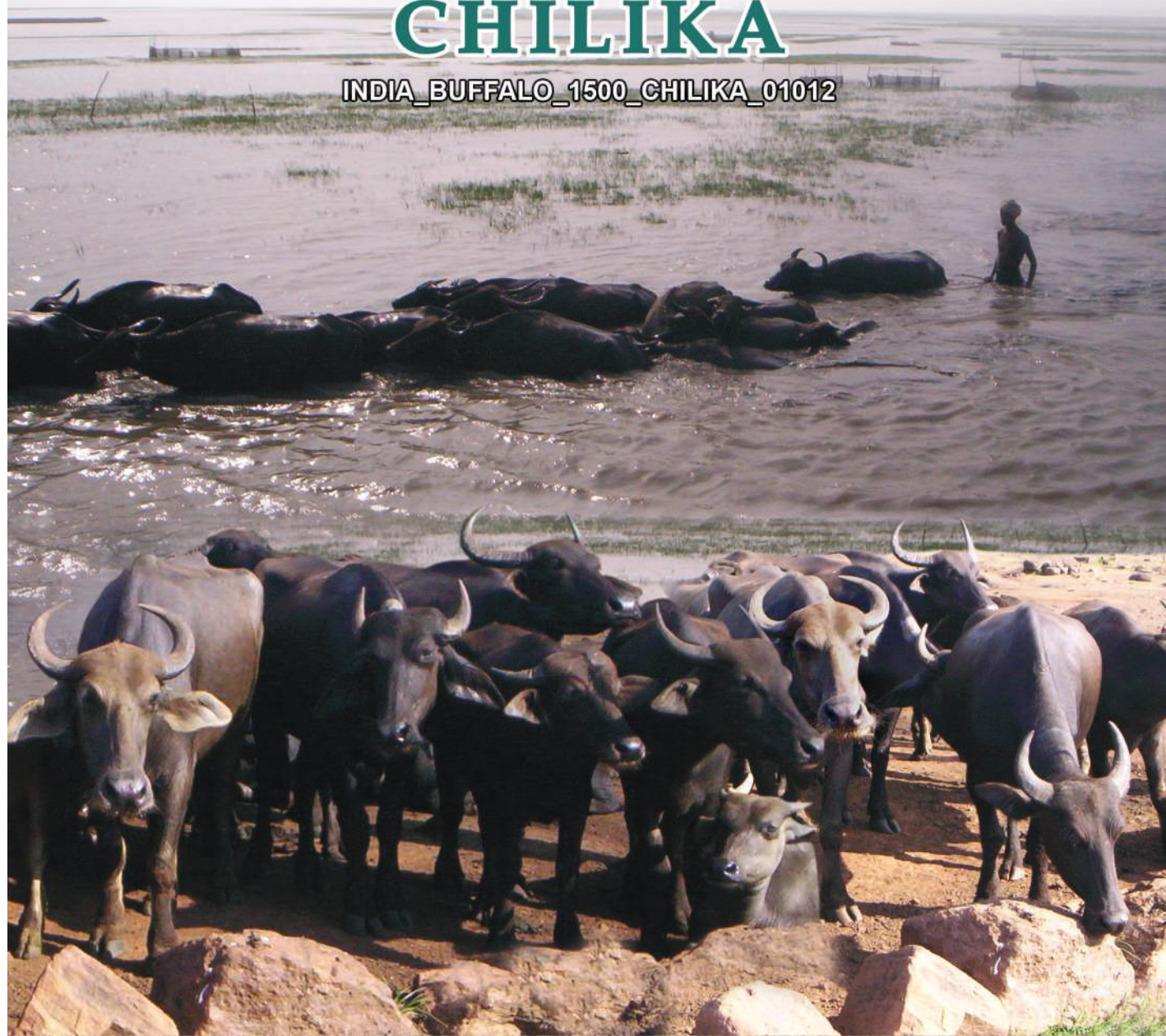


*Buffalo Genetic Resources of India*

# CHILIKA

INDIA\_BUFFALO\_1500\_CHILIKA\_01012



B.P. Sethi, S. K. Dash and P.C. Ray

**Orissa Livestock Resources Development Society**



**Chilika Buffalo Breeders' Society  
(CBPS)**

*Buffalo Genetic Resources of India*  
**CHILIKA BUFFALO**



**B. P. Sethi, S. K. Dash and P. C. Ray**



Orissa Livestock Resources Development Society (OLRDS)

Chilika Buffalo Promoters' Society (CBPS)



Published under  
Orissa Livestock Resources Development Society (OLRDS)

**Mr. B. P. Sethi, IAS**

*Director cum Member Secretary (OLRDS)  
Director, AH & VS,  
Govt. of Orissa*

**Dr. S. K. Dash, Ph. D.**

*Chief Technical Consultant (CBPS)  
Dept. of Animal Breeding and Genetics  
Orissa Veterinary College, O.U.A.T. , Bhubaneswar.*

**Mr. P. C. Ray**

*Secretary  
Chilika Buffalo Promoters' Society  
Orissa*

## PREFACE

Various indigenous breeds of cattle and buffalo in our country are the result of thousands of years of selection, evolution and development of the wild species in the process of domestication suiting to the local agro-climatic conditions. The Indian cattle breeds were developed both for agricultural operations and dairy performance with differential degree of importance as per needs.

Chilika buffalo, one of the lesser-known cattle breed is indigenous to the state of Orissa, which has been contributing to the welfare of farming community in general and landless, small and marginal farmers in particular in its native tract. Information on distribution, enumeration, physical parameters, production as well as reproduction performance of general and elite animals alongwith the socio-economic profile of farmers is essentially required to know the status of this breed towards developing strategy for conservation and improvement.

Orissa Livestock Resources Development Society (OLRDS) by sanctioning a Project on survey, evaluation and characterization of Chilika buffalo, has provided adequate technological and financial support to carry out the research activities which provided the raw material to bring this manuscript to its present form.

All the infrastructure, administrative and logistic support of **Dr. H. K. Panda**, I.A.S., Principal Secretary, F & ARD Department, Govt. of Orissa and CMD, OMFED and **Mr. C. J. Venugopal**, I.A.S., Ex-Commissioner cum Secretary, F & ARD Department, Govt. of Orissa, have ultimately helped the better understanding of this unique buffalo genetic resource indigenous to the state of Orissa and realising the present status.

Last but not the least, the cooperation and assistance rendered by the real stake holders of Chilika buffalo, during the survey visits and collection of data which made the real base of this bulletin, is highly appreciable. At the end the authors thank all the members of CBPS and others who directly or indirectly supported this mission.

OLRDS, Cuttack.  
1st October, 2007.

Authors



## A. Introduction

Animal husbandry is an integral part of the Indian agriculture . Buffaloes having docile nature, less demanding in terms of management and nutrition, disease resistance, thriving under stress, contribution to milk production, draft and manure and above all their being part of our mythology speaks of their integration with human beings. Buffalo forms an integral part of the typical Indian farming system due to its ability to sustain under harsh climatic condition, scarce feed and fodder that too coarse and lignified and produce high quality milk with high fat content.

As per the legend, domestication of buffaloes started during the epic period of Ramayana . However, Hindu mythology says that curd of "Chilika" buffalo was served to Lord Jagannath by 'Manika' during 'Kanchi' war (Fig. 1).

Better known for its brackish water and migratory birds, Chilika lake is popular as the largest tropical lake in Asia. The area of the lake varies from 1165 km<sup>2</sup> in the monsoon season to 906 km<sup>2</sup> in other seasons. The swampy land surrounding Chilika lake with weeds and other vegetation confer feed for the buffaloes for the whole year since generations. These buffaloes have distinct body characteristics and feeding habits. The managerial practices are also different. The villagers rear buffaloes which make their living from vegetations of the lake. Chilika buffalo, one of the lesser known buffalo breed has been proving its worth in agricultural operations and milk yield under extensive management system. The status of this breed would help formulating strategies for its conservation and improvement as well.





## Characterization of the breed

During the present study, information on 4256 animals from all age groups and both sexes belonging to 242 farm families were collected through massive survey covering 36 villages surrounding Chilika lake covering three districts. The information on body confirmation were collected by actual measurements and on production , reproduction, management of animals and socio-economic status of farmers were collected through interactions and questionnaires developed by NBAGR with little modifications suiting to local conditions.

### B. Breed name and synonyms

The name of this breed backs to its habitat which is surrounding the world famous Chilika lake. Chilika buffaloes are often called as “Deshi” buffaloes in its native tract .These buffaloes are reared mostly by small and marginal farmers of the area with almost nil input except part time labour. One member of the family stays with the herd only at the time of milking and during the period when the herd stays nearby the village. These animals are reared with extensive management system without any supplementation of feed in most of the cases. Seldom the lactating animals are provided with grass when the animals are at rest near the village (Fig 2). The buffaloes cover a distance of 3-5km to go near the Chilika lake to fill their rumen with submerged weeds and vegetations of the lake and nearby grazing field. Other buffalo types when were brought to this area in past failed to cope up with the management system and saline climate.



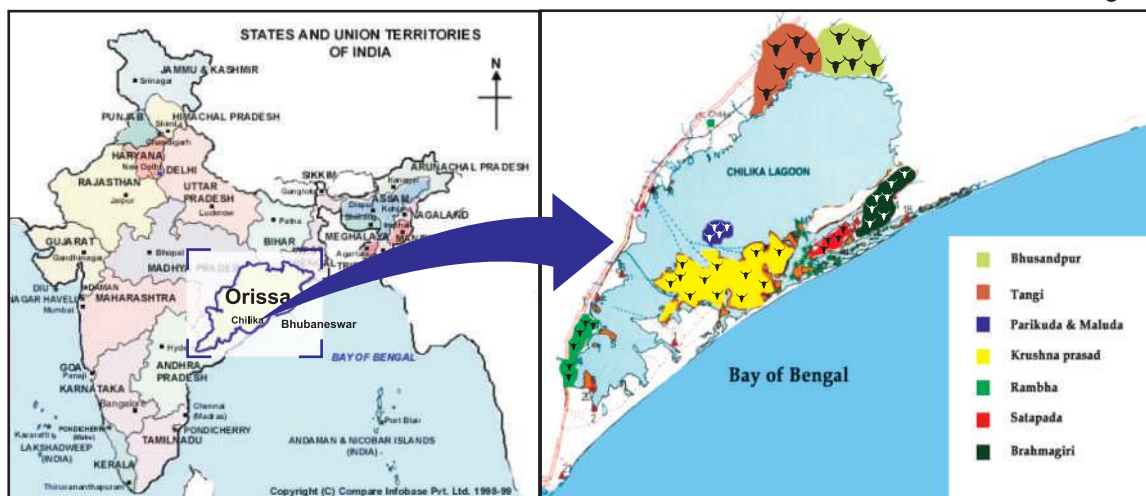
Fig 2



### C. Native tract

Chilika buffaloes are found in nearby villages around Chilika lake in Orissa. The area covers parts of Puri, Ganjam and Khurda district of Orissa. Heavy concentration of these buffaloes are seen in Rambha and Palur area in Ganjam district, Bramhagiri, Satapada, Krushnaprasad, Parikud and Malud in Puri and Bhusandpur and Tangi area of Khurda district. The name of the breed backs to the world famous Chilika lake, the periphery of which is the natural habitat of this buffalo type. The native tract can be spelled out as the circumference of Chilika lake extended to 20-30 km on land. This is distributed over 19° 10' to 19° 54' N latitude and 85° 05' to 85° 40'E longitude and spread over an area of around 3000 sq km mostly in the peninsula of eastern Orissa (Fig 3). The area mostly comprises of saline zone with highest tourist interest in the state of Orissa. The native tract enjoys a typically tropical climate with an average maximum temperature of 38.8 °C. and minimum temperature of 13.9 °C during June and December months, respectively. The average annual rain fall is 1350.9 mm. with 95 rain days. About 70.03% of the annual rainfall is received during monsoon months from June to September. The wind speed is high during the month of March to July and low during the winter season. The wind speed varies from 5.3 to 16 km/ hr. in normal climatic conditions. The salinity of water body in the habitat of Chilika buffaloes varies from 5 to 12 ppt. The average climatic condition of the area in terms of minimum and maximum temperature and average rain fall in the region are presented in Table. 1

Fig 3





## D. Origin of the breed

Chilika buffaloes might have been developed from the indigenous animals through several generations of natural selection and selective breeding over the time from king's rule. The king of Parikud had keen interest in rearing and improvement of buffaloes in the area. Though no specific literature is available on development of this breed, it is assumed that the topography and climate of this area along with human's mediation for producing a better animal with good economic return resulted in the development of this buffalo type or breed.

## E. Utility of the breed

Chilika buffalo serves as a dual type animal which contribute substantially to the milk production (Fig 4) and agricultural operations (Fig 5). These animals have been assuring economic protection to the farmers since long. It has been noticed that a farm family with 5-6 members can meet all the socio-economic needs from rearing 10 to 15 buffaloes of this type.

The milk and products like Khoa, chhena and ghee fetch optimum price and are preferred by the people with comparison to similar products from cow milk.

The buffalo bullocks prove their working ability both in agricultural operations and carting not only in the habitat but also in nearby areas. The dung whatsoever is collected is used mostly as manure. However a part of it at places is used as fuel after drying.

Very old animals along with a few young males are often sold to middlemen which are sent for meat purpose elsewhere, but not in or around the native tract. Considering the above facts Chilika buffalo can be considered as a dual type buffalo in the contest of Indian farming system.



Fig 4



Fig 5





## F. Physical characteristics

It is a medium sized, horned, strong dual type docile buffalo with compact body and strong legs. The coat colour ranges from brownish black to black. As age advances the horns grow upward then lateral and then inward to develop sickle shape. The tip of both horns meet or leave very little space. Tail extends up to or at times just below the hock. Vulva in females is comparatively larger and milk vein is less prominent. Udder is small with cylindrical teats, lateral view of which is possible only in lactating animals at early stage of lactation (Fig 6). The males are vigorous with medium penis sheath and naval flap (Fig 7). The body conformation traits along with body weight at different stages of growth in both sexes are presented in Table 2.





## Head

The head of Chilika buffalo is straight with long and strong horns (Fig 8) Head is in up right position and almost parallel to the ground while in motion. Head is long and proportionate to the body size. No long hair is seen on face of these animals. The average head length of adult male and female Chilika buffalo are  $47.21 \pm 0.18$  cm and  $47.63 \pm 0.11$  cm, respectively.



Fig 8

## Ear

Ear of these buffaloes are horizontal in position (Fig 9) Inner side of the pinnae is light coloured in some of brownish black coat coloured animals. The pinnae is hairy like at young age which disappears in later age. The average length of ear in adult males and females are  $23.52 \pm 0.16$  cm. and  $23.44 \pm 0.07$  cm, respectively. The length of ear does not increase proportionately with the body size. The ears of many animals are cut to make flower like appearance for their identification (Fig 10) and to make the appearance beautiful as well.



Fig 9

## Horn

The horn pattern of these buffaloes can be considered as a physical marker for identification of this breed / type of buffalo. The horns in adult animals are sickle shaped grown upward and inward. The base of the horn is thick and flat but pointing towards the tip (Fig 10 ). The body of the horn is flat shaped with alternate ridges between flat surfaces in adults. However till maturity the horns are almost straight and stumpy and very less difference in circumference of horn



Fig 10



at base and tip is observed (Fig 11). In some cases both the horns grow to meet each other at the tip; which at times becomes fatal to the animals as the horns of two animals lock inside the water resulting death of both the animals. To get rid of or to reduce the change of occurrence of this happening, the farmers cut down the horns at tip to maintain safe distance between two horns at the tip (Fig 12) The average length of the horns in adult males and females are  $48.32 \pm 0.24$ cm-and  $50.76 \pm 0.12$ cm., respectively. However as long as 57,cm. horn was noticed in these animals.

### Coat colour

The coat colour of Chilika buffaloes is predominantly black. However brownish black coat colour is seen in 10.80% of animals (Table 3). The calves are light coloured at younger age which becomes dark in later ages. 70% of calves are light coloured (Fig 13) and 30% are dark coloured but in adulthood the coat colour pattern is reversed. The body colour is mostly uniform except the inguinal region which is lighter than rest of the body. The body of calves is usually hairy but in adults the long hairs of around 4-5 cms are seen in thoracic regions and on necks extending upto the humps with very thin concentrations (Fig 14).





## Tail

Tail of this animal type is medium in size which extends just below the hock (Fig 15). Tail is tapering towards the tip having good switch with coarse hairs in it. The colour of switch is mostly black, however in 10% of cases the colour of switch is brown. The average length of tail in adult males and females are  $72.32 \pm 0.12$  cm and  $72.16 \pm 0.08$  cm, respectively.

## Body size

Chilika buffaloes are medium in size with very less difference between two sexes at all ages. The average height of these animals is around 125 cm, with body weight of around 350 kg. The heart girth and punch girth of these animals at different stages of growth are almost similar. The detail body conformation traits of both sexes at different stages of growth are presented in Table 2.



Fig 15

## G. Management

These animals are never provided with housing system of any kind. The herd size of Chilika buffalo ranges from 10 (Fig 16) to 70 (Fig 17) animals per farm family with an average of 25 animals. But the animals of 10 to 12 farmers of one village go together for grazing and one herd thus constitutes 200 to 500 buffaloes in the grazing area.



Fig 16



Fig 17



The feeding management of these animals in different zones is presented in Table 4. Usually the buffaloes go for grazing in the afternoon and come back to the resting site near the village in the morning. The animals graze throughout the night in marshy land of Chilika lake. These buffaloes feed on submerged weeds and aquatic vegetations in Chilika lake (Fig 18). In the morning they come back only to get fresh water to drink. No animal owner ever goes inside the lake to bring them back, rather the buffaloes are habituated coming for having fresh water to drink. In summer season it is interesting to observe buffaloes rushing to the freshwater ponds near villages for satisfying their thirst. In rainy season the salinity of water logging area around Chilika lake decreases due to pouring in of rain water. So the buffaloes quench their thirst by drinking this water in the grazing area. The practice of grazing and feeding habit is modified in rainy season in the western part of the native tract, particularly in Bhusandpur area . In rainy season the buffaloes in this area are allowed to go for grazing in the morning after milking and brought back in the evening. The calves are also allowed to go along with mothers, however the ailing calves are kept in the villages tied with ropes at neck of fore legs (Fig 19 ). No feed or water is given to these buffaloes when they stay near the village during day time. In very few cases the lactating buffaloes are fed with some grass in rainy season and the children or women member of the family takes care of lactating buffaloes and calves in the village. The animals are taken to nearby pond before they go for grazing in evening .

The animals gather at a common place near the village during day time in summer and winter season and during night in rainy season mostly under trees (Fig 20). The dung thus collected during the period is collected by female members (Fig 21 ) and used as fuel and manure as well.



Fig 18



Fig 19



Fig 20



Fig 21

The Chilika buffalo owners pay individual attention to each animal before they go for grazing. The pregnant and lactating buffaloes are paid more attention than others. Usually the lactating animals are washed while coming back to the villages (Fig 22).

## H. Production performance

Chilika buffaloes are reared for milk, draft, fuel and manure purpose. Though these animals are never used for meat purpose in the habitat, the middlemen purchase these animals for use as meat animals in other places.



Fig 22

The lactation milk yield of this buffalo type is around 500 litres with average fat of 8.7%. Peak yield is around 2.5 litres at 75 days of lactation. The lactation period ranges from 8 to 9 months with average of 265 days. In case of death of newborn calf, letting down of milk is not so much affected but the earlier calf of more than one year old often is attached with the she buffalo. These conditions and in



Fig 23

general when the calves are more than 3 months old, an indigenous device made of bamboo sticks is fixed at the face of the calf to debar them from feeding of milk (Fig 23). Milking is done at 21<sup>st</sup> day of parturition and once a day. So milk production potential of Chilika buffaloes is quite more than it is recorded in practical field situation. Though the average daily milk yield is observed to be 1.85 litres, the highest yield of 3.5 litres is also



recorded . The details of dairy performance in different lactations in these buffaloes are presented in Table 5. The milk obtained from these buffaloes are sold either in the village or even at the grazing field itself. The middle man takes the milk from either grazing field or the farmers bring the milk in some containers and then it is collected by the middle man from villages with bigger containers (Fig 24). The farmers are paid @ Rs.20/- per litre of milk, but the middleman sells this milk @ Rs 25 to Rs 30/- to commercial organizations . The milk of Chilika buffalo is used in lord Jagannath temple at Puri on regular basis. The khoa and curd obtained from these milk is of heavy demand both in the native tract and nearby cities as well and fetch good price. The ghee prepared from this milk is also sold @ Rs 300/- per Kg.



Fig 24

The income from milk product is often owned by the female member of the family .Chilika buffaloes spend more than 12 hours in a day in Chilika lake itself, thereby defecate there which help production of zooplanktons and phytoplanktons which are consumed by aquatic animals and act as manure in production of vegetations as well. The dung available at the time of rest of these animals near the villages are collected mostly by the females and either used as manure or fuel (Fig 25 ). The dung thus collected are dumped and further sold @ Rs 1000/- per tractor load (Fig 26 ).

The males are castrated at later age of around 3 years of age and are subjected to agricultural operations as well as carting. Though The bullocks of this



Fig 25



Fig 26



buffalo type are of good demand around the native tract mostly for agricultural operations(Fig 27). These animals are kept engaged in agriculture operations either in the morning or in the evening to avoid sun, resulting optimum utilization of efficiency. It has been observed that a pair of bullocks with average weight of 680 kg can plough 0.6 acre



Fig 27

of land in 6 hrs under normal climatic condition of the native tract. However, further study based on land texture and environmental conditions may give better picture on draftability of these buffaloes . But in general, castrated males of chilika buffalo are often used for all agricultural operations not only near the breeding tract but in the central and coastal Orissa. The marketing of animals do occur at the grazing field or near the villages. No organized marketing facility or involvement of middleman is noticed in marking of these animals. An average pair of bullocks of this buffalo type costs Rs 5000/- to Rs 6000, which adds to the income of the farmer apart from the income from milk, manure and milk products.

## I. Health status

The general health condition of these animals is good. No mineral or vitamin deficiency is reported in these animals in the native tract resulting in optimum reproductive performance. The cause might be due to high quality aquatic vegetations in and around Chilika lake. A few calf mortalities have been noticed when the parturition occurs inside the water, but if the calf resist the water logging for

nearly one hour, then it starts moving with the mother (Fig 28). The worm infestation is more in these animals and the farmers often administer extracts of leaves of 'Bhuin nimba' (*Andrographis paniculata*) plants to get rid of worm infestation. Still a few mortalities due to liver fluke



Fig 28





had been registered in recent past. Now a days the farmers practice regular deworming for calves and vaccination against FMD, HS and BQ. Though exposed for whole life under the sky, these animals in general do not suffer much. But in case of disease, the animals are presented at nearby veterinary aid centres for treatment. It has also been observed in some places that the farmers themselves treat the animals and even inject the drugs. During the survey it has also been reported that the animals when enter into shrimp culture area for seeking food, are being attacked causing wounds, resulting septicemia and death at times. Further these animals swallow parts of left over nets in shrimp culture ponds causing acute impaction and death at times. Chilika provides the best ecosystem for keeping these animals healthy since generations. But the fast growing shrimp culture is restricting the freedom and food source of these large ruminants and declining the numbers as well. The details age wise and season wise occurrence of diseases are presented in Table 6 and 7, respectively.

## J. Reproduction performance

Details of reproduction performance of Chilika buffalo is presented in Table 8. The male attains puberty at around 3 years of age (Fig 29 ) and renders satisfactory service upto 10 to 12 years of age. However the breeding bulls are culled after 3 to 4 years of service till another strong male is raised to replace it. The females attain puberty at around 33 months (Fig 30) with oestrus cycle duration of 21 days. The buffalo in oestrus at grazing is usually mated by the strong bull available in the herd. They drop the first calf at around 45 months of age. Calving interval in these buffaloes is little more than 13 months with gestation length of 309 days. Chilika buffaloes hardly show significant reproductive problem in the native tract. The details of incidence of reproductive health problems of this buffalo breed is presented in Table 9. The distribution of oestrus of these buffaloes in different

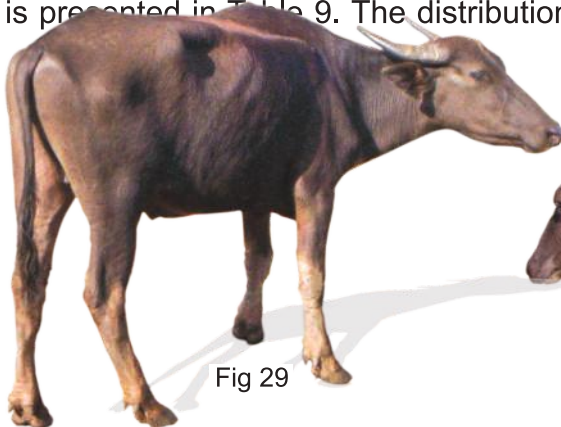


Fig 29

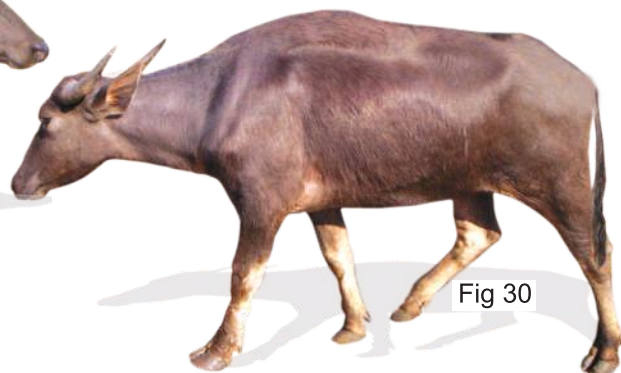


Fig 30



seasons during the year is presented in Table 10.

## K. Breeding

Chilika buffaloes are bred through natural services only. No information regarding artificial insemination is obtained. Usually these buffaloes are bred by bulls of same type. However, in some areas the presence of Murah males are observed. Though a few females are crossed by the said male, the proportion of crossbreds in the herd is negligible. The cause behind this is that Murah male as supplied by Govt. or private agencies fail to cope up with the management behaviour of Chilika buffaloes in saline environment and thus fail to show its breeding efficiency compared with the indigenous bulls.

In the herd of Chilika buffaloes the males are castrated at the age of 3 years or even more. By that time the male would be in service. This is an indirect method of selection of breeding bulls as the best male would be allowed for rendering service and the weaker ones would be subjected to castration and be used for draft purpose and mostly marketed. This phenomenon could be adjudged as the indigenous technical knowledge (ITK) of the farmers contributing towards selection of healthy and strong bull for breeding purpose. The breeding males thus kept as “Gothia” or breeding bull are often used for 2-4 years till one good bull is selected to take its position. The males however are not exchanged but as nearly 10 herds go together for grazing and stay together for the whole year, the inbreeding is mostly avoided. The proportion of breeding males to females were observed as 1:25 to 1:50 in different herds.

The females in general are not marketed however, very old or handicapped females (Fig 31) are culled and put to marketing. These females along with some of



Fig 31



castrated males are taken by butchers for meat purpose.

## L. Socioeconomic profile

The stake holders of Chilika buffaloes mostly belong to general category of people in small or marginal farmer section. Most of the owners of these buffaloes have acquired the art of maintaining these animals from earlier generations .The older member of the family often teaches the art of rearing these animals to the younger ones by involving them in day to day management practices of animals (Fig 32). Very few new entrants to rearing these buffaloes are noticed in recent years. Though there is very few increase in number of stake holders of these animals, the number of Chilika buffaloes is in decreasing trend . This is mostly due to decrease in herd size and less economical viability. The cost of the milk is not increased over period and the grazing land of these buffaloes are decreasing due to invasion of prawn and fish entrepreneurs in recent years.

It is interesting to note that the average land holding of Chilika buffalo owners is more than the rest of the villagers. This indirectly explains the handful income obtained through rearing these animals. The details of the land holding of Chilika buffalo owners in three major areas under study is presented in Table 11. As



Fig 32



the rearing of Chilika buffaloes requires very less attention and time by the owner, agriculture happens to be the primary source of income for them, however the rearing of these buffaloes constitutes a major part of their income and these animals mostly manage to meet both the daily expenses as well as emergency requirements. The daily income is obtained from sale of milk and the emergency expenses are met through sale of animals.

Very few owners of Chilika buffaloes take the help of hired labours for managing their herds as the owners are engaged in some other assignments. The animal owners usually go together to the grazing field early in the morning to collect milk. They pay individual attention to their animals and milk the lactating buffaloes. They help each other (Fig 33) and take food at the grazing field it self. By 10 am in the morning they come to the villages along with the buffaloes . Then at 4 am in the afternoon the owners take their animals and leave them to feed. While coming to villages the owners try to wash the body of the animals. The farmers do their routine assignment while the animals are in rest under the shades of trees in or around the village.

The integration of farmers with Chilika buffaloes is since generations and in spite of short comings and hurdles, it is expected to continue for next few generations as well. The normal physiology of these buffaloes is presented in Table 12.



Fig 33



## RECOMMENDATIONS

Chilika buffaloes contribute to the welfare of farming community in general and small and marginal farmers in particular in the native tract surrounding Chilika lake. These animals render their services as dual type animal with many good qualities like adaptability to saline and harsh climatic conditions, low incidence of diseases in general and reproductive health problems in particular and good draft capacity. The milk yield with high fat content from Chilika buffaloes is of low cost as these animals are maintained under extensive range system even without provision of housing system of any kind. Part time labour of the farmer and regular attention help rearing these animals with optimum production performance since generations.

Keeping in view the economic importance, productivity and adaptability of Chilika buffalo in its native tract along with socio-economic status of the farmers, efforts should be made for conservation and improvement of this valuable buffalo germplasm.

Improving the overall performance of locally adapted breeds with better management and breeding practices will often produce more sustained benefits than strategies of crossing with exotic or improver breeds.

Though the daily as well as the lactational milk yield is not so much encouraging in the present study, relative variability amongst animals is often very much higher. Further under prevailing managerial practice milking is done only once a day. So milk yield potentiality of these animals can be augmented through interventions in prevailing management and exploiting between animal variability through well planned selective breeding programmes. Besides this, optimum cost of milk and products of these animals should be ensured through organized marketing system towards enhancing the economic importance of this breed having unique qualities.

To achieve the target for conservation and improvement of this breed, the following action plan is suggested.

1. Establishment of breed nucleus herds/ bull mother farms/ young bull rearing centres in the operational areas.
2. Ensuring implementation of deworming and vaccination schedules in the whole population.
3. Development of marketing facility for the milk and milk products toward enhancing economic importance of this breed.
4. Active participation of farmers / breeders through Chilika Buffalo Promoters' Society in conservation and improvement programmes.



## BREED DESCRIPTOR

### I. GENERAL DESCRIPTION

1. Name of the breed : **Chilika**
2. Background for such a name : **The name of the breed backs to its native tract which is surrounding the Chilika lake**
3. Species name : ***Bubalus bubalis***
4. Most closely related breeds (in appearance) : **Nil**
5. Since when the breed is known
6. Estimated population (Approx) : **29,000**

	<b>Male</b>	<b>Female</b>
Claves (up to 1 year)	3,500	3,500
Stock (1 to 3 years)	4,500	5,000
Adult (3 years and above)	2,500	10,000
Milking females	-	5,000
Stud bulls	500	-
7. a. Native tract of distribution in terms of : **Longitude 85° 05'to 85° 40' E  
Latitude 19° 10' to 19° 54' N**
- b. Approximate area of distribution (in sq. kms.) : **1000 sq.km.**  
Place(s) : **Bhusandapur, Tangi, Parikuda, Maluda, Krushnaprasad, Brahmagiri and Satapada area surrounding Chilika lake.**
8. a. Communities responsible for developing the breed : **Non specific**
- b. Description of community (Farmers/nomads/isolated/tribals) : **Farmers is general and small & marginal farmers in particular.**
9. Native environment
  - a. Soil description : **Saline**
  - b. Minimum temperature **13.9°C** month of min. **December**
  - c. Maximum temperature **38.8°C** month of max. **June**
  - d. Maximum humidity **98.2%** month of max. **October**
  - e. Minimum humidity **44.2%** month of min. **November**
  - f. Annual rain fall **1350.9 mm**
  - g. Peak rain **427.3 mm** month of peak. **September**
  - h. Annual duration of rain. **95 days**
  - i. Annual duration of drought
  - j. Annual duration of flood **3 months**
  - k. Elevation of land mean **2 meters** range **1 to 3 meters**
  - l. Sub-soil water depth during summer (in mtrs) **2.3**
  - m. Sub-soil water depth during rainy season (in mtrs) **0.6**
  - n. Forest area (in sq. kms.) : **500 sq. km.**
  - o. Wet cultivated area : **-**
  - p. Dry cultivated area : **-**
  - q. Uncultivated area : **-**
  - r. Main cultivated cereals : **Rice**
  - s. Main cultivated pulses : **Bengal gram and Black gram**
  - t. Other crops : **Jute and Vegetables**



## 10. Feed

### a. Major fodder trees

- (a) Dimiri - *Ficus sp.*
- (b) Chakunda - *Abizia lebeck*
- (c) Sahada - *Stveblus asper*
- (d) Mandar - *Hibiscus rosa sinensis*
- (e) Bamboo - *Bambusa tulda*
- (f) Dhanwantari - *Cyndophogon flexupsus*
- (g) Bara - *Ficus bengalensis*
- (h) Aswastha - *Ficus religiosh*
- (i) Mango - *Magnifera indica*
- (j) Jackfruit - *Artocapus heterophylla*
- (k) Banana - *Musa paradisica*

### b. Major fodder shrubs

- (a) Bhuin nimba - *Andro grphis paniculata*

### c. Major native fodder grass / weeds

- (a) Chingudia - *Hydrila sp.*
- (b) Mainshia - *Potamegetom sp.*
- (c) Pitta grass
- (d) Shitala grass

### d. Cultivated legume fodder and monocot grass : Very negligible

- (a) Green gram - *Vigna radiata*
- (b) Black gram - *Vigna mango*
- (c) Bengal Gram - *Phaseolus radiatus*
- (d) Rice - *Coryza sativa*

### e. Cultivated tubers : Sweet potato

### f. Source of dry fodder : Nil

### g. Seed and grain feed : Nil

### h. Cakes and other concentrates : Nil

### i. Any reported deficiency of minerals in water : Not studied

### j. Any reported minerals in harmful quantity and source : Not studied



## 11. Housing :

- a. Type of housing : Nil

## 12. Herd size (Avr. farm family N = 20) In grazing (N=300)

a. Number of breeding females	:	08	120
b. Number of replacement females	:	04	80
c. Number of bullocks	:	02	20
d. Number of calves (less than 12 months)	:	05	60
e. Bull	:	01	20

## 13. Mating method

- a. Natural service (%) : 100%
- b. Artificial insemination (%) : Nil



## II. PHYSICAL CHARACTERS

### 1. COLOUR

		% Surface area in	
		Male	Female
a. Coat colour	<b>Brownish black</b>	<b>85</b>	<b>88</b>
	<b>Black</b>	<b>05</b>	<b>04</b>
b. Muzzle	<b>Black</b>	<b>100</b>	<b>100</b>
c. Eyelids	<b>Black</b>	<b>100</b>	<b>100</b>
d. Tail (switch)	<b>Black</b>	<b>88</b>	<b>90</b>
	<b>Grey</b>	<b>12</b>	<b>10</b>
e. Hoofs	<b>Black</b>	<b>100</b>	<b>100</b>

### 2. HORNS

		Male	Female
a. Colour		<b>Black</b>	<b>Black</b>
b. Size		<b>48.32 ± 0.24</b>	<b>50.76 ± 0.12</b>
c. Shape (Straight/curved)		<b>Curved</b>	<b>Curved</b>
d. Orientation		<b>Upward inward</b>	<b>Upward inward</b>

### 3. EARS

a. Length	: <b>23 cm</b>
b. Orientation (Horizontal/drooping)	: <b>Horizontal</b>

### 4. HEAD

a. Forehead (Convex/concave/straight):	<b>Straight</b>
b. General description	: <b>Head is in upright position and medium in size</b>

### 5. BODY

	Male	Female
a. Hump (Large/medium/small)	<b>Small</b>	<b>Small</b>
b. Dewlap (Large/medium/small)	<b>Small</b>	<b>Small</b>
c. Naval flap (Large/medium/small)	<b>Small</b>	<b>-</b>
d. Penis sheath flap	<b>Medium</b>	<b>-</b>
e. Basic temperament	<b>Moderate</b>	<b>Docile</b>

### 6. UDDER

a. Shape (bowl/round/trough/pendulous)	: <b>Bowl / Round</b>
b. Fore-udder size (Large/medium/small)	: <b>Small</b>
c. Rear-udder size (Large/medium/small)	: <b>Medium</b>
d. Teat shape (cylindrical/funnel/pear)	: <b>Cylindrical</b>
e. Teat tip (pointed/ round/flap)	: <b>Round</b>
f. Milk vein (Large/medium/small)	: <b>Small</b>

## III. PERFORMANCE

### 1. Body weight (kg)

	Male	Female
a. Birth weight	<b>18.06 ± 0.19</b>	<b>17.67 ± 0.11</b>
b. Pre-weaning weight	<b>46.40 ± 0.39</b>	<b>44.44 ± 0.33</b>
c. 12 month weight	<b>178.11 ± 1.13</b>	<b>170.93 ± 0.82</b>
d. Adult weight	<b>352.56 ± 2.48</b>	<b>341.38 ± 1.23</b>





<b>2. Body measurements(cm.)</b>	Male	Female					
a. Chest-girth	<b>172.63 ± 0.33</b>	<b>171.42 ± 0.12</b>					
b. Body length	<b>122.72 ± 0.26</b>	<b>120.58 ± 0.12</b>					
c. Height at withers	<b>125.87 ± 0.78</b>	<b>123.64 ± 0.65</b>					
d. Punch girth	<b>168.36 ± 0.55</b>	<b>168.42 ± 0.21</b>					
<b>3. Dairy performance</b>	Lactation						
	I	II	III	IV	V	VI	VII
							& above
a. Daily milk yield (lts)	1.76	1.78	1.82	1.96	1.93	1.91	1.85
b. Peak milk yield (lts)	2.45	2.48	2.62	2.85	2.86	2.75	265
c. Days to reach peak yield	70	72	75	75	78	76	75
d. Lactation length (days)	250.32	255.63	260.36	262.52	265.23	262.32	270.12
e. Lactation milk yield (lts)	440.56	455.02	473.86	514.54	511.89	501.03	499.72
f. Fat %	8.62	8.57	8.72	8.68	8.77	8.81	8.76
g. SNF %	8.73	8.66	8.68	8.72	8.65	8.71	8.65
h. Dry period (days)	165	151	146	144	141	144	136
i. Productive life span (month)	<b>190-261 months</b>						
j. Milking rate (litres/min.)	<b>1lt in 8 min</b>						
<b>4. Reproduction</b>							
a. Males							
(i) Age at puberty (days)	<b>: 1065.62 ± 4.63</b>						
b. Females							
(i) Age at puberty (days)	<b>: 1019.76 ± 5.26</b>						
(ii) Oestrous cycle duration (days)	<b>: 21</b>						
(iii) Oestrus duration (hrs)	<b>: 20.30 ± 0.24</b>						
(iv) Age at first mating (days)	<b>: 1033.57 ± 5.33</b>						
(v) Age at first calving (days)	<b>: 1362.25 ± 7.24</b>						
(vi) Age at second calving (days)	<b>: 1768.43 ± 9.58</b>						
(vii) Calving interval (days)	<b>: 406.54 ± 3.52</b>						
(viii) Gestation length (days)	<b>: 309.17 ± 1.17</b>						
(vii) Twinning percentage	<b>: Nil</b>						
(viii) Dystocia percentage	<b>: 1.20</b>						
(ix) Placental retention (%)	<b>: 2.17</b>						
(x) Abortions (%)	<b>: 1.30</b>						
(xi) Still births (%)	<b>: 2.61</b>						
(xii) Post-gestational mortality (%)	<b>: Not studied</b>						
<b>5. Type of work</b>							
a. Purpose (Ploughing, threshing. Power etc.)							<b>All types of</b>
<b>agricultural operations</b>							
b. Capacity for work (Hard/medium/light)	<b>: Medium</b>						
c. Average duration of work per day (hrs)	<b>: 4 hours</b>						
6. Drought tolerance (Allocate grades 1-5, 1=high)	<b>: 1</b>						
7. Heat tolerance (Allocate grades 1-5, 1=high)	<b>: 3</b>						
8. Diseases and parasites	<b>: Mostly resistant to most of diseases and external parasites.</b>						



**TABLE 1. MONTHLY CLIMATIC PARAMETER OF CHILIKA BUFFALO BREEDING TRACT**

Month	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
	<b>Air Temp (°C)</b>											
<b>Max.</b>	28.9± 0.06	32.7± 0.08	34.1± 0.07	36.9± 0.08	37.5± 0.08	38.8± 0.06	32.1± 0.04	32.0± 0.04	32.0± 0.07	30.7± 0.05	30.6± 0.05	27.9± 0.06
<b>Min.</b>	16.1± 0.08	19.1± 0.2	23.4± 0.1	25.7± 0.09	26.7± 0.08	27.7± 0.06	25.8± 0.04	25.7± 0.06	25.5± 0.06	24.3± 0.05	17.0± 0.06	13.9± 0.08
<b>Relative Humidity (%)</b>												
<b>Max.</b>	91.2± 0.3	94.0± 0.2	93.8± 0.6	90.2± 0.3	86.0± 0.4	88.8± 0.2	93.6± 0.3	92.3± 0.2	93.3± 0.3	98.2± 0.4	87.5± 0.2	82.1± 0.4
<b>Min.</b>	47.6± 0.3	32.6± 0.4	53.1± 0.5	52.2± 0.5	52.8± 0.4	50.2± 0.2	74.3± 0.2	74.7± 0.2	80.1± 0.2	80.2± 0.4	44.2± 0.3	46.4± 0.3
<b>Rain fall (mm)</b>	16.3	26.3	56.9	45.2	59.4	101.4	255.7	161.6	427.3	110.7	56.4	33.7
<b>Total rainy days</b>	2.0	2.0	3.6	2.3	4.7	11.3	20.6	15.3	18.6	10	2.6	2.3



**TABLE 2. BODY WEIGHT AND BODY MEASUREMENTS OF CHILIKA BUFFALO**

	SEX	BW(kg)	HW(cm)	BL(cm)	HG(cm)	PG(cm)	TL(cm)	HeL(cm)	HoL(cm)	EL(cm)
<b>Birth</b>	M	18.06 ±0.13	47.23 ±0.21	40.34 ±0.08	45.42 ±0.12	48.22 ±0.12	20.53 ±0.06	18.21 ±0.07	-	13.12 ±0.08
	F	17.67 ±0.11	45.35 ±0.18	38.76 ±0.10	43.53 ±0.16	46.26 ±0.16	20.47 ±0.07	17.76 ±0.08	-	12.53 ±0.10
<b>3 month</b>	M	46.40 ±0.39	77.62 ±0.16	60.73 ±0.12	78.62 ±0.21	78.34 ±0.22	48.27 ±0.11	30.23 ±0.13	1.23 ±0.01	15.53 ±0.07
	F	44.40 ±0.33	75.32 ±0.12	58.56 ±0.14	77.83 ±0.24	78.33 ±0.24	46.21 ±0.13	29.35 ±0.15	1.07 ±0.01	15.32 ±0.08
<b>6month</b>	M	75.55 ±0.78	86.84 ±0.43	78.61 ±0.16	92.73 ±0.23	94.52 ±0.37	52.31 ±0.21	35.42 ±0.18	14.23 ±0.08	16.42 ±0.08
	F	72.49 ±0.63	85.78 ±0.39	78.48 ±0.18	90.62 ±0.26	92.27 ±0.28	52.18 ±0.24	34.18 ±0.21	14.36 ±0.07	16.33 ±0.06
<b>12month</b>	M	178.11 ±1.13	106.25 ±0.52	107.82 ±0.42	130.52 ±0.56	125.62 ±0.43	60.34 ±0.37	42.22 ±0.31	27.42 ±0.13	18.34 ±0.07
	F	170.93 ±0.82	104.36 ±0.44	106.65 ±0.53	128.56 ±0.48	123.73 ±0.51	60.25 ±0.33	42.32 ±0.28	26.28 ±0.11	18.12 ±0.09
<b>Adult (&gt;2yr)</b>	M	352.56 ±2.48	125.87 ±0.78	122.72 ±0.26	172.63 ±0.33	168.36 ±0.55	72.32 ±0.12	47.21 ±0.18	48.32 ±0.24	23.52 ±0.16
	F	341.38 ±1.23	123.64 ±0.65	120.58 ±0.12	171.42 ±0.13	168.42 ±0.21	72.16 ±0.08	47.63 ±0.11	50.76 ±0.12	23.44 ±0.07

- BW - Body weight
- HW - Height at withers
- BL - Body length
- HG - Heart girth
- PG - Punch girth

- TL - Tail length
- HeL - Head length
- HoL - Horn length
- EL - Ear length

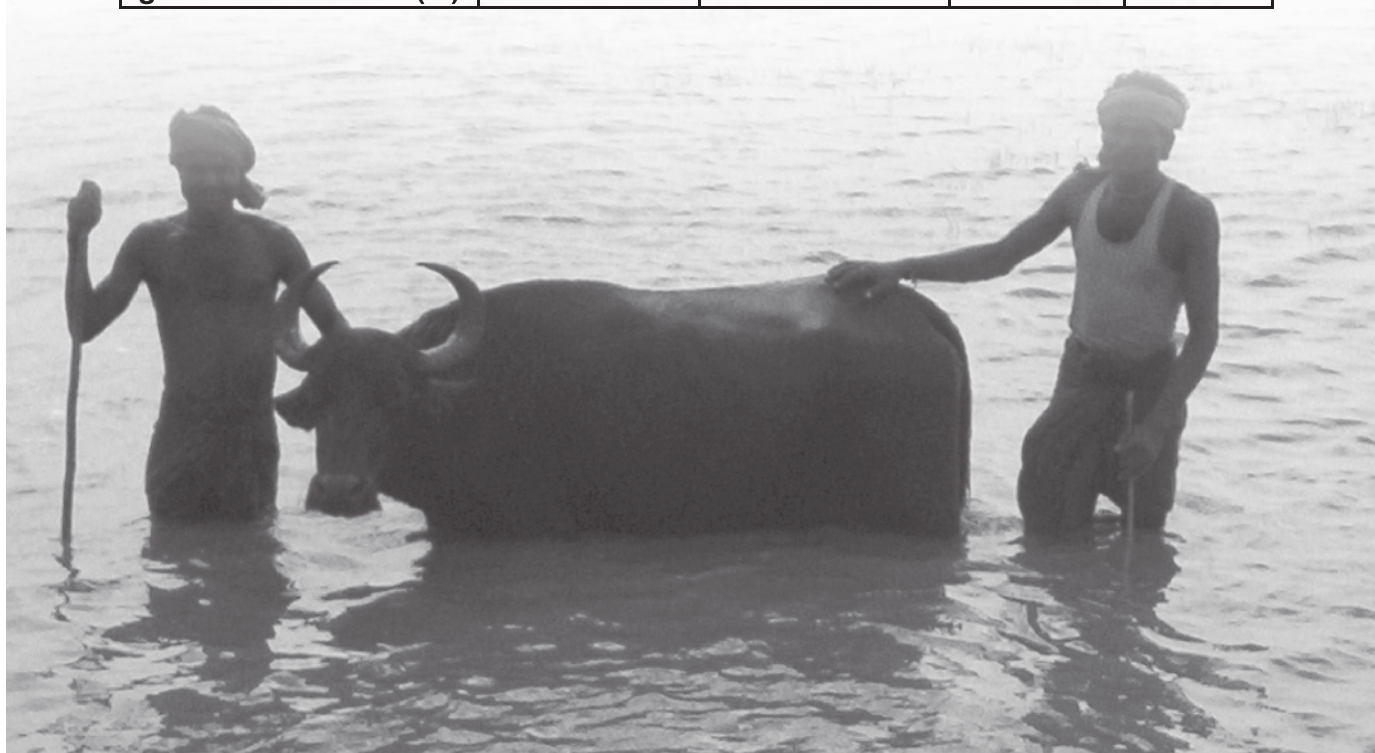


**TABLE 3. COAT COLOUR PATTERN OF CHILIKA BUFFALO IN DIFFERENT ZONES ( % )**

Coat Colour	Zone			
	Bhusandapur	Krushnaprasad	Satpada	Overall
Brownish Black	9.33	13.78	1.014	10.80
Black	90-67	86.22	89.86	89.20

**TABLE 4. FEEDING MANAGEMENT OF CHILIKA BUFFALO IN DIFFERENT ZONES**

Parameters	Bhusandapur	Krushnaprasad	Satpada	Overall
Maximum distance travel from home ( Km)	4.2	3.7	4.5	4.13
Duration of suckling Without milking (days)	6	4	6	5.33
Duration of grazing (hr)	10	9	10	9.67
Duration or grazing (hr) in submerged weeds	21	21	21	21
Proportions calves grazed with mother (%)	80	70	85	78.33





**TABLE 5. DAIRY PERFORMANCE IN DIFFERENT LACTATIONS OF CHILIKA BUFFALO**

Dairy performance	Lactation						
	I	II	III	IV	V	VI	VII&Above
Daily milk yield (Its)	1.76	1.78	1.82	1.96	1.93	1.91	1.85
Peak milk yield (Its)	2.45	2.48	2.62	2.85	2.86	2.75	2.65
Days to reach peak yield	70	72	75	76	78	76	75
Lactation length (days)	250.32	255.63	260.36	262.52	265.23	262.32	270.12
Lactation milk yield (Its)	440.56	455.02	473.86	514.54	511.89	501.03	499.72
Fat %	8.62	8.57	8.72	8.68	8.77	8.81	8.76
SNF %	8.73	8.66	8.68	8.72	8.65	8.71	8.65
Dry period (days)	156	151	146	144	141	144	136

**TABLE 6. AGE SPECIFIC INCIDENCE OF DIFFERENT DISEASES IN CHILIKA BUFFALO (%)**

Diseases / Symptoms	Age group		
	Up to 1 month	>1 mo. To 12 mo.	>12 months
Digestive disorder	62.61	23.33	14.06
Fever	63.35	24.21	12.44
Pneumonia	52.23	36.25	11.52
Parasite	17.64	42.11	40.25
Skin disease	Rare	Rare	Rare
Hepatitis	37.51	32.12	30.37
Ear/Eye infection	13.32	40.25	46.43
Viral disease	8.11	38.37	53.52
Blood protozoan disease	--	44.53	55.47
Miscellaneous	23.72	37.12	39.16



**TABLE 7. SEASONALITY OF DISEASE INCIDENCE  
IN CHILIKA BUFFALO (%)**

Disease / Symptoms	Season			Overall
	Summer	Rainy	Winter	
Digestive disorder	19.3	21.2	7.3	47.8
Fever	4.5	21.2	8.1	33.6
Pneumonia	1.2	3.4	2.1	6.7
Parasite	30.3	27.0	31.1	88.4
Skin disease	1.1	0.9	1.3	2.3
Hepatitis	3.8	4.6	4.2	12.6
Ear/Eye infection	1.0	1.6	1.6	4.2
Viral disease	2.1	14.3	2.3	18.7
Blood protozoan disease	4.8	5.3	5.2	15.3
Miscellaneous	4.3	6.2	2.8	13.3

**TABLE 8. REPRODUCTION TRAITS OF CHILIKA BUFFALO**

Sl.No	Traits	Observation
<b>Male</b>		
1.	Age at puberty (days )	1065.62±4.63
<b>Female</b>		
1.	Age at puberty (days)	1019.76±5.26
2.	Oestrus cycle duration (days )	21
3.	Oestarus duration ( hrs )	20.30±0.24
4.	Age at 1 <sup>st</sup> mating (days )	1033.57±5.33
5.	Age at 1 <sup>st</sup> calving (days)	1362.25±7.24
6.	Age at 2 <sup>nd</sup> calving (days)	1768.43±9.58
7.	Interval from calving to conception (days )	98.62±1.21
8.	Calving interval (days )	406.54±3.52
9.	Gestation length (days )	309.17±1.17
10.	Life time no. of successful matings	11
11.	No. of calvings	11



**TABLE 9. INCIDENCE (%) OF REPRODUCTIVE HEALTH PROBLEMS OF CHILIKA BUFFALO**

Types of Problems	Zone			
	Bhusandapur	Krushnaprasad	Satapada	Overall
Abortion	1.39	1.11	1.32	1.30
Still birth	2.22	4.44	2.11	2.61
Retention of placenta	1.94	2.78	2.11	2.17
Repeat breeding	2.78	5.00	2.63	3.15
Pyometra	1.11	2.76	1.05	1.41
Anoestrus	2.78	7.22	2.37	3.48
Dystocia	1.11	1.11	1.32	1.20
Prolapse	0.56	0.56	0.79	0.65

**TABLE 10. EFFECT OF SEASON ON DISTRIBUTION OF OESTRUS OF CHILIKA BUFFALO**

Sl.No	Animals	Summer	Rainy	Winter
1.	Heifer	27.42	25.85	46.73
2.	She buffalo	33.26	26.22	40.52

**TABLE 11. LAND HOLDING OF CHILIKA BUFFALO FARMERS (%)**

Zone	Land holding		
	Up to 2 Acre	2.1 to 4 Acres	> 4 Acres
Bhusandapur	25.00	58.33	16.67
Krushnaprasad	15.79	63.16	21.05
Satapada	10.71	71.43	17.86
Overall	16.90	64.79	18.31



**TABLE 12. PHYSIOLOGICAL PARAMETERS OF CHILIKA BUFFALO**

Sex	Age group	Rectal Temperature( <sup>0</sup> F)	Pulse rate (per min.)	Respiration rate (per min. )
Male	Up to 3 month	101.3±0.06	74.8±0.08	21.8±0.02
	More than 3 month	100.6±0.04	66.5±0.07	19.1±0.01
Female	Up to 3 month	101.3±0.05	75.2±0.07	21.7±0.02
	More than 3 month	100.5±0.02	66.4±0.05	19.2±0.02
Overall		100.6±0.03	70.6±0.04	19.8±0.01

### List of Elite Animals

Name of the Farmers	Village	Colour	Milk yield (lt.)	Horn (cm)	Age (yr)
Ravi Pradhan	Parala	Black	2.7	44	6
Krushna Mohanty	Parala	Black	2.6	40	6
Dukhisyam Majhi	Nuapada	Black	2.8	44	11
Golakh Bihari Pradhan	Nuapada	Black	2.9	45	7
Trinatha Pradhan	Nuapada	Black	3.1	47	6
Soamanath Biswal	Porala	Brownish	2.8	47	11
Balaram Jena	Anlakuda	Black	2.9	42	12
Shyama Jena	Gambhari	Black	3.1	43	6
Chema Jena	Gambhari	Black	2.9	48	12
Sarbeswara Jena	Gola	Black	3.2	45	6
Nilakantha Mohanty	Paradhi	Black	3.1	44	10
Raghunatha Mohanty	Paradhi	Black	2.9	43	8
Rathakana Jena	Nuadiha	Black	2.7	47	10
Bidyadhana Dalai	Paikasahi	Black	2.8	43	7
Dushasan Jena	Gambhari	Brownish	2.6	44	8
Banshidhar Jena	Gambhari	Black	2.6	40	13





<b>Name of the Farmers</b>	<b>Village</b>	<b>Colour</b>	<b>Milk yield (lt.)</b>	<b>Horn (cm)</b>	<b>Age (yr)</b>
Dharani Mansingh	Gada	Black	2.8	42	12
Raghunath Nayak	Baulapatana	Black	2.9	43	11
Bhabani Pallai	Baulapatana	Brownish	2.6	44	6
Aparti Barik	Baulapatana	Black	2.7	45	6
Surendra Pallai	Baulapatana	Black	3.1	43	10
Michu Rana	Baulapatana	Black	2.9	50	11
Kailash Rout	Brahmapada	Black	3.2	48	10
Dirig Rout	Brahmapada	Black	2.8	48	11
Kelu Charan Palai	Brahmapada	Black	3.3	45	12
Banamali Pradhan	Brahmapada	Black	2.8	44	7
Naran Maharana	Haripur	Black	2.7	43	6
Narayan Gadu	Haripur	Black	2.6	44	13
Prafulla Gadu	Haripur	Brownish	3.1	45	7
Bula Behera	Siara	Black	3.3	43	7
Kelu Chandran Singh	Siara	Black	2.9	45	13
Sukanta Sith	Gambhari	Black	2.8	44	12
Kuber Behera	Siara	Black	2.8	45	8
Bidyadhar Behera	Siara	Black	2.9	47	9
Deba Behera	Panasapada	Black	2.7	48	8
Sudam Behera	Panasapada	Brownish	2.8	45	11
Prafulla Majhi	Nuapada	Black	2.6	43	9
Purna Chandna Jena	Anlakuda	Black	3.5	42	8
Kedar Jena	Kurupala	Black	3.2	45	7
Kulamani Behera	Mangalajodi	Black	2.6	45	8
Nabakeshore Swain	Gothapatana	Black	2.8	43	8
Panu Behera	Mangalajodi	Brownish	2.6	44	9
Ganga Behera	Mangalajodi	Black	2.9	43	8
Balabhadra Behera	Mangalajodi	Black	2.7	44	10
Natabara Behera	Mangalajodi	Black	3.2	43	8
Purusottam Behera	Udayagiri	Black	3.1	44	9
Sarat Behera	Bhusandapur	Black	2.8	45	11
Purna Behera	Mangalajodi	Black	2.7	43	7
Dambarudhara Behera	Mangalajodi	Black	2.9	42	6
Manaba Behera	Abhimanpur	Brownish	3.4	45	8
Abhiram Swain	Abhimanpur	Black	3.0	48	10
Prasanth Pradhan	Udayagiri	Black	2.8	44	7
Nebasi Behera	Balipatapur	Black	2.7	47	14
Satrughna Behera	Balipatapur	Black	2.6	46	8
Dharama Behera	Gothapatana	Brownish	3.1	47	8
Halu Behera	Udayagiri	Black	3.3	45	9
Kasinath Jena	Badajhad	Black	2.9	43	8
Sadhu Chandran Jena	Patharakata	Black	3.1	42	7
Arat Biswal	Mardarajpur	Black	2.8	43	13
Ballar Palei	Samantarapur	Black	2.9	44	8
Golakha Pradhan	Nuapada	Black	3.1	45	7
Naba Parida	Jahrikuda	Brownish	2.8	44	13
Sarat Jena	Tichhini	Black	3.2	43	9
Prafulla Chand	Fulabari	Black	3.1	42	7

