn length, horn circumference, ear length, hip bone, pin bone, tail length and tail up to switch recorded in adult males and in adult female Gojri buffaloes are presented in Table 1 & 2.

Gojri buffaloes are reared for their milk and were found to be unique and possess distinct phenotypic appearance, from extant buffalo breeds in the region. By evaluating with average mean height, chest girth and body length reported for Murrah and Nilli Ravi (Table 3), it appears that Gojri buffalo is lighter, smaller and shorter than Murrah and Nilli Ravi buffaloes.

**Table 1: Morphometric measurements (cms) of adult Gojri Male (N=33)**

S. N.	Character	Mean	Min.	Max.	CV%
1	Height at withers	136.63 ± 1.22	124	145	5.00
2	Body length	138.91 ± 1.59	121	149	6.50
3	Chest girth	203.47 ± 1.99	182	217	5.50
4	Paunch girth	230.88 ± 2.48	207	255	6.10
5	Face length	48.97 ± 0.44	45	52	5.00
6	Face width	24.50 ± 0.36	21	28	8.30
7	Horn length	35.75 ± 1.32	23	47	20.90
8	Horn circumference	21.41 ± 0.48	16	26	12.70
9	Ear length	29 ± 0.16	28	31	3.00
10	Hip bone	55.38 ± 0.57	49	59	5.90
11	Pin bone	23.63 ± 0.56	19	29	13.40
12	Tail length	95.81 ± 1.44	82	108	8.50
13	Tail with switch	109.16 ± 1.31	97	120	6.80
14	Estimated body weight	536.45 ± 15.56	370.57	648.72	16.40

**Table 2: Morphometric measurements (cms) of adult Gojri female (N=200)**

S. N	Character	Mean	Min.	Max.	CV%
1	Height at withers	128.66 ± 0.32	117	145	3.50
2	Body length	133.33 ± 0.35	122	151	3.70
3	Chest girth	195.91 ± 0.67	170	214	4.90
4	Paunch girth	213.91 ± 1.34	221	242	8.90
5	Face length	48.58 ± 0.11	44	54	3.30
6	Face width	22.33 ± 0.09	20	27	5.60
7	Horn length	44.61 ± 0.61	21	82	19.40
8	Horn circumference	19.82 ± 0.12	17	28	8.70
9	Ear length	28.76 ± 0.09	25	31	4.30
10	Hip bone	53.58 ± 0.24	50	60	6.40
11	Pin bone	24.29 ± 0.29	19	30	17.00
12	Tail length	90.57 ± 1.15	82	116	18.00
13	Tail with switch	104.15 ± 0.67	73	124	9.10
14	Estimated body weight	475.18 ± 4.06	336.68	639.37	12.10

**Table 3: Comparison of Morphometric measurements (cms) in adult male and female buffaloes of Gojri, Nili-Ravi and Murrah**

S. N.	Character	Gojri		Nili-Ravi *		Murrah†	
		Female	Male	Female	Male	Female	Male
1	Height at withers	128.66	136.63	134	140	133	142
2	Body length	133.33	138.91	165	160	148	150
3	Chest girth	195.91	203.47	207	230	202	220
4	Body weight	475.18	536.45	483	567	516	567

\*Nili-Ravi estimates are taken from Nivsarkar et al. (2000) and Taneja (2004).

†Sadana et al (2006)

### Migratory route

Migratory Route of Gojri buffalo was identified from Sundernagar, Pathankot districts in Punjab and Nurpur in Himachal Pradesh to Jassur, Chawari, Jyot, Sahu, Rakh, Bharmaur and Tissa areas in Kangra and Chamba division of Himachal Pradesh. Gujjars from these areas are engaged in buffalo rearing, whether under migration of long distance or short distance movement. Migration by Gujjar starts from plains / foot hills during mid-May to June and continue till last of September to early November (4-5 months) every year to reach Chamba division of Himachal Pradesh, the one way of migration takes around 10-15 days to reach hill tops. During migration their journey starts right at the break of first light of the day and they will travel the maximum distance before noon for the day. State animal husbandry department of Himachal Pradesh usually organize the vaccination drive to vaccinate these buffaloes during their migration. Gujjars occupy the hill tops assigned to them, for grazing, on permit basis (@ Rs 8/- per animal, 2012-13) by forest department of Himachal Pradesh. The Gujjars or Van Gujjars



GOJRI BUFFALO

from Shivaliks of Uttarakhand state, in the recent past were facing problems, as state is denying grazing of their animals in protected forest land under the pretext of forest conservation. Based on the findings of the pilot survey Gojri buffalo from Chamba division of Himachal Pradesh to Pathankot tehsil of Punjab were having large population of Gojri animals. Some of the livestock keepers who are resource rich, have now stop following this practice and are settled in plains. They are primarily settled in those areas which are nearby a water source or natural canals. They have started stall feeding to their animals. In the recent past a new practice has been seen among Gujjar pastoralist during migration, where few livestock keepers do not migrate but transport their animals to highlands as far as the motorable road goes and reduce the migratory distances, time and labour.

## **Management system**

### ***a) General Management***

Buffaloes are managed under different conditions over the world. These depend both on the geographic situations and utility of the buffaloes management varies from multi-purpose buffaloes kept in backyards to high yielding milk producers in advanced and organised farms. Ninety-nine percent of the milk producing buffaloes are owned by small to medium land holding farmers and are merely a source of a small extra income. One or two buffaloes are a fairly common herd size managed under backyard system.

Temperament wise Gojri buffaloes are considered to be docile animals. Aggressive behaviour seldom occurs. For example, a new group of buffaloes is allowed to enter another groups' wallow or to drink from their water hole. Moreover, a very

# MNGMT



GOJRI BUFFALO

strong bond between the mother and her calf was observed. New born calves suckle their mothers up to 3 weeks and there after start to nibble grass at 3 to 4 weeks of age. When the calves have reached two months of age, forage starts to become more important part of their diet and soon most of the nutrient intake comes from forage rather than milk. Natural weaning of calves is usually within a year or before its mother's next parturition. Generally male calves are neglected and often only used to secure milk let down. Female calves receives more attention from their owners. The mortality is observed quite high among calves of these buffaloes. The farmers of Pathankot region reported that calf mortality is high and varies from 15 to 40 per cent. The most predominant diseases recorded were abortion, retention of placenta and alopecia. Other health problem includes vaginal and uterine prolapse. The reasons for high prevalence of these diseases are unknown. Another complication observed during late pregnancy is uterine torsion which most often occurs due to wallowing behaviour of pregnant females. Wallowing is a very important way for these buffaloes to maintain their body temperature under extreme hot and humid conditions. Longevity is an important feature of Gojri Buffaloes, it is not uncommon to find animals well over 20 year's old still being milked.

Although buffaloes can adapt to harsh environments and live on low quality forage, its reproductive efficiency is often compromised by such conditions. Poor nutrition usually related to seasonal fluctuations in availability and quality of feed, delays puberty, age at calving and increases the duration of post-partum anoestrous and long calving interval. In males, this results in loss of libido. Heat detection in Buffalo can be very difficult. Artificial insemination is not practised in adult Gojri females as traditionally kept under pastoral

management, however the trend is fast changing in plains where these animals are stall fed and up grading through AI is practised for higher milk yield.

### ***b) Feeding management***

Traditionally, Buffalo have been fed poor quality forage as they have the ability to convert this to meat or milk. As a rough guide a buffalo will consume 2.5% of its body weight as a daily dry matter intake. Feeding behaviour of Gojri and other buffaloes in the region is restricted to grazers and only browses when feed is utterly scarce. They are fed crop residues like wheat straw, paddy straw, stovers, etc. This diet is sometimes supplemented with grazing and/or fodder by the cut-and-carry system and concentrates. Normally, the buffaloes graze during the day. In case of extremely high ambient temperatures, grazing takes place in the morning and sometimes during night time. Under migration Gojri buffaloes graze for about 6-7 hours/day among hill top and hilly terrains in Himachal Pradesh but herder from Punjab region does not migrate large distances and their animals are more or less stall fed. These buffaloes are reared mostly under extensive range system without giving any feed supplement, except sick and last stage of pregnancy a little amount of concentrate mixed with bhoosa. Animals are usually left loose in the morning and graze across the foot hills and road side vegetation including harvested fields. The buffaloes are taken to nearby pond during grazing to provide drinking water. During summer the buffaloes graze nearby water source in foot hills. During grazing male members of the family will accompany the composite herd, which is generally a pool of 2-3 families and may constitutes 40-45 buffaloes.

# FEEDING

GOJRI BUFFALO



### **C) Breeding management**

The migration of Gojri buffaloes to highland pastures, specially those buffaloes which are dry and non-pregnant is an important exercise which utilises the seasonal variation of temperature. In summer season temperature is quite high in plain areas therefore, it is difficult to observe the signs of oestrus in females, generally referred to silent heat. Whereas in comparatively low temperature of highland areas led to proper expression of oestrus and higher conception rate. It was observed that while returning from highlands, majority of the buffaloes which were earlier dry and non-pregnant have conceived before the onset of winters. This can be considered as an important breeding management practices among Gojri buffaloes. Natural mating is preferred over artificial insemination among Gojri buffaloes. The bull is raised and reared along with the buffaloes in a single herd; no special management is done for buffalo bulls. Criterion for bull calf selection is based on phenotypic characters which are true to breed and is a progeny of good yielding dam.

### **D) Housing**

Adult animals along with their followers were mostly housed in 'closed kutcha type' houses during night time. A composite house (part of the residence) was observed with animals on ground floor and livestock keepers on first floor in Chamba district but in plains of Punjab animals are kept under open sky with shade under trees (particularly the calves) and during night hours animals were housed in Kutcha house, separate to their residence.

# HOUSING

GOJRI BUFFALO



## Socio economic status of the keepers

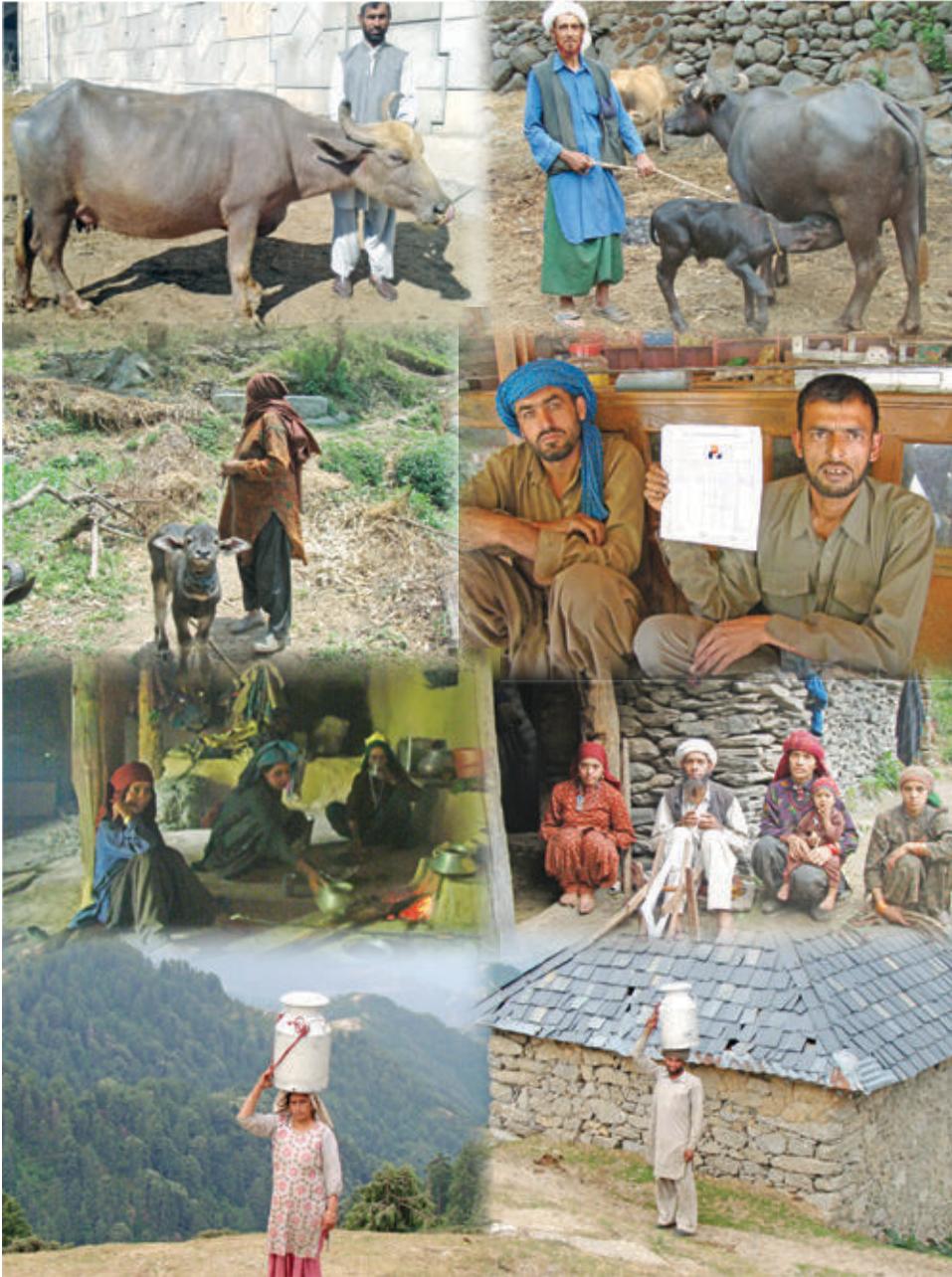
Herders of Gujjar community rear these buffaloes and majority of the herders were Muslims, by religion. Livestock rearing is their primary occupation. Literacy percentage observed was 21% and majority of these livestock keepers are small farmers with average land holding size varies from 2-5 bighas, which is primarily used for fodder production. An average herd size of 7-8 buffaloes per family was common (ranging from 3 to 12 buffaloes) and 1-2 buffalo bulls per household studied.

## Utility of Gojri buffaloes

Gojri buffaloes are reared for milk, draught power and manure/dung. He buffaloes are used for ploughing agriculture operations and transport etc. The primary commodity sold during migration in summers is '*Paneer and Ghee*' instead of raw milk when nearby marketing facilities are not available, whereas, in plains (Pathankot area) raw milk is marketed in the nearby local markets. The bulls were used for transportation and draught power in agriculture fields. In economic terms, these animals are laboured intensive and cost-effective. Though, buffalo bulls in general are slower in movement than cattle but they can pull heavier load and cover large distances. In Northern India the mechanization in agriculture has led to decrease in the use of animal power in the last couple of decades leading to slight decrease in the population of these buffaloes as farmers are more interested in rearing the she buffaloes for milk (particularly Murrah breed). Animals dung is also one of the major contributions towards economic contribution of livestock and account for about 10% of the value of output of livestock sector. The dung is used as organic manure and fuel as source of energy (bio gas).

# SE

GOJRI BUFFALO



## Production performance

### a) Milk

Milking is predominantly done by hand twice a day among Gojri buffaloes. Average milk yield recorded ranged from 3 to 6 kg/buffalo/day in Chamba and Kangra region of Himachal and 4 to 8 kg/day in Pathankot area of Punjab. Gojri buffaloes are reared for their milk and average daily milk yield varied from 3-8 kg for first 6-7 months of lactation, thereafter; it varies between 1.5-2.0 kg a day in subsequent 3 to 4 months. This production potential was comparable to Bhadawari breed of buffaloes which is reported to yield 2.24 to 3.95 kg/day. The estimates for milk constituents like fat percent and SNF were not available for Gojri buffaloes. The peak milk yield of Gojri buffaloes was estimated in a field test day, by conducting milking competition (in ten villages of Pathankot tehsil) in breeding tract and the peak yield irrespective of parity and stage of lactation and was found to be around 10 kg per day. During the period (2011-14) the milk of Gojri buffalo was sold at ₹ 30-35/liters.

### b) Average 305 days lactation

Milk production in some of the well-defined breeds of buffaloes in India varies from 1384 kg to 2033 kg. However some of the high producing Murrah buffaloes it is as high as 4000 kg and more in 305 days lactation yield, but their number is limited. The average 305 day lactation in Nili Ravi buffalo, an important extant breed in the region has 1800-2000 kg.

In India, about 75 - 80 % of the non-descript buffaloes do not come under any well-defined breed as indicated above and their average productivity is much lower than the buffaloes of milch breeds available in the country. The exact 305 day lactation average is not

available for Gojri buffaloes due to lack of systematic recording and organized herds but according to an estimate the average production ranges from 800 – 1000 litre per lactation. Breeding policy for their improvement in milk production have not been formulated in states having these germplasm. Our immediate target should be to double the productivity of these buffaloes through systematic selection and breeding through elite Gojri males.

### **Reproductive performance**

There is positive correlation between age at first calving and the length of their 3 calving intervals, thereby reducing the total productive period. Based on the survey information regarding the reproduction traits of Gojri buffaloes in their breeding tract reveals, that age at first calving (AFC) ranged from 4-5 yr. with a calving interval of 1.2 to 2 yr. Average age of first mating in Gojri buffalo males was found to be 4 yrs.

Service period and dry period are interdependent factors and determine the length of productive days. The higher service period tend to reduce productive days and make the system less sustainable. Dry period is highly correlated with the service period and calving interval, a short calving interval is bound to have short dry period. Whereas longer dry period is likely to have longer service period and longer dry period. Based on the survey information regarding the reproduction traits of Gojri buffaloes in their breeding tract reveals, that a service period of 2-6 months.

### **Health and ITK**

Gojri buffaloes are sturdy and are less prone to diseases. The animals can sustain the change in environment and the general health condition is not easily affected. Livestock keepers adopt indigenous

# ITK



GOJRI BUFFALO

knowledge and use traditional medicines/herbs available in hills to cure some diseases like *root protion of Hulla* is used in treatment of unidentified poisoning cases, and *root of Katcchli* is used to treat cases of retention of placenta (ROP). The state animal husbandry department of Himachal Pradesh generally organize vaccination camps in the month of April-May every year and vaccinate majority of the animals during migration. Animals are vaccinated against three major disease Hemorrhagic septicemia, Black quarter and Foot and Mouth disease.

### **Problems / constraints identified among Gojri livestock keepers**

1. Inadequate knowledge among the animal keepers regarding animal husbandry practices and value addition of the livestock products organized marketing of animals as well as their products.
2. Lack of organization support like cooperatives, self-help group, breeder's society etc.
3. Lack of training in the field of animal husbandry.
4. Farmers are becoming stationary and shifting from pastoral management system to stall fed system.
5. Demand for Murrah bulls by the Gujjar community.
6. Population of Gojri buffalo seems to have declined in last few decades.

### **Conservation of Gojri buffaloes**

There has been a gradual decline in Gojri population in its breeding tract which warrants immediate attention of State and

Central Government Animal Husbandry Department and other livestock improvement agencies. Programmes should be initiated at government level or NGO's should come forward for the conservation and sustainable management of this valuable buffalo genetic resources. First and foremost step is to stoppage of use of Murrah buffalo semen in the native tract of Gojri buffaloes followed by *ex-situ* conservation programmes should be initiated by state and central government organizations with the help of NGO's and progressive livestock keepers.

## CONCLUSION

The information generated under the project has established the Gojri buffalo as unique and distinct bovine germplasm. Gojri buffalo have potential as multipurpose animal, which is maintained on pastoral management system in states of Punjab, Himachal Pradesh and in some parts of Utrakhand and Jammu Kashmir. Majority of the herders solely depend upon Gojri buffalo rearing and do not possess much of farming land therefore, livestock rearing is their prime occupation. These animals seem to play a vital role in earning the livelihood security of Gujjar pastoralists from sub Himalayan region. Shrinkage of grazing pasture land is a serious problem for these migratory pastoral groups. Providing adequate drinking water to their animals is becoming difficult day by day due to fast drying up of ponds and canals in the region. Seasonal migration pattern is seen among Gojri pastoralism to utilize the natural resources of high land pastures, as during summer season they migrate to hills and return to plains with the onset of winters. Marketing of milk is not much of a problem as the livestock keeper daily collect their produce and sell in local markets nearby which are having a good demand. Those pastoralists which migrate to higher heights

and to un-accessible forest areas prepares the milk products before sale especially '*Paneer and Ghee*'. One of the herder will collect the produce from each family and will sell in local market with the commission margin of Rs 10 per kg. Some of the major problems identified among the Gujjar pastoral group/Gojri buffalo keepers in their order of priority are listed below:

- a. Drying up of natural water reservoirs leading to limited access of water for buffaloes
- b. Declining pastures and restriction from entering the forest for grazing their buffaloes but it varies from state to state
- c. Lack of organization support like cooperatives, self-help group, breeder's society etc.
- d. Lack of credit facilitating institutions, since nationalized banks does not include livestock to access the credit worth of pastoralists in the region.

## RECOMMENDATIONS

1. A detailed study on evaluation of Gojri buffalo should be done, may be under network project on animal genetic resources.
2. Gojri buffalo are mainly found in sub Himalayan region of Punjab, Himachal Pradesh and in adjacent States, these animals are often deprived of the benefits from state govt. agencies. There should be more coordination between the livestock keepers and state agencies involved in genetic improvement of the breeds in the states having considerable number of these animals.
3. An improvement program in the shape of ONBS is required immediately in the breeding tract.

4. Livestock keepers should be made aware about the unique characters like sure footing while grazing compared to other buffaloes breeds and utility of Gojri buffalo and must be provided incentives to maintain the pure and true to breed animals.
5. The ITK used for curing poisoning and in cases of retention of placenta (ROP) should be further explored and their effectiveness in other buffalo breeds can be studied.
6. A breed society must be formed for Gojri buffalo by involving their stakeholders in the respective breeding tract.
7. Indiscriminate upgrading with improver buffaloes must cautioned.
8. Gojri buffalo should be included in census, so as to know the time trend of their population and their reasons thereof.
9. Gojri buffalo have a potential for milk production, with unique characteristics therefore, we recommend to register these animals as a separate breed of buffalo.

# BREED DESCRIPTOR – GOJRI BUFFALO

## I. GENERAL DESCRIPTION

1	Name of the Population	Gojri
2	Synonyms	Desi
3	Species name	<i>Bubalus bubalis</i>
4	Origin of name (Gojri)	Derived from word Gujjar
5	Since when the population is known	Time immemorial
	b. Strains (or within breed types)	-
6	Most closely related breeds (in appearance)	-
7	Native tract distribution in terms of Latitude & Longitude	Latitude 32° 09' N to 32° 57' N Longitude 75° 27' E to 76° 13' E
	b) Estimated population	
	a. Year of estimation	2012-14
	b. Population	15000 - 20000
	c. Source / Reference	NBAGR Survey /Pilot Project
8	Native tract distribution	<b>Punjab:</b> Pathankot district, Hossiarpur, Mohali <b>Himachal Pradesh:</b> Nurpur, Jassur, Chawari, Jyot, Sahu, Rakh, Bharmaur and Tissa areas in Kangra and Chamba division. <b>Jammu Kashmir and Uttarakhand.</b>
9	Communities responsible	Muslim Gujjars
	Description of community	Pastoralists, Nomads and tribal
10	Herd Book / Register established (Yes/No)	No
11	Herd: Average size Composition:	An average herd size of 7-8 buffaloes per family was common (ranging from 3 to 12 buffaloes) and 1-2 buffalo bulls per household studied.
12	Utility of the breed (Milk/meat/draught/manure/other specify)	Milk, Draught and Manure
13	Basic temperament of the breed (docile/ moderate/ tractable/ wild)	Docile

## 14. Feed

Major fodder trees	-
Major native fodder grass	<i>Cynodon dactylon</i> also known as dūrvā grass
Cultivated legume fodder and monocot grass	Berseem
Cultivated tubers	-
Source of dry fodder	Wheat Straw Paddy Straw
Seed and grain feed	Khal; Chokar
Cakes and other concentrates	-
Any reported deficiency of minerals in water	-
Any reported minerals in harmful quantity and source	-
Practice of feeding	
Grazing	Grazing for about 6-7 hrs a day
Individual/Group feeding	

## 15. Housing

Only during the day	No
Only at night	Yes
Day and night	-
None	-
Type of housing	<ul style="list-style-type: none"> <li>• During migration: Housed in Open during day time and Closed during night</li> <li>• During winter months when not migrating (native villages) animals are housed in kuchha and Part of residence</li> <li>• Animal house lacks proper drainage system</li> </ul>

## 16. Mating method

Natural service (%)	100%
Artificial insemination (%)	Nil

## 17. Any other information

**Literacy rate:** Adult herders were illiterate (21%)

**Average land holding capacity:** Landless or with average land holding 2-5 bighas

The Gojri buffaloes are migratory in nature and are maintained on low input cost (Migration starts in February - March and ends in October – November, every year)

## II. PHYSICAL CHARACTERS

1. Colour		
a.	Coat colour	Brown (60%) Black (40%)
b.	Skin	Black (81%) Brown (19%)
c.	Muzzle	Black
d.	Eyelids	Black
e.	Tail Switch	Brown or Grey (72%) Black (28%)
f.	Hooves	Black
2. Horns		
	Male	Female
a.	Colour	Black (80%); Brown (20%) Black (82%) Brown & Grey (18%)
b.	Size	35.75 ± 1.32 cms 44.61 ± 0.61 cms
c.	Shape (Straight/curved)	Curved
d.	Orientation	Moves backwards and then upwards towards front to complete a big loop
e.	Horn circumference	21.41 ± 0.48 cms 19.82 ± 0.12 cms
3. Ears		
	Male	Female
a.	Length	29 ± 0.16 cms 28.76 ± 0.09 cms
b.	Orientation (horizontal/drooping)	Horizontal

4.	Head	Male	Female
a.	Forehead	Straight (80%); Slightly convex (20%) (White patch of hairs observed in about 65% animals)	
b.	Face length	48.97 ± 0.44 cms	48.58 ± 0.11 cms
c.	Face width	24.50 ± 0.36 cms	22.33 ± 0.09 cms

5.	Body	Male	Female
a.	Hump (large/medium/small)	Absent	Absent
b.	Dewlap (large/medium/small)	Absent	Absent
c.	Naval flap (large/medium/small)	Small	-
d.	Penis sheath flap (large/medium/small)	Small	-

6.	Udder	
a.	Shape (bowl/round/trough/pendulous)	Round
b.	Udder size (large/medium/small)	Medium
c.	Teat shape (cylindrical/funnel/pear)	Cylindrical
d.	Teat tip (pointed/round/flap)	Pointed
e.	Milk vein (Prominent / not prominent)	Less Prominent

### 7. Any other information:

Gojri buffalo has a medium built proportionate body with thick skin. Horns are heavy medium sized with curved orientation which moves backwards and then towards front to complete the loop, locally called '*Pattih wale seengh*'

### III. PERFORMANCE

#### Body measurements (in cm)

Parameter	Male	Female
Height at withers	136.63 ± 1.22	128.66 ± 0.32
Body length	138.91 ± 1.59	133.33 ± 0.35
Chest girth	203.47 ± 1.99	195.91 ± 0.67
Paunch girth	230.88 ± 2.48	213.91 ± 1.34
Hip bone	55.38 ± 0.57	53.58 ± 0.24
Pin bone	23.63 ± 0.56	24.29 ± 0.29
Tail length	95.81 ± 1.44	90.57 ± 1.15
Tail up to switch	109.16 ± 1.31	104.15 ± 0.67

#### Dairy performance

Average milk yield	Ranges from 4 to 8 kg /buffalo/day
Peak milk yield	10 kg

#### Reproduction

a. Males	Average	Range
(i) Age at first ejaculation (months)	No attempt has been made so far, to collect the semen from males. Therefore, no systematic record is available	
(ii) Age at first mating (months)	4 yrs	3.5 to 5 yrs
b. Females	Average	Range
(i) Age at first oestrus (month)	Farmers practise 100% natural breeding / mating in their herds, however a broad range is available based on information collected through survey and interview	
(ii) Oestrous cycle duration (days)	Not known	
(iii) Oestrus duration (hrs)	Not known	
(iv) Age at first mating (months)	Not known	

(v)	Age at first calving (months)	48 - 60 month
(vi)	Service period (days)	Not known
(vii)	Calving interval (days)	544 - 726 days
(viii)	Gestation length (days)	275 - 300
(ix)	No of services per conception	A.I. is not practised where as 100% - natural mating

## 5. Draught performance

a.	Purpose (ploughing, threshing, power etc.)	Ploughing and power
b.	Physiological parameters	Before work      After work
	Rectal temperature (°F)	101 ± 0.5
	Respiration rate /min	16 - 21
	Pulse rate /min	50 - 60
c.	Fatigue Score	
	Frothing	After 4 to 5 hr. of continuous work
	Leg in-coordination	
	Excitement	Not known
	Inhibition of progressive movement	
	Tongue protrusion	
d.	Draught Power (HP)	Not known
e.	Average duration of work per day (hrs)	5-6 hr.

6. Drought tolerance (Excellent/ Very Good/ Good/ Average/ Low)      Good
7. Heat tolerance (Excellent/ Very Good/ Good/ Average/ Low)      Very Good

## 8. Any other information specific to the breed

The animals are feed on grazing with very low input system on routine basis, however very little additional supplement / concentrate is given to animals. Gojri buffaloes does not share their breeding tract with other 13 buffalo breeds reported and infact has different and non overlapping breeding tract

in sub Himalayan region. Moreover, Gojri buffalo play a significant role in the rural livelihood of the Gujjar's / nomads in the region.

### Source

NBAGR funded research project "Characterization of Gojri Buffalo and Belahi Cattle populations under migration in Foot Hills and Sub-Himalayan Regions of Northern India"

## REFERENCES

- Anonymous. 2014. Animal Husbandry Statistics. Department of Animal Husbandry and Dairying, Ministry of Agriculture, Govt. of India, New Delhi.
- Bansal P C and Malhotra S P. 2006. Livestock economy of India, *First Edition*, CBS publishers and distributors New Delhi.
- Blench R.M. 2000. Extensive pastoral livestock systems: Issues and options for the future. *London: Overseas Development Institute*.
- FAO. 1998. Secondary guidelines for development of National farm animal genetic resources management plans. Measurement of Domestic Animal Diversity (MoDAD), FAO, Rome, Italy. (<http://dad.fao.org/en/refer/library/guideline/workgrp.pdf>)
- Kataria RS, Mishra BP, and DK Sadana. Buffalo genetic resource of India – BHADAWARI Monograph # 10 (2005). Published by *National Bureau of Animal Genetic Resources, Karnal - India*.
- Kathiaravan, P., Mishra BP, Kataria RS, Sadana DK, and SPS Ahlawat. Buffalo genetic resource of India – NILI-RAVI Monograph # 59 (2007). Published by *National Bureau of Animal Genetic Resources, Karnal - India*.
- Kohler-Rollefson I and Rathore, H.S. 2000. Strategies for livestock development in Western Rajasthan: An overview and analysis. *Discussion paper. Leauge for pastoral peoples. Ober-Ramstadt, Germany*

- Nivsarkar, AE, Vij, PK and MS Tantia (200). Animal genetic resources of India: Cattle and Buffalo. Directorate of Information and publication of Agriculture, ICAR, New Delhi
- Sadana DK, Kataria RS and Mishra BP. Buffalo genetic resource of India – MURRAH. Monograph # 25 (2006). Published by *National Bureau of Animal Genetic Resources, Karnal - India.*
- Sharma V.P., Kohler-Rollefson I and Morton J. 2003. Pastoralism in India: A scoping study. *Department for International Development, UK*
- Taneja (2004). [http://dad.fao.org/cg-dad/\\$cgi\\_dad.dll/BreedEdit](http://dad.fao.org/cg-dad/$cgi_dad.dll/BreedEdit)
- Vohra V, Niranjana S.K, Mishra A.K and Joshi, B.K. 2014. Belahi Cattle Pastoralism in the Himalayan Foot Hills. *Proc. Aust. Soc. Anim. Prod.* 2014 Vol. 30: 317
- Vohra V, Niranjana S.K, Singh P.K, Sadana D.K, Joshi B.K. 2011. Pastoral Management of Kankrej Cattle during Migration between Western Dryland and Trans-Gangetic Plain of India. *Indian Journal of Dairy Science.* 64(6) 501-507.
- Vohra V., Niranjana S. K., Mishra A. K., Jamuna V., Chopra A., Sharma N and Dong Kee Jeong. 2015. Phenotypic characterization and multivariate analysis to explain body conformation in lesser known buffalo (*Bubalus bubalis*) from North India. *Asian Australian Journal of Animal Sciences (South Korea)* 28 (3) Pages 311-317.
- Vohra V., Niranjana S.K. and Joshi B.K. (2012). "Gojri- A novel migratory buffalo germplasm in Punjab and Himachal Pradesh". *Journal of Animal Research* 2(3) 317-321.

