



Karnataka Biodiversity Board



INDIGENOUS TRADITIONAL KNOWLEDGE AMONG LIVESTOCK KEEPERS OF KARNATAKA



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**Southern Regional Station
ICAR-National Dairy Research Institute**



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Karnataka Biodiversity Board
Bengaluru, Karnataka

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FOREWORD

India is a mega biodiversity hub of livestock genetic resources. Livestock keepers have rich indigenous traditional knowledge. The traditional knowledge is a people derived science which is an eco-system specific science and it represents observation skills which is based on keen understanding of animal feeding behavior and it represents people's creativity, innovations and skill. It is based on the necessities, instinct, observation, trial and error and long experience of indigenous communities. It has been globally acknowledged that the basic component of any country's knowledge system is its indigenous traditional knowledge and region specific biodiversity. However, this heritage needs to be documented and validated for the benefit of communities possessing this knowledge to promote holistic treatment science to prevent the ill effects of modern medicine. Holistic science approach is being recognized by WHO and other organizations who are promoting the health of the eco-system there by which promotes health of animals and humanity.

In this context, I wish to congratulate the Karnataka Biodiversity Board and Southern Regional Station of ICAR-NDRI, Bengaluru for bringing out this publication titled "Indigenous Traditional Knowledge among Livestock Keepers of Karnataka" in which Scientists of Southern Regional Station have meticulously documented traditional knowledge practices of livestock keepers in relation to livestock production, health and processing of livestock products. The scientists of NDRI have done commendable job of conducting exhaustive survey, meeting ITK practitioners, recording their age-old wisdom and documenting the same. This publication provides an insight of the ITK system prevailing in the region among livestock keepers and surely, it would pave the way for its validation and propagation.

In this century the ill effects of antibiotics, hormones and their impacts on evolving disease resistant super bugs is a challenge for modern medicine. Instead traditional treatments are not only cost effective and prepared from the herbs and locally available natural resources may not give any clue to bugs to develop resistance because they may not be able to locate the active principles which impair their survival to develop any kind of resistance to specific drugs because they contain multi-level chemical composition. I am sure this publication will be very useful to students, scientists and teachers, livestock keepers of Karnataka as well as other states.



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PREFACE

In developing countries, about 80% of the population depends on traditional medicine for their primary health care needs (The World Health Organization). As per L. Grenier (IDRC, 1998), ITK refers to localized, structured, traditional application of knowledge generated from continuous experimentation and observation of a given phenomenon of interest. The application of indigenous knowledge to treat animal diseases, animal healthcare system that includes the traditional beliefs, knowledge, skills methods and practices of a given society (Mc Corkle 1986; Ethno-veterinary medicine comprises the traditional management of veterinary diseases, their remedies and the spiritual elements associated with the healing procedures practiced by a local community.

This book presents documented information of indigenous traditional knowledge and medicinal plant usage in management of livestock health and husbandry by the farmers of Karnataka. The basic information provided in this book on indigenous traditional knowledge would pave the way for its proper validation and application in livestock health and management. In addition this book provides information on agro climatic zones, livestock breeds, population, production system and the role of IPR in protection of indigenous traditional knowledge. We are sure that this publication would be useful for academicians, students, researchers, farmers and traditional healers.

I take this opportunity to thank the Karnataka Biodiversity Board for funding this project. I thank the Director, Joint Director (Research) and all the administrative staff of ICAR-NDRI, Karnal who extended all the support in successful completion of the project. I thank all the Scientific, technical and administrative staff of SRS-ICAR-NDRI for their support in execution of this project.

I am thankful to the Veterinary Officers, Livestock Inspectors and staff of AH&VS Department for the successful completion of the project especially Dr. Shivmoorthi from Chowlahiriyur village of Chikmagalur district, Dr. Shridhar, Dr. Jayashree from Shivamogga Veterinary college, Dr. Dayanand, Dr. Nagaraju from Sagara, Shivamogga, Dr. Vivek Patil of KVAFSU, Bidar, Dr. Thrinesh and Sree Sujatha from Mandya, Dr. Lokesh and Dr. Shridhar from Tumakuru, Dr. Arun from Jamkhandi for their assistance in collecting data of ITK's from various villages.

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I acknowledge all round support and kind co-operation rendered by farmers from Karnataka for their valuable time and knowledge which they have shared with us for documentation of indigenous traditional practices in livestock management.

I record my heartfelt gratitude to traditional practitioners for sharing their valuable knowledge regarding disease treatment methods using herbal medicines in livestock health management.

I record my sincere gratitude to co-investigators of the project Dr. S. Jeyakumar, Dr. S. Subash and Dr. Mukund A. Kataktalware and Mrs. Deepa P. R., Junior Research Fellow of the project for conducting survey and compilation. I am thankful to Dr. Siddaramanna, Senior Technical officer for his assistance.

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(K. P. RAMESHA)

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INTRODUCTION

The traditional or indigenous knowledge is the knowledge that people have gained through inheritance from their ancestors. It is a people derived science and it represents people's creativity, innovations and skills. The traditional knowledge is based on the necessities, instinct, observation, trial and error and long experience of indigenous societies of different region. The indigenous traditional knowledge embraces people's knowledge of tools and techniques for the assessment, acquisition, transformation and utilization of resources which are specific to particular location. The basic component of any country's knowledge system is its indigenous knowledge. It encompasses the skills, experiences and insights of people, applied to maintain or improve their livelihood.

Karnataka State is situated on a tableland where the Western and Eastern Ghat ranges converge into the Nilgiri hill complex, in the Western part of the Deccan Peninsular region of India. Karnataka has 10 agro-climatic zones and each zone is delineated based on the diverse characteristics of climate, physiographic and cropping pattern. The agro-climatic zones also have prominent regional diversities along with regional disparities. There are diversities in natural resources such as the soil type, climate, rainfall distribution, mineral, forest and physiography. The state has diverse breeds of cattle and other livestock and has become integral part of our agriculture and livestock economy. Traditional livestock practices are location specific and depend upon cropping pattern and type of cattle maintained.

Indigenous knowledge has two powerful advantages over scientific knowledge like it has little or no cost and it is readily available. Traditional knowledge in livestock management can be on dairy herd management, animal health care practices and product or by-product management. Several indigenous practices in the above aspects can be seen all over Karnataka with small or considerable differences based on the culture and availability of the sources in the particular region. Utilizing locally available plant resources for formulating a wide range of plant based medicines for treating animal diseases is an accessible, efficacious and economically sustainable means to animal health care practices. Herbal remedies are evolved over generations of experiences and practices.

The study of indigenous knowledge will help to identify ideas which have considerable scope for commercial exploitation after value addition. It will also help to understand concepts and practices depicting the elements of sustainability to integrate with the modern information system for efficient resource management.

LIVESTOCK AND POULTRY GENETIC RESOURCES AND PRODUCTION IN KARNATAKA

Karnataka state

The state of Karnataka was formed on November 1, 1956 by merging the Kannada speaking areas of old Hyderabad state and Bombay province with the erstwhile Mysore state. Karnataka is situated between 11° 31' and 18° 45' N latitude and 74° 21' and 78° 40' E longitude in Deccan plateau. The geographical area of Karnataka is 1,91,791 Sq.Km which is 5.8% of the country's geographic area. The state has three principal geographical zones viz. The coastal region of Karavali, The hilly Malenadu region comprising the Western Ghats and the Bayaluseeme region comprising the plains of the plateau. The bulk of the state is in the Bayaluseeme region, the northern part of which is the second-largest arid region in India. Karnataka has rich heritage of culture and natural resources including livestock. Integrated crop-livestock farming has been an age old practice with Karnataka farmers. They excel in livestock rearing as is evident from a number of breeds of livestock developed in the state.

Livestock and poultry production in India

India has rich and diverse genetic resources of livestock and poultry in the form of a large number of species, breeds, and strains within a species. India is home to 197 indigenous breeds of livestock and poultry with unique traits, which include 50 of cattle, 17 of buffalo, 34 of goat, 44 of sheep, 7 of horses & ponies, 9 of camel, 10 of pig, 3 of donkey, 1 of yak, 19 of chicken, 2 of duck and 1 of geese (NBAGR, 2020). Besides recognised breeds there are populations of livestock and poultry in various geographical locations with unique traits. India has contributed richly to the international livestock gene pool and improvement of animal production in the world. Brahman cattle are found in 45 countries while Sahiwal breed is found in 29 countries (Ramesha *et al.*, 2007). India with only 2.5% of the land area-accounts for 7.8% of recorded species. India possesses one of the largest livestock populations in the world, which is more than 535.78 million. As per the BAHS, 2019, In India there are 109.85 million buffaloes with 1st position, 192.49 million cattle with 2nd position, 148.88 million goats and 74.26 million sheep with 2nd and 3rd position respectively in the world. The total livestock of the country comprised of 35.94 % cattle, 20.45% buffalo, 13.87% sheep, 27.80% goats and 1.92% other livestock species.

The livestock sector alone contributes nearly 27% of value of output at current prices of total value of output in Agriculture, Fishery & Forestry sector. The overall contribution of livestock sector in total GDP is nearly 4.5% at current prices during 2018-19.

Livestock and poultry production in Karnataka

The geographic area of Karnataka state is 1,91,791 Sq.km which is 5.8% of the country's geographic area. The state has very rich livestock and poultry resources comprising of about 30.34 million livestock and 61.82 million poultry (20th Livestock census, 2019). The share of Karnataka in all India livestock and poultry population was 5.41% and 7.33% respectively. The density of livestock in the state was estimated at 151.21 per sq km and 47468 per lakh human population. Cattle and buffalo population in Karnataka is 129.87 lakhs, consisting of 65.87 lakhs indigenous, 28.99 crossbred and exotic and 34.71 lakhs buffaloes (Livestock census 2019). There is a decline of 12.4% in bovine population over previous census 2007. The number of milch animals (cows and buffaloes) decreased from 40.91 lakh to 38.91 lakh in number during the period with a negative growth of 7.3% from 2007 to 2012. The buffalo population showed 19.8% decline from 2007 to 2012 from 43.27 lakh to 34.70 lakh in number. The number of milch animals (in-milk and dry) in cows and buffaloes have decreased from 62.88 Lakh to 58.30 Lakh in number, a negative growth of 7.3%. The indigenous milch cattle decreased from 26.56 lakh to 22.00 lakh in number, a decrease of 17.1% while the exotic/crossbred milch cattle increased from 12.59 lakh to 17.32 lakh in number, giving rise to an increase of 37.6%. The buffaloes population has decreased from 43.27 lakh to 34.70 lakh numbers showing a negative growth of 19.8%. The estimated No. Of animals in milk of exotic/ Crossbred cattle, buffalo, productivity 17.20 lakhs, 17.24 lakhs and 16.47 lakhs respectively. Estimated milk yield/day for indigenous cattle, Crossbred cattle and buffaloes in Karnataka is 2.26 kg/day, 6.03 kg/day and 3.0 kg/day respectively (ISS-2017-18).

The population of sheep and goat is 1,10,50,728 and 61,69,392 respectively. Karnataka is also home to 3,23,836 pigs, 8,856 horses and ponies, 9,029 mules and donkeys (Livestock Census, 2019). Estimated milk, meat, wool and egg production as per ISS 2017-18 was 7136 thousand tonnes, 228 thousand tonnes, 4305 thousand tonnes and 55666 million tonnes respectively. The total estimated value of major livestock in Karnataka according to the rates fixed as on 1-7-2013 was Rs.27,79,108 lakhs. The total contribution of livestock products in Karnataka during the year 2012-13 was estimated as Rs. 19,24,991 lakhs through their products viz., milk, meat, wool and eggs and the estimated valued of livestock byproducts (skin and dung) was Rs. 6,44,751 lakhs. Milk products account for more than 50 per cent of the total value of livestock output, while meat and meat products, eggs and other products account for the remainder.

Livestock sector plays a vital role in the rural economy and in the socio economic development of Karnataka. Livestock provide a diverse range of output for agriculture, irrigation, transport, fiber/leather goods and manure for fertilizer besides milk and meat. Karnataka is the home tract for the finest draft breeds such as Amrithmahal, Hallikar and Khillari with respective population (pure + graded) (Breed survey 2013) of 2,29,063, 18,07,932 and 20,14,352; dual purpose breeds - Krishnavalley

(population 14,381 and Deoni (population 3,51,600); one dwarf breed - Malnad Gidda (population 10,49,543), buffalo types/breeds- Gowli, South Kanara and Dharwari, five breeds of sheep-Hassan, Deccani, Bellary and Chitradurga and Bannur; Osmanabadi breed of goat.

The UAS, Bangalore is accredited with evolving one synthetic strain of poultry-Giriraja which is exclusively developed for backyard poultry farming. In the north-eastern Karnataka region, with regard to livestock production, the production of eggs by improved hens has grown better than by desi hens. The production of pork has been highest across the state while mutton and chevon production has registered a dismal growth. However, production of cow milk has been higher than of buffalo milk in the state.

Cattle and buffalo genetic resources

Cattle and buffalo production systems in majority of the areas in Karnataka are mostly based on traditional knowledge, low cost agricultural residues and agro-by-products leading to lower productivity. The different production systems like zero input – low output, low input – moderate output, intensive input – high output are characteristics of dairy production system in Karnataka. Our state is one of the first states to adopt crossbreeding in India in order to increase the milk production. Best Crossbred cattle are concentrated in Kolar, Bengaluru rural & urban, Mysore, Tumkur and Ramnagara districts; buffaloes are concentrated in Northern Karnataka while Amrithmahal and Hallikar cattle are concentrated in Southern Karnataka while Deoni and Khillar cattle are found in Northern Karnataka. The dwarf breeds Malnad Gidda cattle are found in Malnad and coastal region. Krishnavalley breed is in endangered category. In Karnataka, the grazing facilities available are meager. Individual farmers generally do not own grazing fields of their own. Animals in the village are taken for grazing on wastelands, tank beds, roadsides etc. according to the convenience. Each category of bovines are playing important role in the livelihood security of the rural masses in Karnataka (Ramesha *et al.*, 2020).

Indigenous cattle of Karnataka are well known for their unique characteristics as detailed for indigenous cattle of India and the genes responsible for them will be of value under access of genetic resources and benefit sharing regime. Amrithmahal milk is believed to have therapeutic value in the treatment of gastritis. Malnad Gidda cattle have been reported to show differential disease resistance (higher) for Foot and Mouth symptoms as compared to exotic cattle (Ramesha *et al.*, 2013). They are found to have reproductive uniqueness of regular calving under low input region and their milk was reported to have high lactoferrin content.

Cattle breeds of Karnataka

Various breeds of indigenous cattle (*Bos indicus*) have been evolved over centuries to meet requirements under different agro-climatic situations. Karnataka state has rich cattle bioresources in the form of six recognized breeds. The native breeds have unique morphological features viz., prominent hump, a long face, upright horns, drooping ears, dewlap and slender legs. They have relatively low basal metabolic rate and better ability for heat dissipation.

Hallikar

The Hallikar breed has its origin in Deccan plateau nearly 600 years ago. Golla tribals and their sub tribe Hallikars, with their superior cattle, believed to have migrated in ancient times from Northern India and settled in different parts of Chitradurga and Tumkur districts contributed to the evolution of Hallikar breed. These cattle were involved in the development of most of the cattle breeds in Southern India including Amrithmahal, Khillari and Kangayam. The home tract of Hallikar cattle lies mainly in Chitradurga, Chikamagalur and Tumkur and adjoining taluks of Mysore, Mandya and Hassan districts.

Hallikar breed is medium sized with a long, slender and compact body. Colour varies from gray to dark gray with deep shading on fore and hindquarters and light gray/white markings on face, especially around eyes. Horns are long and emerge from top of poll closely together, carried backwards and slightly upwards terminating in pointed ends. Hump and dewlap are moderately developed. Sheath is small and tugged up to the body. Both cows and bullocks are fierce and temperamental. These cattle are considered as champion of the draft breeds. Bullocks are known for light, fast and steady agricultural operations. They have good trottability and suitable for road and field works. They can travel more than 40 kms in a day on rough roads carrying heavy loads. However, cows are poor milk yielders but possess excellent mothering ability to protect their young ones.

The survey conducted by the Scientists of NDRI, Bengaluru indicated that Hallikar bullocks are used for 124 days in a year with the duration of use ranging from 2 to 10 hours per day (Obi Reddy *et al.*, 2001). Hallikar cows are very poor milk producers, with most of them (more than 95%) yielding less than 2 litres per day. The Hallikar cows are rarely milked if the calf born is a male, while cows with female calves are usually milked. Another notable feature of this breed is that 60% of the dry cows are also used for work. It is further noticed that nearly 20% of farmers use Hallikar cows instead of bullocks for draft purpose, as they could not afford to purchase the bullocks.

Amrithmahal

Amrithmahal is one of the famous and best-known draught breeds of India. They are also called as Dhuyu and Nambri in villages. The animals have established over centuries as most hardy and active in the field as well as on the road. They were described as fiery and said to walk faster than troops.

The home tract of this breed is semi-arid and spread over Chikmagalur, Chitradurga, Shimoga, Tumkur and parts of Mandya, Mysore and Hassan districts of Karnataka. The coat colour of Amrithmahal cattle vary from almost white to nearly black with some shades of grey. They have soft, thin and mellow skin with short glossy coat. The muzzle, feet and switch are usually black. The head is well shaped, long and tapers towards the muzzle. Forehead is prominent with a furrow in the middle. The horns emerge from the top of the poll, fairly close together in an upward and backward direction, and terminate in sharp points. The eyes look bloodshot, very bright and appear like torchlight. These are medium sized animals with tucked in body and long legs. The neck is strong and fairly long and the hump is well developed. The body is compact and muscular body with straight back and broad loins and rump. They have well arched short ribs and powerful sloping quarters. The skin is tight with a thin dewlap. The sheath and naval flap are very small and close to the body. The animals have well-proportioned strong muscular legs and very hard, small and compact hooves with very close clefts. It is observed that Amrithmahal bullocks are able to work without shoeing. The average body length, height at withers and heart girth are 139.0 and 138.5 and 188.0 cm in bulls and 119.3, 117.1 and 148.3 cm in cows respectively (Ramesha *et al.*, 2002).

Origin and historical development

The credit for developing Amrithmahal breed goes to the Viceroy of Vijayanagar dynasty of Karnataka during 1572-1617 AD. Cattle of Amrithmahal establishment originally comprised of three distinct varieties *viz.* Hallikar, Hagalvadi and Chitaldoorg (Kristnasamiengar and Pease, 1912). Establishment of large herds of cows (Benne chavadi) was initiated by Mysore King Chikka Devaraya Wodeyar (1672-1704 AD). He reserved 240 huge grazing lands measuring 4,13,539 acres for their grazing and was called as Amrithmahal kavals. The Benne Chavadi was reconstituted by Haider Ali and his son, Tippu Sultan (Rulers of Mysore during 1704-1799 AD) thoroughly organized and renamed them as Amrithmahal and the kavals as Amrithmahal kavals. The Amrithmahal bullocks were extensively used for military operations for the transport of artillery and ammunition both by Mysore rulers and Britishners. In 1923, the job was entrusted to the Department of Agriculture, Govt. of Mysore and the control was finally transferred to Dept. of Animal Husbandry and Veterinary Services in 1945. The state Amrithmahal cattle breeding station is located at Ajjampura, Chikmagalur district and subcentres at Birur, Basur, Habbanaghatta, Lingadhalli, Kyadigere and Chikkayammiganur. The Amrithmahal kavals were distributed in different districts of Karnataka state, but within easy reach of each other. The kavals are often located within the catchment areas of water reservoirs built for irrigation purpose. This area is undulated and receives an annual rainfall of 250 mm to 750 mm from both Southwest (June to August) and north east (September to November) monsoon. The kavals are covered mainly with indigenous varieties of grasses like Heteropogan, Themida and Discanthium. These kavals are classified as summer, rainy and winter kavals and are used for gazing of Amrithmahal cattle around the year. These cattle are maintained on ranch system. Amrithmahal animals in the past were as an integral part of the agricultural economy of Karnataka. They also played a major role in military combats.

Krishnavalley

Krishnavalley is a massive and powerful breed developed during 19th century. This breed is mostly found in the valley of river Krishna and its tributaries in the present Karnataka and Maharashtra states of India. The original home tract of the breed comprises of Sangli, Miraj and Satara districts of Maharashtra, Belgaum, Bijapur, Bagalkot and Dharwad districts of Karnataka State. The area is taken by low ranges of hills and shallow valleys. The climate is generally dry. The cold and dry season lasts from the middle of October to the middle of February. The summer season extends over the period from February to June, while the rainy season is usually from June to the middle of October. The annual rainfall ranges from 30 to 50 inches. Maharaja of Sangli contributed substantially to evolve the desired type of animals, which eventually became Krishnavalley breed. Wide variation is seen in the morphological characteristics of animals, as the breed is an admixture of at least three distinct types Gir from Kathiawar, Ongole from erstwhile Madras state and local cattle of the native tract having Hallikar blood (Oliver, 1936). The animal is large with a massive frame and deep broad chest but is loosely built (Ramesha *et al.*, 2000). Color is variable, but mostly it is gray-white with darker shades on the fore and hindquarter in males. The forehead is wide and concave. The muzzle is large and black. The eyes are wider and dark and give a docile expression. The ears are small and pointed with inside being black. The horns are short, thick, flat, blunt and take an outward curve slightly upwards and inwards. The neck is short, thick, and gives massive appearance. The dewlap is well developed and pendulous. It is joined by a fold of loose and pendulous skin hanging between the forelegs to the sheath. In cows, navel sheath is substituted by a pendulous fold of skin. The chest is wide, deep and capacious. The lower half of scrotum is usually black. The limbs are well set and are quite muscular. The feet are fairly compact and well shaped, but in old animals are inclined to spread. However, hoofs are soft. The tail is long, fine and tapering, and the switch is black almost reaches the ground. In general Krishnavalley animals are massive and heavy. The average body length, height at withers and heartgirth were 129.4, 121.4 and 144.8 cms in bulls and 113.20, 106.96 and 136.96 in cows respectively (Ramesha *et al.*, 2001).

The Krishna valley bullocks were highly valued for their good working qualities in heavy black cotton soils, which require heavy draft animals to do the agricultural operation thoroughly. Bullocks are powerful animals best suited for work in heavy black cotton soils. Over short distances a pair of Krishna valley bullocks can carry loads of even two tons while over long distances they transport a load of about one ton for 8 to 10 hours a day at a speed of 4 kms per hour. The major crops grown in the area at present are sugarcane and sorghum. Earlier cotton used to be grown extensively in the area. Tobacco, beetal vines and various other horticultural crops are also grown in the irrigated lands. Shevri (*Sesbania aegyptiaca*) is grown extensively along the banks of rivers and its loppings are used for feeding cattle.

Periodical surveys conducted by the Scientists of NDRI, Bangalore indicated that presently the breed is on the verge of extinction. The animals true to breed are available only in Jamakandi, Mudhol and Athani Taluks of Karnataka. Presently there are only

2314 animals (Livestock Census, 2012) as against above 6,50,000 in 1946 as a result of indiscriminate crossbreeding with exotic (Holstein Friesian and Jersey) and Khillari bulls (another draft breed of the area) and paucity of Krishnavalley bulls, the number of Krishnavalley animals declined over the years. The reasons attributed by the farmers for the present status are the non-availability of Krishnavalley bulls/semen in the area, preferences of farmers for Khillari males because of their suitability for work in wider area and easy availability of exotic semen. Despite this, one comes across even today Krishnavalley cows yielding 5–6 lts of milk per day with 5 to 6 percent fat maintained mostly on Sorghum stovers and Sugarcane tops. The average milk production of Krishnavalley cows is 2.3 kgs with a fat percentage of 5.2 (Ramesha *et al.*, 2000).

Deoni

Deoni breed a medium sized, dual purpose indigenous cattle of Maharashtra, Karnataka and Andhra Pradesh. Deoni breed has a history of over 300 years. This breed was evolved through crossing of Gir cattle with the local Dangi and Dongari breeds of Marathwada and local desi cattle of Bidar and Osmanabad districts. This breed was earlier referred to also as Dongari or Surti breed of cattle. The home tract is mainly hilly with an average altitude of 480 to 705 meters above mean sea level. The minimum ambient temperature in the home tract ranges from 9 °C to 26 °C and the maximum ambient temperature from 29 °C to 44 °C. The average annual rainfall in these areas varies from 736 to 919 mm. Based on the morphological characters; the animals are classified into 3 type's *viz.*, Balankya (pure white), Waghya (white and black spots on the body) and Wannera (animals with complete white body and black face). This breed is hardy and well adapted for tropical draught prone areas.

The breeding tract of Deoni includes mainly Bidar district in northern part of Karnataka and Latur district in south- eastern part of Maharashtra. Deoni cattle are also found in small numbers in the neighboring districts of Gulbarga in Karnataka and Parbhani, Nanded, Osmanabad districts of Maharashtra and Medak district of Telangana. Productive and reproductive performances of Deoni cattle at NDRI-SRS, Bengaluru herd showed that mean lactation yield, mean lactation length, average daily milk yield, highest yield recorded/cow/day, calf mortality, birth weight of calves, age at first calving and calving interval was 911.14kg, 206.03days, 4.42kg, 14.0kg, 2.17 per cent, 20.81kg, 38.73 months and 447.22days respectively (Das *et al.*, 2012). Pure Deoni breed of cattle are maintained at Southern campus, NDRI, Bengaluru and Deoni breeding farm, Dharwad, Karanja, Bidar District, under KVAFSU, Bidar, Udgir Veterinary College, Maharashtra and College of veterinary Science, Hyderabad. Under field conditions calves are generally allowed to suckle liberally and male calves in particular are given preferential treatment in terms of concentrates and better feeding practices. Oil cakes specially linseed, safflower, groundnut and cotton seed cake along with broken pulses and damaged grains are fed as concentrate feed (Dani mixture) in rural areas. Animals are taken for grazing during day time along the road sides, gomalas and other vacant lands. At night they are given sorghum/ stover, gram husk, straws and other other agricultural bi-products *ad libidum*.

Deoni bullocks are powerful and well suited for agriculture operations like ploughing, harrowing and other heavy works and road transportation (Patil, V. 2015). Deoni bullocks are able to pull maximum load of 2.8 –3.0 tons when light steel bullock cart with pneumatic wheels are used for carrying the load and for about 10-15 km distance without rest. The bullocks have endurance to plough in black cotton soil for about 7-8 hours a day and half an acre of land can easily be ploughed per day.

Khillari

Khillari/Khillar breed owes its origin to Hallikar breed. Khillar means a herd of cattle and Khillari means belonging to Khillar. Herdsman is known as Khillari and in some areas Thillari. There is a tribe of cattle breeders in the Satpura range of hills known as Thillaris who maintain Khillari cattle. There are four types of Khillari cattle (Joshi and Phillips, 1953) found in Maharashtra and Karnataka. The type having similarity with Hallikar and Amrithmahal cattle and found in Bijapur, Bagalkote, Belgaum, Haveri and surrounding areas of Karnataka are known as Hanam Khillar or Atpadi Mahal. The Khillari cattle found in Sholapur, Satara and the surrounding areas is known as Mhaswad variety. The variety found in Satpura range of hills is called as Tapi Khillari or Thillari. The tribals who are professional cattle breeders of this area are known as Thillaris. Another variety is Nakali Khillari which is found in adjacent areas of original home tract and is of more recent origin. There could be some intermixing of blood with the local cattle of the area.

Normally, Thillaris produce bulls and bullocks. There is a great demand for males for work purpose. They fetch very good price. The bullocks are mostly used for agricultural operations and transport of goods. They have hard hoof and are extremely good for draught purpose. Except Thillaris in Satpura range of hills, other areas the herd size of Khillari cattle is usually small. Khillari cattle have a compact body. They are tight skinned. The hair is short and glassy. Their appearance is like a compact cylinder with stout, strongly set limbs. The trunk is of barrel shape. They have a quick and spirited gait. Atpadi and Mhaswad variety of Khillaris are greyish white in colour. The males have deeper colour over forequarters and hind quarters, with peculiar grey and white mottled markings on the face. The Tapi Khillari is white with carrot nose and hooves. The Nakali Khillari is grey with brick dust colour over the forequarters. Newly born calves have rust red colored polls which disappear within few months of birth.

Khillari have a distinct groove running in the center of the forehead from the nasal bridge to the center of the poll. The muzzle is mottled and the eyes are elongated but small though prominent. They have small pointed ears which are always held sideways. Horns are long, pointed and follow the backward curve of the forehead. At the beginning horns are close, grow backwards for half of their length and then turn upwards in a smooth bow shape. The hump in males is of moderate size and firm fleshed. The legs are very strong. The average body height at withers is estimated at 125.8 in bulls and 111.8 in cows respectively (Ramesha, 2001a).

Khillari bullocks are well known for their draft ability. They move fast and they are also powerful. Cows are poor milkers. The birth weight of the calf is about 13 to 14 kgs. The weight of cows is 300-400 kgs and adult males weigh 450-650 kgs (Payne and Hodges, 1997). Typical Khillar is a compact cylindrical, long body and tight skinned animal with strong set legs and clean cut body features. Mature male measures 135-140 cm behind hump and cows measuring 125-130 cm behind hump. Khillari bullocks are in very good demand. They are sold in shandies at premium price. They are available in good numbers in Bijapur, Bagalkote, Belgaum, Haveri, Gadag and Dharwad districts of Karnataka and Satara, Sholapur, Sangli and adjoining districts in Maharashtra. Though they are available in large numbers, they are losing purity due to indiscriminate crossbreeding and neglect of females at young age. Only bullocks are given concentrates. Normally natural service is practiced. Calves are not weaned and are allowed to suckle their dams.

Malnad Gidda

The Malnad Gidda breed is an unique dwarf cattle of Karnataka state. Their number as per livestock Census 2007 was 12, 81,493. Based on the detailed information along with breed descriptor submitted by the scientists of Southern Regional Station of NDRI, Bangalore, Malnad Gidda cattle was registered as a breed in July 2012 with Accession Number INDIA_CATTLE-0800MALNADGIDDA-03037. Under the Karnataka Live stock Development Agency funded project, survey was conducted in the breeding tract of Malnad Gidda cattle. Genetically and phenotypically Malnad Gidda breed is distinctly different from other breeds of the region (Ramesha *et al.*, 2002).

Characteristics and performance

The coat colour in majority of Malnad Gidda cattle is black with light shades of fawn on thigh and shoulder region. Brown, red and black skin coat coloured animals are usually observed. Generally skin, hooves, eyelids, tails switch and horn are black in colour, the orientation of ears in horizontal. They have small but well defined humps in males. Malnad Gidda cows have bowl shaped small sized udder with funnel shaped teats with pointed tips. Kabetti, a pale yellowish brown mutant form has been considered as a special sacred type. Local Malnad Gidda cows with specific character of giving birth to one calf every year and milking up to nine months is called as Varshagandhi. Local Malnad Gidda cattle with specific character of skin coat colour with black and white patches are known as Handa. Malnad Gidda cattle with pale brown animal with white small patch on forehead, tail end and center of four leg palms are known as Kapile/Kapila and there is lot of demand for them. However they are rare. Malnad Gidda cows which are yellowish are known as Kavle, they are very mild, friendly animal, has more religious significance. Kavle cows are good milk yielders (2-5 liters per day). Local Malnad Gidda cattle with skin coat colour of brown and white patches are generally called as Mangalathi. Brown Malnad Gidda cattle are generally known as Kabbethi. Mangalathi and Kabbethi cattle are associated with religious sentiments and beliefs. Cows with loose shaky small horns are known as Haludana. They are generally good milk yielders.

Malnad Gidda cattle mostly thrive on grazing and play a unique role in the farming systems of the heavy rain fall Malnad and coastal regions of Karnataka (Ramesha, 2001b). Green leaves are spread on the floor everyday as bedding material over the dung and urine. It is cleared once in one to two months which results in good quality compost manure. Malnad Gidda cows calve for the first time at the age of around 3 years and give milk for about 8-9 months. The birth weight of calves was 7.91 ± 0.58 kgs. The average lactation milk yield, daily milk yield, peak yield and inter-calving period among the elite cows under field condition was 522.33 ± 69.40 liters, 2.17 ± 0.29 liters, 3.42 ± 0.39 liters and 14.91 ± 0.93 months respectively. The percentage Fat, Protein, Lactose and SNF among Malnad Gidda cow's milk was 5.66, 3.36, 4.77 and 9.18, respectively (Ramesha *et al.*, 2013). Malnad Gidda milk has significantly higher beneficial antimicrobial substance lactoferrin (225.20 ± 31.40 mg/L) as compared to Deoni (99.95 ± 7.48 mg/L), Cross-bred cattle (ranged 42.59 to 91.89 mg/L) and Murrah buffaloes (ranged 11.75 to 47.13 $\mu\text{g/ml}$) (Ramesha *et al.*, 2014). Their milk has the lowest somatic cell score as compared to milk from other breeds reared in the same region. They have the reproductive uniqueness of regular calving (inter calving period of 396+ 33 days) under low input regime. There is a huge demand for Malnad Gidda cow milk and other products particularly ghee due to preference for usage in ayurvedic medicine preparation. Malnad Gidda cow urine distillate is also used extensively in their home tract for treating various ailments in ayurvedic system of medicine. They believe that their produce is superior to other breeds as they are reared mostly on grazing.

Malnad Gidda cattle are highly adopted to harsh climatic conditions including heavy rainfall conditions (Ramesha, 2001b, Ramesha *et al.*, 2007). They are well adapted to hot humid and hilly region and are generally let for grazing on their own forests and open areas. They are very active, lively with an extraordinary power of endurance and resistance to diseases (Ramesha *et al.*, 2012). They have excellent heat tolerance and drought tolerance ability. They have been proven better resistance against Foot and Mouth disease in comparison to any other breed of the region (Das *et al.*, 2009). They mostly thrive on grazing and play a unique role in the farming systems of the heavy rain fall Malnad and coastal regions of Karnataka. At present, generally no selection is practiced for their improvement.

Besides the above recognized breeds of Karnataka, farmers in the state are in the forefront in crossbreeding. Large numbers of Holstein Friesian (HF) and Jersey crossbreds are found throughout the state. HF crossbreds are extensively used for milk production in Kolar, Bengaluru Rural (Ramnagara), Mysore, Tumkur and surrounding districts. Many progressive farmers have brought cattle belonging to Sahiwal, Tharparkar, Gir and Kankrej breeds and rearing them for milk production.

Buffalo breeds of Karnataka

In Karnataka, there are around 42.39 lakh buffaloes as per the 2012 census. The state possesses few distinct buffalo types, such as Dharwadi, Gowli and South Kanara

buffaloes besides Pandharapuri breed. Gowli buffaloes are very popular in Dharwad, Belgaum and North Kanara districts of the state, both for milk production and agricultural operations. South Kanara buffaloes have been used in the local buffalo races called “Kambala”. The South Kanara buffalo is distributed in Dakshina Kannada and Udupi districts, whereas, Gowli buffaloes are distributed in Dharwad, Uttar Kannada and Belgaum districts of Karnataka and are mostly maintained by Gowli tribes. In addition to native breeds of Karnataka Murrah and Surti buffaloes brought from other states are also extensively used in Karnataka for milk production. Murrah breed is also used for crossbreeding to improve milk production of native buffaloes in Karnataka.

South Kanara (Kanara, Malabar Type)

The name of the breed is derived from the district South Kanara, the home tract of the breed. South Kanara buffaloes are medium sized and well built and are found in coastal Karnataka especially in Dakshina Kannada and Udupi districts of Karnataka. The breeding tract of South Kanara buffaloes comprises of the western coastal part of Karnataka, extending from south of Mangalore to North of Kundapura. The estimated population of South Kanara buffaloes is around 1.3lakhs (Anon, 2000). The cultivation practices in this area carried out necessitate the use of these animals, as the indigenous cattle are small and insignificant. Littlewood (1936) described South Kanara buffaloes as a fine hardy breed of buffalo owned by a sect of Hindus known as the Jain Bhants. Mason (1996) described the South Kanara buffalo breed as draft type with synonyms of Kanara, Kanarese and Malabar, and these animals are often used for racing during post-harvest season. The South Kanara buffaloes tend to meet the requirements of local farmers by virtue of having inherent specific qualities of adaptability to local conditions, farming situations, resistance to diseases, and perform under available poor quality feed and fodder resources and are well adapted to the coastal regions of Karnataka.

South Kanara buffaloes are very muscular with well-formed shoulders and hindquarters. Hooves are hard and set close together. The bulls are jet black in colour, while the bullocks and females are dark in colour. The horns are curved and flat projecting backward, sideward and downward at neck region. Females are poor milk yielders, but are powerful work animals. They are used for puddling the slushy paddy fields and for transportation in rural areas. An uncastrated male buffalo are used in buffalo racing in harvested paddy fields and is commonly known as “Kambala” in local language. Buffalo racing, is one of the great amusement and also tradition of these people. Farmers take extreme care to maintain bulls, which are used for the purpose of “Kambala”. Farmers in this region take it as a pride to maintain a prize-winning buffalo bulls. Farmers give extreme care to maintain buffalo bulls, which are used for “Kambala”. South Kanara buffaloes are used for agricultural operations, transport apart from buffalo racing immediately after harvest of crops. Females are poor milk yielders but males are powerful work animals which are used for puddling the slushy paddy fields and other agricultural operations.

These buffaloes are sustained mainly on grazing and agricultural by products. Majority of the farmers send South Kanara buffaloes other than breeding bulls for grazing

throughout the year with average hours of grazing being 6 per day. These animals graze on harvested fields/forest lands/barren lands/road side areas/tank beds etc. The bulls, which are used for “Kambala” purpose, are usually fed around 3kg of concentrate per day per bull along with two to three eggs. Farmers feed the bullocks with 1kg to 2kgs of concentrates and agricultural by-products. Shashidhara (2002) conducted detailed survey and reported the body measurements and status of South Kanara buffaloes in their native tracts. The calves are allowed to remain with their mothers and not weaned, which indicates a strong maternal instinct amongst these animals. The buffalo cows are poor milkers. The milk yield recorded ranges from one liter to five liters. She-buffaloes are bred when they are about 3 ½ years to 4 years of age. Bulls are put to service at about four years of age. These buffaloes are bred by natural service. Buffaloes are housed in well-ventilated typical 'Kachcha' house. The average body length, height at withers, heart girth, are 124.4±1.85, 128±1.37 and 212±2.69cms in she-buffaloes and 129.6±1.28, 135.2±1.15 and 229.6±4.43cms in breeding bulls, respectively (Shashidhara, 2002).

Chromosomal studies revealed that these animals are very closely related to the riverine type of buffaloes, though these buffaloes have acquired many traits (body stature, poor milk yield etc.) like those of swamp buffaloes (Joshi and Govindaiah, 1997)

Dharwari

Dharwadi/Dharwari buffaloes are medium in size with compact body frame weighing around 300-400Kg. Dharwadi buffaloes are active and thrive well on grazing with an extraordinary power of endurance and resistance to diseases. No special managerial care is given to these animals. During nights animals are housed in traditional sheds. These animals are sent for grazing from morning till evening. According to farmers these buffaloes are excellent in using their body reserves during extreme scarcity of feed and fodder and tend to gain body weight rapidly once the monsoon is onset and greens are available in plenty. They are also fed with small quantities of paddy, jawar and wheat straw and by products of green-gram, Bengal gram etc. Women in the household feed them with kitchen waste while milking the animals. Generally they are milked by women. Generally they are bred by natural service when they go for grazing. Mothering instinct is very high among Dharwadi buffaloes and generally they do-not let down milk in the absence of their calf. These animals are used for cultivation, milk, and manure. Generally comparatively well built and good males are castrated and used for cultivation especially in Central Karnataka. They are well adapted to the local agro ecological systems of Central and Northern Karnataka. They play a major role in the rural economy of this region by providing milk, Khoa for traditional milk products such as Dharwad Peda, Belgaum Kunda and manure as well as draft power with negligible inputs. These buffaloes are main contributors towards the production of famous Dharwad peda. The farmers attribute the special taste of Dharwad peda to milk of these buffaloes.

Pandharpuri

The habitat of Pandharpuri buffaloes is South Maharashtra, parts of Andhra Pradesh and Karnataka. It is a hardy animal and well suited to the dry regions of Sholapur, Ahmednagar, Kolhapur, Bijapur and Bagalakot districts. These are medium-sized

animals with long narrow face and very long, flat and usually twisted thin horns. These animals are fairly good milkers and are kept by Gowlies in Dharwar and Belgaum districts. A good buffalo yields about 8 to 12 kg of milk per day. This breed is used for upgrading of local buffaloes in North Karnataka.

The women folk of 'Gavali or Gowli' community are ardent lovers of animals and totally dedicated to rising of buffaloes for milk production. The women generally carry head loads of milk and milk products like curds, ghee and khoa for selling at the door steps of the customers for their living. The buffaloes reared by Gowli people are not much different from Phandharpuri buffaloes. A distinctive feature is the practice of varietal cutting of the ears of the buffaloes by these tribals, for identification as well as for beautification.

Sheep and Goat breeds of Karnataka

Small ruminants with 1,10,50,728 sheep and 61,69,392 goats play an important role in the rural economy of Karnataka. They are principally maintained by poorer section of the rural community providing them a source of livelihood. Sheep with its multi-facet utility for wool, meat, milk, skin and manure, form an important component of rural economy of Karnataka. Sheep-rearing is primarily in the hands of poor, landless or small and marginal farmers who own either an uneconomical holding or no land at all, and thus graze their sheep on natural vegetation and crop stubbles supplemented by tree topplings. Large areas formerly available for livestock grazing, because they were not considered suitable for crop production, have now been put under cereals. The density of livestock per unit of grazing area has greatly increased, owing to increases in their numbers and the shrinkage of grazing land. Because of the non-availability of the necessary grazing lands, sheep-owners practice migrant grazing over extensive areas, sometimes including goats within their sheep flocks. The productivity of sheep and goats is low, yet considering the nutritional and physical environmental conditions under which they are reared, it cannot be considered inefficient. Karnataka is the home tract for important mutton type breeds viz. Hassan, Deccani, Bellary, Bannur and Kenguri breed of sheep. As per 2012-13 estimates the average meat yield per animal is only 16.71 kgs and 15.92kgs for sheep and goats respectively which needs to be improved. The estimated wool production per animal is only 747 grms per sheep per year and is of coarse type. In Karnataka most of the goats are of Non-descript type and mostly reared for meat purpose. The only recognized goat breed of Karnataka is Osmanabadi goats. In Karnataka farmers are rearing many breeds of sheep brought from other states including Sirohi, Jamunapari, Thalachery, Boer, Ganjam, Gohilwadii, Sangamneri, and Mehsana breeds of sheep in addition to exotic breeds viz. Saanen, Toggenburg, Angora, Anglo-nubian, British Alpin, French Alpin. Sirohi is used as a dual purpose breed while Boer breed is used for meat production and Thalachery is known for multiple births.

Sheep breeds

Karnataka has rich genetic resources of sheep with lot of genetic variability among them. State has recognized breeds of sheep for mutton production like Mandya, Deccani,

Bellary and Kenguri. Mandya breed of sheep is the best mutton breed in India while Kenguri is one among the taller breeds of sheep in India. Along with these recognized breeds of Sheep, Karnataka also has populations yet to be recognised as breeds like Yalaga (Dayanand, 2013) and Mouli (Sindagi, 2014) sheep.

Bellari

Bellari breed sheep are of medium size and of mutton type and found in Bellary district and surrounding areas. The colour varies from white to white and black. Females are polled and males are horned. Fleece is extremely coarse and hairy. Legs and belly are usually devoid of wool.

Hassan

Hassan breed of sheep is reared in Hassan districts and surrounding areas for mutton purpose. They are small sized, and their body colour is white with light brown or black spots. Ears are medium-long and drooping. Females are polled and so also about 70% of the males. Fleece is white and extremely coarse. Legs and belly are devoid of wool.

Mandya/Bannur

This breed originated from Bandur village near Malwali in Mandya district, and mainly concentrated in Mandya and Bangalore districts of Karnataka. They are medium sized with short legs and straight top line and under line. Both the sexes are polled. Body color is white with brownish tinge around the neck and head in some animals. Body is muscular with wide and even rump. Fleece is extremely coarse and hairy and yield upto 400 gms/year. Bannur is adjudged superior to other Indian breeds in carcass traits. The meat is of excellent quality with pleasant flavour, juiciness and tenderness. Males weigh from 30-40 kg and females 20-30 kg. Dressing percentage is 38 to 45. The breed can be maintained under stall-feeding conditions also.

Deccani

Mutton type breed of sheep found in Bijapur, Belgaum, Bagalkot districts of Karnataka and Pune, Satara, Sangli region of Maharashtra.

Kenguri

The home-tract of Kenguri sheep is Raichur, Koppal and parts of Gulbarga districts in Northern Karnataka. It is also known as Tenguri sheep. The sheep of this breed have endurance to high atmospheric temperature, fatigue and are resistant to many diseases. They thrive well under scarcity condition and sparse vegetation. The breed has high potential for meat production (Jain *et al.*, 2006). The average birth weight of male and female lambs was 2.99 ± 0.08 kg and 2.79 ± 0.08 kg, respectively. The slaughter weight (kg) and carcass weight (kg) at the age of 12 months were 20.78 ± 0.84 and 9.30 ± 0.39 , respectively (Appannavar *et al.*, 2010).

Yalaga

Yalaga sheep not yet recognized as breed of sheep which has high potentiality for meat production. The breeding tract of Yalaga sheep is Badami, Bilagi, Bagalkote, Hungund

and Mudhol talukas of Bagalkote district in Karnataka state. The overall mean body weight in adult males and females were 54.78 ± 0.96 kg and 34.76 ± 0.24 kg respectively and Yalaga sheep was taller, longer and had better growth and reproductive performance compared to other recognized breeds of Karnataka and has distinct breed characters (Dayanand, 2013).

Mouli

Mouli sheep which is also not yet recognized as breed of sheep has high potentiality for meat production like Yalaga sheep. The breeding tract of Mouli sheep breed is Bijapur, Bagewadi, Muddebihal, Indi and Sindagi talukas of Bijapur district and Jewargi taluka of Gulbarga district in Karnataka. The overall mean adult body weight in male and female Mouli sheep were 54.54 ± 0.54 kg and 42.35 ± 0.30 kg, respectively (Sindagi, 2014). Birth weight of male and female Mouli lambs were 3.76 ± 0.006 and 3.55 ± 0.005 kg, respectively. Mouli sheep is taller, longer and had better growth and reproductive performance compared to other recognized breeds of Karnataka (Sindagi, 2014).

Goat breeds of Karnataka

Most of the goats in Karnataka are of non-descript type and mostly reared for meat purpose. The only recognized goat breed of Karnataka is Osmanabadi goats.

Osmanabadi

Osmanabadi goats found in Bidar and surrounding areas have all the characteristics required for efficient meat production *viz.* high prolificacy, more than one breeding season in a year, higher milk production and capacity to bear twins and triplets. Goat meat is preferred and fetches higher prices in national and international markets. In spite of the prejudice against goat rearing due to environmental issues, the population of this species has grown at a faster rate than any other species of livestock. In case of goats no exotic germplasm is available for increasing the yield of meat since superior goat breeds found in foreign countries are essentially dairy breeds.

Pig breed of Karnataka

Karnataka possesses a desi pig breed called “Ankamali” which is a medium sized and thin bodied, Sows which are good mothers and prejudice against pork large section of people relish and accept this meat in Karnataka.

Poultry breed of Karnataka

In Karnataka state the poultry population has increased tremendously and consistently across different livestock censuses. Karnataka produced 622.37 Million (DAVHS, GoK, 2016). Karnataka does not have its own native breed of fowl. However farmers are rearing broilers and layers with exotic inheritance in large numbers. Poultry genetic resource of Karnataka consists of a lion's share of the poultry in Karnataka is in rural areas. Poultry Breeders of UAS, Bangalore realized this as early as 1970 and a variety – Giriraja was released for the use of villagers, after an extensive field study, during 1980.

Giriraja is a dual purpose bird which produces about 110-150 eggs in its productive life span, but the birds are heavy and they require more feed. It is a synthetic strain bred to resemble local/desi fowls, evolved by blending heterogeneous exotic components strains. Giriraja yields high quality & quantity of meat & eggs. It is sturdy, has excellent adaptability to environmental condition. Giriraja do not demand sophisticated management condition/farming systems. It has attractive appearance; it produces three times in growth and egg production over & above the local / desi birds. It has attractive colorful plumage with an admixture of single and pea shaped comb as is commonly seen in native / desi fowl. Breeds do well in captivity unlike native birds and perform well even under semi-range and range system. All the above features make Giriraja, an ideal one for rearing among the tribals/nomads & landless laborers. UAS Bangalore has also released one variety - Girirani useful layer type for backyard poultry.

Note: This chapter includes part of presentation and publications of the first author in different conferences/seminars and also reports submitted to Karnataka Biodiversity Authority. with update informaton.

LIVESTOCK BREEDS OF KARNATAKA

Cattle



Hallikar Bulls



Hallikar cow with calf



Amrithmahal bullock



Amrithmahal cattle herd



Krishnavalley bull



Krishnavalley cow



Deoni bull



Deoni Cow



Khillari bull



Khillari cow



Malnad gidda elite bull



Kapila type Malnad gidda cows



Comparison of Malnad gidda and Holstein bull



A pair of south kanara buffalo bulls ready for "Kambala"



Malnad gidda cow with calf



Nagi-Malnad Gidda cow gave 24 calves in 27 years

buffalo



Dhawardi she buffalo



Phandarapuri buffalo

Sheep



Bellari



Hassan



Mandya



Deccani



Kenguri



Yelaga

Goat



Mouli



Osmanabadi

INDIGENOUS TECHNICAL KNOWLEDGE AND PRACTICES IN DIFFERENT AGROCLIMATIC ZONES OF KARNATAKA

Traditional livestock practices are location specific and purely depend upon the cropping pattern and type of cattle maintained; so the present study was conducted in 10 agro-climatic zones of Karnataka where each zone is delineated based on the diverse characteristics of climate, physiographic and cropping pattern. Village people were considered as the storehouses of indigenous knowledge since they practice traditional techniques in their day today life. The data was collected from selected villages of each agro-climatic zone and 30 respondents from each village along with village veterinarians and traditional livestock practitioners.

Documentation of indigenous technologies was done through semi structured interviews and group discussions along with several criteria like purpose, scope, descriptions, conditions, cost and technical effectiveness of ITK practices were discussed. People of different religion and culture were chosen to gain maximum and diverse traditional knowledge of livestock practices. ITKs pertaining to animal breeding, feeding and healthcare practices were documented.

Karnataka is divided into 10 agroclimatic zones taking into consideration the rainfall pattern-quantum and distribution, soil types, texture, depth and physio-chemical properties, elevation, topography major crops and type of vegetation.

Survey area and Agro-climatic zones

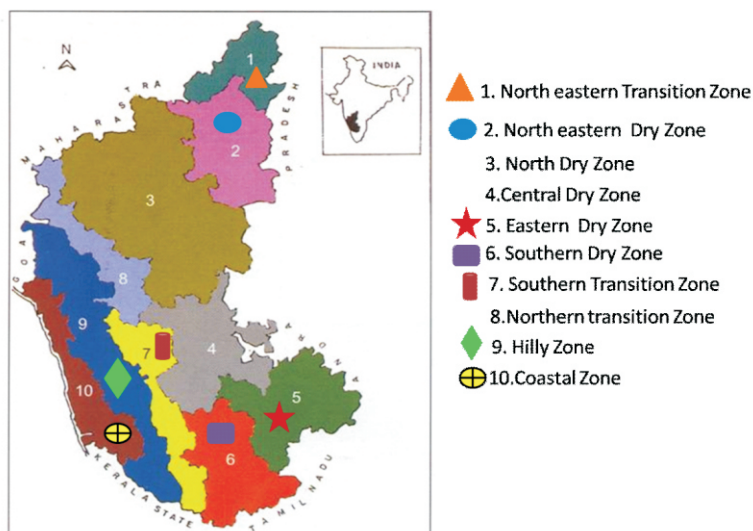


Table 1. Agro-climatic zones of Karnataka and their characteristics(Source: http://wgbis.ces.iisc.ernet.in/energy/paper/TR109/tr109_std2.htm and Agriculture department, accessed on 27 November, 2017)

Agro-climatic zones	Area (in Mha)	Districts (No. of Taluks)	Taluks	Characteristics and major crops grown			
				Rainfall (range)	Elevation	Soil type	Major crops
North Eastern Transition Zone	0.871	Bidar (5) & Gulbarga (2)	Aland, Bhalaki, Basavakalyan Bidar, Chincholi, Humnabad Aurad	830-890 mm. About 63% of the rainfall is received during the Kharif season	800-900 m	Shallow to medium black, clay and lateritic	Pulses, Jowar, Oilseeds, Bajra, Cotton and Sugarcane
North Eastern dry Zone	1.762	Gulbarga (5) Yadgir (3) & Raichur (3)	Afzalpur, Chitapur, Gulbarga, Jewargi, Sedam, Shorapur, Shahapur, Yadgir, Raichur, Devdurga, Manvi	633.2 to 806.6 mm About 55 % of the rainfall is received during Rabi season (October to March)	300-450 m	Deep to very deep black clay and shallow to medium black	Rabi jowar, Bajra, Pulses, Oilseeds and Cotton
Northern dry zone	4.78	Koppal (4), Gadag (4), Dharwad (1), Belgaum (5), Bijapur (5), Bagalkot (6), Bellary (7), Davangere (1), Raichur (2)	Gangavathi, Koppal, Kusthagi, Lingasur, Sindhanur, Yelbarga, Badami, Bagalkote, Bagewadi, Bilgi, Bijapur, Hunagund, Indi, Jhamakhandi, Mudhol, Muddebihal, Sindagi, Bellary, Hagaribommanahalli, Harapannahalli, Hadagali, Hospet, Kudligi, Sandur, Siruguppa, Ron, Navalgund, Naragund, Gadag, Mundargi, Ramadurga, Gokak, Raibag, Soundatti, Athani	464.5-785.7 mm About 52 % of the annual rainfall is received during Rabi season	450-900 m	Shallow to deep black clay	Jowar, Maize, Bajra, Groundnut, Cotton, Wheat, Sugarcane and Tobacco

Agroclimatic zones	Area (in Mha)	Districts (No. of Taluaks)	Taluks	Characteristics and major crops grown			
				Rainfall (range)	Elevation	Soil type	Major crops
Central dry zone	1.943 Mha	Chitradurga(6), Davangere (3), Tumkur (6),Chikmagalur (1), Hassan (1)	Challakere, Chitradurga, Davangere, Harihara, Hiriyur, Hosadurga, Holalkere, Jagalur, Molakalmur, Arasikere, Kadur, Madhugiri, Pavagada, Korategere, C.N.Hally, Sira, Tiptur	453.5-717.7 mm of which more than 55 % is received in Kharif season	450-900 m	Red sandy loams, shallow to deep black	Ragi, Jowar, Pulses and Oil seeds
Eastern dry zone	1.808 Mha	Bangalore Rural (4), Ramanagar (4) Bangalore Urban (3),Kolar (5),Chikkaballpur (6) Tumkur (2)	Gubbi, Tumkur, Anekal, Bangalore-N Bangalore-S, Channapatna,Devanahally, oddaballapur, Hoskote, Kanakapura, Magadi, Nelamangala, Rannagar, Bagepalli, Bangarpet, Chikkaballapur, Chintamani, Gudibande, Gowribindanur, Kolar, Malur, Mulbagal, Shidlaghatta, Srinivaspur	679.1-888.9 mm. More than 50 % of it is received during the Kharif season	800-900 m	Red loamy, lateritic	Ragi, Rice, Pulses, Maize and Oil seeds
Southern dry zone	1.739 Mha	Mysore (4), Chamarajnagar(4) Mandya (7), Tumkur (2), Hassan (2)	K. R. Nagar, T.Narasipur, Mysore, Kollegal, Nanjangud, Turuvekere, Kunigal, Nagamangala, Srirangapatna, Malavalli, Maddur, Mandya, Pandavapura, K. R.pet, Channarayapatna, Hassan, Chamrajnagar, Yelandur, Gundlupet	670.6 - 888.6 mm of which more than 50 % rain is received in Kharif season	450 -900 m	Red sandy loam and red loamy	Rice, Ragi, Pulses, Jowar and Tobacco.

Southern Transition Zone	1.218 Mha	Hassan (4), Chikmagalur (1), Shimoga (3), Mysore (3), Davanagere (2)	H.D.Kote, Hunsur, Pinyapatna, H.N.Pura, Alur, Arakalgud, Tarikere, Bhadravathi, Shimoga, Honnali, Shikaripura, Channagiri	611.7-1053.9 mm. More than 60 % of the rain is received in Kharif season.		Red sandy loam in major areas and red loamy	Rice, Ragi, Pulses, Jowar and Tobacco
Northern transition zone	1.194 Mha	Belgaum (4), Dharwad (3), Haveri (6), Gadag (1).	Hukkeri, Chikkodi, Bylhongal, Belgaum, Haveri, Shiggoan, Shirahatti, Kundgol, Savanur, Hubli, Dharwad, Byadgi, Hirekerur, Ranibennur	619.4-1303.2 mm. About 61 % of rainfall is received in Kharif season.	450-900 m	Shallow to medium black clay and red sandy loam	Rice, Jowar, Groundnut, Pulses, Sugarcane and Tobacco
Hilly zone	2.56	Uttar Kannada (6), Belgaum (1), Dharwad (1), Haveri (1), Shimoga (4), Chikmagalur (5), Kodagu(3)	Sirsi, Siddapur, Yellapur, Supa, Haliyal, Mundgod, Khanapur, Soraba, Thirthahally, Koppa, Sringeri, Mudigere, Narasimharajapura, Chikmagalur, Kalaghatgi, Hanagal, Sakaleshpur,	904.4-3695.1 mm. About 75 % of it is received in Kharif	--	red sandy loam	Rice and pulses

Coastal Zone	1.167 Mha	Hassan (1) Udupi (3), Dakshina Kannada (5), Uttara kannada (5)	Virajpet, Somvarpet, Madikeri Karwar, Kumta, Homnavar, Bhatkal, Ankola, Bantwal, Udupi, Belthangadi, Karkala, Kundapur, Mangalore, Puttur, Sulya	season. 3010.9 - 4694.4 mm of which 80 % is received in monsoon season	300 -800	Red lateritic and coastal alluvial	Rice, Pulses and Sugarcane
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District wise livestock population in Karnataka

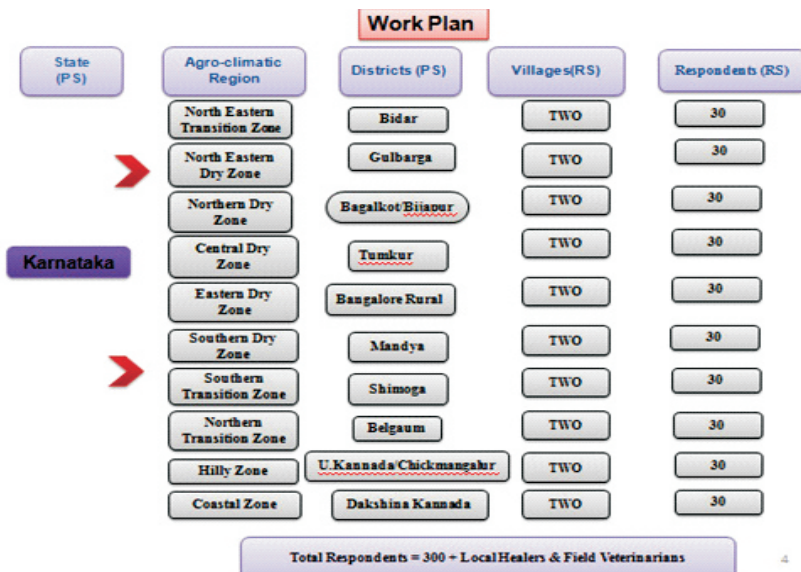
SNo.	District	Livestock	Poultry
1.	Bagalkot	15,28,438	18,39,865
2.	Bangalore Rural	4,42,929	72,15,382
3.	Belgaum	29,59,845	27,50,563
4.	Bellary	21,12,998	25,26,976
5.	Bangalore Urban	4,53,828	13,04,053
6.	Bidar	5,97,750	7,37,208
7.	Bijapur	13,62,944	2,77,603
8.	Chamarajanagar	5,48,831	7,31,421
9.	Chikkaballapura	10,60,940	24,34,306
10.	Chikmagalur	5,26,852	25,16,002
11.	Chitradurga	21,09,326	19,11,291
12.	Dakshina Kannada	4,65,252	27,13,874
13.	Davanagere	6,70,143	26,37,105
14.	Dharwad	4,13,389	15,43,281
15.	Gadag	8,18,140	1,96,355
16.	Gulbarga	10,88,674	3,83,521
17.	Hassan	10,21,617	23,68,853
18.	Haveri	8,31,574	4,05,558
19.	Kodagu	1,47,986	1,88,253
20.	Kolar	8,46,872	88,23,472
21.	Koppal	11,24,742	40,09,653
22.	Mandya	12,08,990	22,84,763
23.	Mysore	9,61,644	31,25,178
24.	Raichur	13,40,092	4,03,032
25.	Ramanagara	6,09,079	23,80,031
26.	Shimoga	8,36,753	20,73,828
27.	Tumkur	23,40,609	18,61,912
28.	Udupi	3,82,451	12,88,878
29.	Uttara Kannada	5,07,497	5,59,331
30.	Yadgir	10,21,872	3,27,721
	Total	3,03,42,057	6,18,19,269

Source : 19th Livestock Census



As per 20th Livestock Census the total number of livestock in Karnataka in 2019 (in Millions) was 30.34 million. In census 2019, the total livestock population has been distributed under various categories into Sheep contributes highest with 36.42% followed by Cattle 27.91%, Goat 20.33% and Pigs 1.06%. Belgaum district has the highest contribution in cattle population with 6.47%. The second and third highest contributors are Hassan and Shimoga with share of cattle population of 6.48% and 6.12% respectively. Belgaum district has the highest contribution in buffalo population of 28.28%. The second and third highest contributors are Bangalkot and Tumkur with share of buffalo population of 7.85% and 4.75%, respectively. Chitradurga district has

the highest contribution in sheep population with 12.23%. The second and third highest contributors are Tumkur and Bellary with share of sheep population of 11.67% and 11.51% respectively. Belgaum District has the highest contribution in goat population of 11.37%. The second and third highest contributors are Bijapur and Gulbarga with share of goat population of 9.22% and 7.23% respectively.



NORTH – EASTERN TRANSITION ZONE: BIDAR DISTRICT



Villages visited	Prathap Nagara, Kumelakunda
District livestock population (as per 12 th livestock census)	597750
Major Livestock species /breeds	Deoni, Cross bred Jersey, Holstein Friesian cows, Hallikar, Goats Buffalo Breeds
Number of Livestock keepers and Herbal healers interviewed	30 live stock keepers and 4 herbal healers
Number of medicinal plants and families	16 medicinal plants belongs to 14 families

Documentation of ITKs in health management in livestock

Bloat

1. Around 100 grams of Omkaalu (*Trachyspermum ammi*, Apiaceae) mixed with Jaggery and paste of this mixture is prepared by grinding with little amount of water and given to the animal for once or twice.
2. About 100 ml of vegetable oil is also given in case of severe bloat.
3. Bitter guard (*Momordica charantia*, Cucurbitaceae) leaves are powdered and given with water.

Constipation

About 2- 3 spoons of Kotthambari (*Coriandrum sativum*, Apiaceae), 2 cucumbers with a spoon of salt is given once.

Induction of heat (estrous cycle)

About 200 grams of Reetha (*Sapindus mukorossi*, Sapindaceae) fruit is mixed with a cup of buttermilk and given once daily for 3 days.

Bone fracture and muscular skeletal disorder

Banyan (*Ficus benghalensis*, Moraceae) tree milk is applied on the fractured bone and Bamboo stick is tied for the support. Ekka (*Calotropis gigantea*, Asclepiadaceae) plant milk is smeared all over the body

Poisonous bites

Reetha (*Sapindus mukorossi*, Sapindaceae) fruit is given along with water for snake bite.

Yoke gall

Lambani (*Lantana camara*, Verbenaceae) leaves are crushed and this paste is applied on the yoke gall.

Mastitis

A handful of Mehandi (*Lawsonia inermis*, Lythraceae) leaves, Kulukundi leaves (*Diospyros melanoxylon*, Ebenaceae) along with Alale kai (*Terminalia chebula*, Combretaceae) are crushed altogether and paste is applied on the udder and given orally daily once in a day for 3 days.

Maggot wounds

Four to five leaves of Brahmadaani (*Argemone mexicana*, Papaveraceae) and Banyan (*Ficus benghalensis*, Moraceae) leaves are boiled with Coconut (*Cocos nucifera*, Arecaceae) oil and applied on maggots.

Diarrhoea and Coccidiosis

A handful of Huli soppu (*Oxalis corniculata*, Oxalidaceae) leaves and 100 grams of Urad dal (*Vigna mungo*, Fabaceae) are grinded into a paste and mixed with a litre of curd. This formulation is given once in a day.

NORTH EASTERN DRY ZONE - GULBARGA/ KALABURGI



Villages visited	Kalkurthi
District livestock population	1088674
Major Livestock species /breeds	Khilari, Deoni, Jersey Crossbred and Goats
Number of Livestock keepers and Herbal healers interviewed	30 livestock keepers and 3 herbal healers
Number of medicinal plants and families	10 medicinal plants belongs to 7 families

Induction of heat

Salt water along with Raagi (*Eleusine coracana*, Poaceae) balls for half kilo grams given for 3 days.

Treatment for retention of placenta

1. Agase (*Sesbania grandiflora*, Fabaceae) leaves are fed immediately or within 2 hours of parturition.
2. Flax seeds are fed once or twice.
3. Mixture of Agase (*Sesbania grandiflora*, Fabaceae), Neem (*Azadirachta indica*, Meliaceae) leaves and Jola (*Sorghum bicolor*, Poaceae) 100 grams each are given once.

Treatment of Wounds

Bilwa patre (*Aegle marmelos*, Rutaceae) leaves are crushed and juice is extracted. This juice mixed with Arisina (*Curcuma longa*, Zingiberaceae) and applied on the wounds.

Treatment for post partum uterine prolapse

Equal quantities of Shatavari roots (*Asparagus racemosus*, Liliaceae), Ashwagandha (*Withania somnifera*, Solanaceae) and Ashoka (*Saraca asoca*, Fabaceae) bark are boiled and thick decoction is given once in a day for 3 days.

NORTHERN DRY ZONE: BIJAPUR



Village visited	Ronihal
District livestock population in lakhs	1362944
Major Livestock species /breeds	Cattle, sheep and goat
Number of Livestock keepers and Herbal healers interviewed	30 livestock keepers and 3 herbal healers
Number of medicinal plants and families	4 medicinal plants belongs to 4 families

Documentation of ITKs in health management in livestock

Treatment Bone fracture

Lolesara (*Aloe vera*, Liliaceae) pulp is mixed with red soil. This preparation is applied on the fractured bone daily for 15 days.

Yoke gall

Paste prepared from Chavali kai (*Cyamopsis tetragonoloba*, Fabaceae) plant leaves are applied on the shoulder daily for a week.

Treatment for retention of placenta

Vatavata (*Triumfetta rhomboidea*, Tiliaceae) plant roots for about 250 grams are given as such or crushed and given along with water once.

Mastitis

Chicken egg is mixed with Turmeric (*Curcuma longa*, Zingiberaceae) powder and applied on the udder twice a day for 3 days.

CENTRAL AND SOUTHERN DRY ZONE: TUMAKURU



Villages visited	Urdigere, Ikkal, Ramagondanahalli, Kempohalli, Adjikondanahalli
District livestock population	2340609
Major Livestock species /breeds	Cattle, Sheep and Goat
Number of Livestock keepers and Herbal healers interviewed	30 livestock keepers and 3 herbal healers
Number of medicinal plants and families	48 medicinal plants belongs to 24 families

Treatment for Cough and fever

1. A slice of Lemon (*Citrus aurantifolia*, Rutaceae) and Cooking soda is rubbed on the tongue.
2. Decoction is prepared along with Tea powder, Jaggery and Pepper (*Piper nigrum*, Piperaceae). This preparation is given once in a day for 2 days.

Documentation of ITKs in health management in livestock

Treatment of indigestion

1. Nelaneli (*Phyllanthus maderaspatensis*, Euphorbiaceae) plants are crushed and mixed with water and given twice a day.

Lack of Appetite

Bloat

1. Hire maddina gida (*Withania somnifera*, Solanaceae) leaves are crushed and boiled along with water and diluted by adding equal amount of water. This preparation is given once or twice.
2. Neladurbe (*Abutilon indicum*, Malvaceae) leaves are crushed and fed along with a cup of curd.

Diarrhoea and Coccidiosis

1. For Coccidiosis, aerial roots of Aalada mara (*Ficus benghalensis*, Moraceae) are soaked in water for an hour and given orally.
2. Bark of Jammu nerale plant (*Eugenia jambos*, Myrtaceae), Atthi (*Ficus racemosa*, Moraceae) and Bela (*Limonia acidissima*, Rutaceae) is crushed and mixed with water. Give this preparation orally once in a day.
3. Thangadi (*Cassia auriculata*, Caesalpiniaceae) bark, 4 spoons of fried Thogari bele (*Cajanus cajan*, Fabaceae), Putta bale (*Musa sapientum*, Musaceae) along with rock candy crushed together and given twice a day for 2 days.

Induction of heat

1. Huchchellu (*Guizotia abyssinica*, Asteraceae) is crushed and powdered, given with water or as such for 7 days.
2. Grind Sampige (*Magnolia champaca*, Magnoliaceae) bark along with butter milk and given once for 3 days.
3. Five to six leaves of Turashi (*Mucuna pruriens*, Fabaceae) are given once.

Treatment of repeat breeding problem

1. Bilwa (*Aegle marmelos*, Rutaceae) leaves along with bark crushed and boiled in water. This decoction is given once in a day for 3 days.
2. Prior to insemination apply the paste prepared from Thangadi (*Cassia auriculata*, Caesalpiniaceae) leaves with Raagi (*Eleusine coracana*, Poaceae) on the back.

Treatment for Retention of placenta

1. Feeding of Achche soppu (*Euphorbia hirta*, Euphorbiaceae) leaves.
2. Papaya (*Carica papaya*, Passifloraceae) leaves are given along with jaggery.
3. Kallana (*Argyreia cuneata*, Convolvulaceae) leaves are given after parturition.

To increase milk yield

Soaked mixture of equal quantities of Avare kaalu (*Lablab purpureus*, Fabaceae) and Rice along with Coconut is given for 4 days.

Treatment Bone fracture

1. Huchchellu (*Guizotia abyssinica*, Asteraceae) is fed daily for 20 days.
2. Sugar plant (*Stevia rebaudiana*, Asteraceae) and Huchchellu (*Guizotia abyssinica*, Asteraceae) paste is applied on the fractured bone and tied it using Bamboo stick. This has to be changed every 3 days for about 2 weeks.

Treatment of Wounds

1. Dried powder of Eji gida (*Premna serratifolia*, Verbenaceae) leaves are applied on the wound until the wound dries.
2. Baate gida or Kakke gida (*Cassia fistula*, Caesalpiniaceae) leaves are crushed and leaf juice is applied on the wound.

Treatment of poisonous bites

Aankale (*Alangium salvifolium*, Cornaceae) tree bark, Bevu (*Azadirachta indica*, Meliaceae) bark along with leaves of Aadu muttada gida (*Adhatoda vasica*, Acanthaceae), Eshwari (*Aristolochia indica*, Aristolochiaceae) and Amrutha balli (*Tinospora cordifolia*, Menispermaceae) in equal quantities are crushed and mixed with in a glass of butter milk. This preparation is given orally once or twice.

Yoke gall

Touch the back with Eppe mullu (*Madhuca longifolia*, Sapotaceae) once or twice in a day.

Mastitis

1. A handful of Baavina soppu (*Antidesma menasu*, Euphorbiaceae) crushed with pepper and Garlic and given orally followed by topical application of Narachalu soppu (*Cipadessa baccifera*, Meliaceae) paste prepared with water.
2. Oral administration of Katte kirubana soppu (*Trichodesma zeylanicum*, Boraginaceae) and Eremaddina soppu (*Withania somnifera*, Solanaceae) leaves paste once in a day for 3 days.

3. Baevina kai (*Azadiracta indica*, Meliaceae) paste is mixed with water and given orally and Baavina soppu (*Antidesma menasu*, Euphorbiaceae) leaves are crushed and applied on the udder.
4. Baavina soppu (*Antidesma menasu*, Euphorbiaceae) leaves, Eshwari (*Aristolochia indica*, Aristolochiaceae) leaves along with pepper and Garlic crushed together. This mixture is given orally as well as applied on the udder.
5. Topical as well as oral administration of paste prepared from handful leaves of Eshwari beru (*Aristolochia indica*, Aristolochiaceae) and Aadu muttada soppu (*Adhatoda vasica*, Acanthaceae) for 2-3 days.

Treatment of Dermatitis

1. Paste of Eshwari (*Aristolochia indica*, Aristolochiaceae) is applied.

Treatment of Tail rot

1. Dip tip of the tail in Honge (*Pongamia pinnata*, Fabaceae) oil for 3 days.
2. Tapsi (*Holoptelea integrifolia*, Ulmaceae) plant leaves are boiled along with Honge (*Pongamia pinnata*, Fabaceae) oil and tail is dipped this preparation.

Treatment of maggots

1. Ekka (*Calotropis procera*, Asclepiadaceae) latex milk is applied on the maggot wound.
2. Aalvan (*Erythrina indica*, Fabaceae) plant, Nicotine leaves and Chendu huva (*Tagetes erecta*, Asteraceae) plant leaves are crushed altogether. This formulation is applied on the maggot wounds for 2 days.

Treatment for Cough and fever

1. Dhaniya powder is boiled in a cup of water and given twice in a day. Garike (*Cynodon dactylon*, Poaceae) is given along with goat milk.
2. A handful leaves of Thogari (*Cajanus cajan*, Fabaceae) plant Bilwa (*Aegle marmelos*, Rutaceae), Sooji mallige (*Jasminum auriculatum*, Oleaceae) mixed with equal quantities of Saasive, Pepper and Garlic. A cup of milk is added to this mixture and given twice in a day.

Sprain

A handful leaves of Veelya (*Piper betle*, Piperaceae) and Amrutha balli (*Tinospora cordifolia*, Menispermaceae) are crushed and applied for 5 days.

Ear problems (Otorrhea)

1. Equal quantities of Honge (*Pongamia pinnata*, Fabaceae) tree bark and Kanagile (*Nerium oleander*, Apocynaceae) bark are boiled with a cup of oil and topical administration of the prepared oil twice a day for 3 days.
2. Sugar plant (*Stevia rebaudiana*, Asteraceae) roots are powdered and topical application on ears.

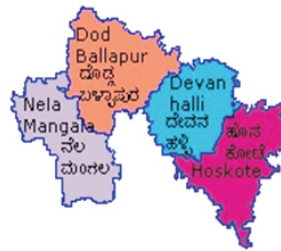
Nerve paralysis

1. Prepare a paste from a handful leaves of Chowdangi (*Solanum erianthum*, Solanaceae) with goat's milk. This preparation is given daily for a week.

Treatment of uterine prolapse

1. Jaggery paste is applied on the uterus and there after it is pushed inside. Cow is made to walk for about 1Km and tied on a slant area.

EASTERN DRY ZONE: BENGALURU RURAL



Villages visited	Narayanapura, Harohalli, T.Gollahalli, Bekuppe
District livestock population	442929
Major Livestock species/breeds	Crossbred cows, buffaloes, sheep, goats, pigs, horses.
Number of Livestock keepers and Herbal healers interviewed	27 livestock keepers and 4 herbal healers
Number of medicinal plants and families	7 medicinal plants belonging to 5 families

Documentation of ITKs in health management of livestock

Lack of Appetite

1. A handful of Mameri plant (*Centella asiatica*, Apiaceae) leaves are crushed with a spoon of Baje (*Acorus calamus*, Araceae) and Hing (*Ferula assa-foetida*, Apiaceae) and this preparation is given twice in a day.

Bloat

1. About 500 grams of Mameri plant (*Centella asiatica*, Apiaceae) leaves are fed as such 3 times a day about 500 grams each time.
2. Four spoons of Pepper (*Piper nigrum*, Piperaceae), 2-3 leaves of Veelyadele (*Piper betle*, Piperaceae) leaves and a table spoon of salt is mixed with butter milk and given once.

Diarrhoea and Coccidiosis

Echalu plant roots (*Phonix pusilla*, Arecaceae), Bagani plant (*Caryota urens*, Arecaceae) leaves and Majjigehullu (*Cymbopogon citrates*, Poaceae) grass roots are crushed and mixed in water. This preparation is given once or twice.

SOUTHERN DRY ZONE: MANDYA



Villages visited	Duddha, Uchchegowdana kopl
District livestock population	1208990
Major Livestock species/breeds	Hallikar, Amrithmahal Crossbreed cows, Buffalos, Sheeps and Goats
Number of Livestock keepers and Herbal healers interviewed	22 live stock keepers and 3 herbal healers
Number of medicinal plants and families	19 medicinal plants for 15 families

Documentation of ITKs in health management

Treatment of Broken horn

1. Kakkechakke (*Cassia fistula*, Fabaceae) plant bark is powdered and mixed with red soil. This formulation is applied on the horn.
2. Red soil is mixed with Uddinabele (*Phaseolus mungo*, Fabaceae) paste and applied on the horn and dressed it with clean cotton cloth.

Yokegall

1. Baavu chakke (*Cinnamomum tamala*, Lauraceae) bark is powdered and mixed with 2 spoons of lemon juice. Topical application of this formulation all over the shoulder twice in a day for 5 days.

Treatment of indigestion

1. Equal quantities of Onion (*Allium cepa*, Amaryllidaceae), Jaggery and Kotthambari (*Coriandrum sativum*, Apiaceae) seeds are given once for 2 Days
2. A handful leaves of Nugga (*Moringa oleifera*, Moringaceae), Veelya (*Piper betle*, Piperaceae) along with a spoon of Pepper (*Piper nigrum*, Piperaceae) and a pinch of Hing (*Ferula assa-foetida*, Apiaceae) for 1 or 2 days

Diarrhoea and Coccidiosis

1. Feed Manthya (*Trigonella foenum-graecum*, Fabaceae) seeds twice in a day for 2 days.
2. Three to four raw Sapota (*Manilkara zapota*, Sapotaceae) is grinded along with buttermilk and given orally twice in a day for 2-3 days.

Anoestrous

1. An entire leaf of Lolesara (*Aloe vera*, Aloaceae) is given daily once for a week to induce heat.

Treatment for Retention of placenta

1. About half kilograms each of Bidiru (*Bambusa arundinacea* Bambusaceae) and Maavina (*Mangifera indica*, Anacardiaceae) leaves are given once.
2. Fleshy leaf of Lolesara (*Aloe vera*, Aloaceae) is given and its juice/ gel applied on the vagina.
3. Oil massage for the animal.

Treatment of ecto-parasites

1. Kaadu tulasi (*Ocimum basilicum*, Lamiaceae) leaves are crushed to extract the juice and this juice is applied all over the body.
2. A paste of Hing (*Ferula assa-foetida*, Apiaceae) prepared in water is useful to get rid of ticks.
3. Topical application of thick paste of Turmeric (*Curcuma longa*, Zingiberaceae) all over the body.

Yoke gall

1. Grind a hand full leaves of Yaddumbe (*Anisomeles malabaricum*, Lamiaceae) into a fine paste, add 4-5 spoons of lemon juice and about 50 ml of dalda oil. Apply this formulation on the yoke gall for 3-4 days.
2. Mix turmeric in Lolesara (*Aloe vera*, Aloaceae) gel and apply it on the shoulder twice a day.
3. Grind Mustard seeds (*Brassica nigra*, Brassicaceae) paste prepared with hot water is applied once in a day for a week.

Treatment of Dermatitis

1. Both oral and topical administration of *Yaddumbe* (*Anisomeles malabaricum*, Lamiaceae) leaves juice for a week helps against skin disorders.
2. Topical application of Pomegranate (*Punica granatum*, Lythraceae) juice for skin infections.

Treatment of Fever

1. Tumbe (*Leucas aspera*, Lamiaceae) leaves juice is added drop wise into the eyes and ears of the cow twice or thrice and illness will be cured in a day.
2. One spoon full of Turmeric (*Curcuma longa*, Zingiberaceae) powder, dry Ginger (*Zingiber officinale*, Zingiberaceae) and about 2-3 spoons of baking soda is crushed together and given orally once in a day for 2 days.

NORTHERN DRY ZONE: BELGAUM



Villages visited	Madurakhandi, Jamkhandi, Janwadi
District livestock population	2959845
Major Livestock species/breeds	Khillar, Krishnavalley Crossbred cows, Buffalos, Sheep and Goats
Number of Livestock keepers and Herbal healers interviewed	30 livestock keepers and 3 herbal healers
Number of medicinal plants and families	29 medicinal plants for 20 families

Documentation of ITKS in health management of livestock

Treatment for indigestion

1. A handful of Kaadu kavadekai (*Citrullus colocynthis*, Cucurbitaceae) seeds are crushed and mixed with a spoon of salt and 100 ml of water. Drench of this preparation once or twice.
2. One full dry Coconut (*Cocos nucifera*, Arecaceae) is fed once, which enhances digestion.

Bloat

1. A handful of Kaadu kavadekai (*Citrullus colocynthis*, Cucurbitaceae) are crushed and mixed with a spoon of salt and 100 ml of water. Drenching of this preparation once or twice in a day
2. Oral drenching of 100-150 ml of edible oil mixed with a spoon of Camphor.
3. Castor (*Ricinus communis*, Euphorbiaceae) leaves are fed once or twice in a day.
4. Bidiru (*Bambusa arundinacea*, Bambusaceae) leaves are fed along with curd once or twice.

Diarrhoea and Coccidiosis

1. Togari bele (*Cajanus cajan*, Fabaceae) is boiled with water and boiled water is drenched once or twice in a day.
2. Adike (*Areca catechu*, Arecaceae) nut powdered and mixed with a glass of buttermilk can be used for oral drenching once or twice in a day.
3. Broken Jowar (*Sorghum bicolor*, Poaceae) is cooked with buttermilk and drenched once or twice in a day.

Induction of heat

1. Coriander (*Coriandrum sativum*, Apiaceae) leaves are fed daily once for a week to induce heat.
2. Raw Turmeric (*Curcuma longa*, Zingiberaceae) leaves are fed daily once for a week.
3. Sprouted Mukuni kaalu (*Vigna unguiculata*, Fabaceae) is given 100 grams daily.
4. Three to four fruits of Bangali kai (*Thespesia populnea*, Malvaceae) are fed for 3 days.

Repeat breeding problems

1. A mixture of Banni (*Acacia farnesiana*, Mimosaceae) leaves with curd is fed for about 5-6 days.
2. Lolesara (*Aloe vera*, Aloaceae) is fed daily for about 15 days.
3. Feeding of Nugge (*Moringa oleifera*, Moringaceae) green leaves with Bilwa patra (*Aegle marmelos*, Rutaceae) fruit once or twice.
4. A bowl full of sprouted Mukuni kaalu (*Vigna unguiculata*, Fabaceae) is fed for 3 days.

Treatment for Retention of placenta

1. Feeding of Banana (*Musa paradisiaca*, Musaceae) fruit for about 15-20 once at a time.
2. Equal quantity of Bende kai (*Abelmoschus esculentus*, Malvaceae) and Banana (*Musa paradisiaca*, Musaceae) are fed to the animal.

To increase milk yield

1. Feeding of Jaggery every day about 100 grams will gradually increase milk yield.
2. Cotton (*Gossypium arboreum*, Malvaceae) seed cake and Groundnut (*Arachis hypogaea*, Fabaceae) cake along with cattle feed is proven to increase milk yield gradually.

Treatment bone fracture

1. Edible oil and raw Turmeric (*Curcuma longa*, Zingiberaceae) is applied with splints.
2. Equal quantities of Lavanga (*Syzygium aromaticum*, Myrtaceae), Dalchini (*Cinnamomum cassia*, Lauraceae), Kaalu menasu (*Piper nigrum*, Piperaceae) and a handful of Harad hachaka (*Zornia gibbosa*, Fabaceae) leaves are crushed and applied as paste at the site of fracture for 15 days.

Treatment of Wounds

For maggot wounds crush a handful of Heere kai (*Luffa acutangula*, Cucurbitaceae) leaves and apply it on the wounds.

Treatment of ecto-parasites

Ticks are removed and burnt in fire to prevent further infection.

Treatment of eye problems

Topical application of Coconut (*Cocos nucifera*, Arecaceae) oil on the horns and head of the animal cures watery eyes

Mastitis

1. Butter and raw Turmeric (*Curcuma longa*, Zingiberaceae) paste is applied on the udder.
2. Sago is boiled and the paste is applied on the udder for 3 days.

Treatment of cough and fever

1. Paste of Jaggery and Kaalu menasu (*Piper nigrum*, Piperaceae) is rubbed on the tongue, best remedy for Cough and wheezing.
2. Tea powder and Neelagiri (*Eucalyptus globulus*, Myrtaceae) leaves are boiled with 2 glasses of water and Jaggery. Drench this formulation twice a day for 3 days for about 250ml.

Uterine prolapse

1. Oral drenching of Gulaganji (*Abrus precatorius*, Fabaceae) leaf juice.
2. Thottalaballi (*Capparis zeylanica*, Capparaceae) leaves are given for 3 days. For uterine infection also 100 grams of Thottalaballi leaves are given once or twice.

NORTHERN DRY AND TRANSITION ZONE: GADAG

Villages visited	Gangimadinagara
District livestock population	818140
Major Livestock species/breeds	Cattle, sheep and goat
Number of Livestock keepers and Herbal healers interviewed	22 livestock keepers and 3 herbal healers
Number of medicinal plants and families	25 medicinal plants for 18 families

Documentation of ITKs in health management of livestock**Treatment of constipation**

A paste prepared from Sona mukhi (*Cassia angustifolia*, Caesalpiaceae) leaves, Castor (*Ricinus communis*, Euphorbiaceae) seeds along with Omkaalu (*Trachyspermum ammi*, Apiaceae) by grinding it altogether and oral administration of this preparation once in a day for 3 days.

Lack of Appetite

Three spoons of Badesoppu (*Foeniculum vulgare*, Apiaceae) and a handful of Ashwagandha (*Withania somnifera*, Solanaceae) Arali (*Ficus religiosa*, Moraceae), Nellikai (*Emblica officinalis*, Euphorbiaceae) and Thaare (*Terminalia bellirica*, Combretaceae) leaves are fed for 3 days.

Bloat

Adusoge (*Adathoda vasica*, Acanthaceae) and Castor (*Ricinus communis*, Euphorbiaceae) leaves are fed once in a day for 2 days.

Diarrhoea and Coccidiosis

A paste is prepared from Shataavari roots, Camphor, Omkaalu (*Trachyspermum ammi*, Apiaceae) and mint. Give this preparation once in a day.

Constipation

Castor (*Ricinus communis*, Euphorbiaceae) seeds are fed as such or along with feed once or twice.

Urinary problems

Southe kai seeds (*Cucumis sativus*, Cucurbitaceae), Kumbala kai (*Hispida, benincasa* Cucurbitaceae) seeds along with Bekkina tharadu (*Crotalaria calycina*, Fabaceae) leaves are fed as such once or twice in a day.

Treatment for retention of placenta

Gulaganji (*Abrus precatorius*, Fabaceae) seeds along with paddy grass are fed once or twice in a day.

To increase milk yield

A mixture of Maamsa rohini (*Soymida febrifuga*, Meliaceae) leaves Shataavari, (*Aspa-ragus racemosus*, Liliaceae) roots and Jeeva (*Holoste mmaada-kodien*, Asclepiadace-ae) leaves are given daily once for 5 days.

Treatment for Bone fracture

Leaves of Uttarane (*Achyranthes aspera*, Amaranthaceae) are crushed into a fine paste and mixed with goat's milk and applied on the fractured bone.

Treatment of Wounds

Teeke (*Tridax procumbens*, Asteraceae) leaves are crushed and applied on the wounds.

Treatment of Endo-parasites

Equal quantities of Vaayuva danga (*Embelia ribes*, Myrsinaceae) seeds and Togari (*Cajanus cajan*, Fabaceae) are fed once in a day for 3 days.

Treatment of Ecto-parasites

Brahmadande (*Echinops echinatus*, Asteraceae) leaves are placed inside the cow shed and this keeps away all the insects and ticks from shed.

Treatment of poisonous bites

1. Khare (*Canthium parviflorum*, Rubiaceae) plant roots are crushed and given with water.
2. For dog bite Uttarane (*Achyranthes aspera*, Amaranthaceae) plant leaf is fed once or twice in a day.

Yoke gall

Chendu huva (*Tagetes erecta*, Asteraceae) plant leaves are crushed and mixed with Lolesara (*Aloe vera*, Liliaceae) pulp and applied on the shoulder with Castor (*Ricinus communis*, Euphorbiaceae) oil.

Milk fever

Oral administration of juice of Kuppi soppu (*Acalypha indica*, Euphorbiaceae) leaves and Tumbe (*Leucas aspera*, Lamiaceae) leaves fed daily twice for 3 days.

Babesiosis

Chitramoola (*Plumbago zeylanica*, Plumbaginaceae) and Kuratiga (*Lannea coromandelica*, Anacardiaceae) leaves are crushed and juice is extracted. This Juice is mixed with a cup of water and given twice in a day for 3 days.

Mastitis

Smoke of Baje (*Acorus calamus*, Araceae) leaves followed by topical application of Lemon (*Citrus aurantifolia*, Rutaceae) and Turmeric (*Curcuma longa*, Zingiberaceae) paste applied over the udder daily two times.

Treatment of Dermatitis

Topical application of paste prepared from equal quantities of Salt, Rock candy with Lemon (*Citrus aurantifolia*, Rutaceae) juice.

Treatment for Cough and fever

Tumbe (*Leucas aspera*, Lamiaceae), Papaya (*Carica papaya*, Caricaceae) and Tulsi leaves are crushed and juice is extracted and is mixed with a spoon of Pepper and Ginger. Give this prepared formulation twice in a day for 3 days by oral route.

Treatment of Black quarter

Topical application of paste prepared from Eddumbe (*Anisomeles malabarica*, Lamiaceae) plant leaves along with salt and Sesame oil twice in a day for 3 days.

Treatment of indigestion

1. Boil a handful of Omkaalu (*Trachyspermum ammi*, Apiaceae) seeds in half a litre of water and given orally 3 times a day.
2. Two to three spoons of Omkaalu (*Trachyspermum ammi*, Apiaceae), 2 cloves of Garlic (*Allium sativum*, Amaryllidaceae), 5grams of Asafoetida (*Ferula assa-foetida*, Apiaceae)
3. Handful of Shiragatti (*Rubia cordifolia*, Rubiaceae) Tulasi (*Ocimum sanctum*, Lamiaceae), Tumbe (*Leucas aspera*, Lamiaceae) leaves crushed altogether and made into a ball and given orally once in a day for 3 days.
4. Boil equal quantities of Ginger (*Zingiber officinale*, Zingiberaceae), Garlic (*Allium sativum*, Amaryllidaceae), Pepper (*Piper nigrum*, Piperaceae) and a pinch of Asafoetida (*Ferula assa-foetida*, Apiaceae) in half a cup of Castor (*Ricinus communis*, Euphorbiaceae) oil and a full cup of water. Prepared decoction is given twice in a day for about a glass for constipation due to indigestion.

Bloat

Bajakone (*Acorus calamus*, Araceae) is fed along with Omkaalu (*Trachys permumammi*, Apiaceae) and Coconut (*Cocos nucifera*, Arecaceae).

Diarrhoea and Coccidiosis

1. Feed a hand full leaves of Huli soppu (*Oxalis corniculata*, Oxalidaceae), Acche soppu (*Euphorbia hirta*, Euphorbiaceae) and Dalimbe soppu (*Punica granatum*, Lythraceae) followed by 300 ml of sour buttermilk (for sheep and goats).
2. Prepare a paste of Muttidare muni (*Mimosa pudica*, Fabaceae) leaves, Achche soppu (*Euphorbia hirta*, Euphorbiaceae) leaves, Maavina kai (*Mangifera indica*, Anacardiaceae) leaves along with Manthya (*Trigonella foenumgraecum*, Fabaceae) and Jeerige (*Cuminum cyminum*, Apiaceae) given twice in a day.

Constipation

1. Prepare a paste of Pepper (*Piper nigrum*, Piperaceae), Lavanga (*Syzygium aromaticum*, Myrtaceae) and Garlic (*Allium sativum*, Amaryllidaceae) in equal quantity along with Lolesara (*Aloe vera*, Liliaceae) gel fed orally.
2. Mungara balli leaves (*Cissus quadrangularis*, Vitaceae), Onion (*Allium cepa*, Amaryllidaceae), Jaggery, Shunti (*Zingiber officinale*, Zingiberaceae) along with Pepper (*Piper nigrum*, Piperaceae) crushed nicely and given orally once in a day for 2-3 days.

Urinary Problems

1. Feed pseudo stem of *Musa paradisiaca* (Banana, Musaceae) to the animal 'as such or remove juice out of it and give orally for about 500ml three times a day.
2. Give tender coconut (*Cocos nucifera*, Arecaceae) water four to five times a day.
3. Feed a handful soaked seeds of Huruli (*Macrotyloma uniflorum*, Fabaceae) twice a day.

Induction of heat

Feed soaked Huruli Kaalu (*Macrotyloma uniflorum*, Fabaceae) seeds along with fodder.

Treatment for Retention of placenta

Grind Bili gulaganji (*Abrus precatorius*, Fabaceae) bark in warm water and given orally for 3 days.

Treatment Bone fracture

1. Apply Castor (*Ricinus communis*, Euphorbiaceae) oil, butter along with Ekka (*Calotropis gigantea*, Asclepiadaceae) and gently massage on it.

3. Crush and prepare a paste of *Antrike* (*Dodonaea viscosa*, Sapindaceae) leaves with 2 raw eggs and apply it on the fractured bone and wrap it with a roll of gauze or clean dry cotton cloth.

Treatment of Wounds

1. Topical application of Castor (*Ricinus communis*, Euphorbiaceae) oil on the wounded region.
2. For Maggot wounds crush 2 bulbs of Garlic (*Allium sativum*, Amaryllidaceae), boil it along with coconut oil and apply on the wounds.

Treatment of poisonous bites

Grind Aadusoge (*Adhatoda vasica*, Acanthaceae) leaves in buttermilk and drench of this preparation immediately will cause vomiting.

Treatment of Broken horn

Topical application of lime paste along with red soil can cure broken horn

Yoke gall

1. A handful leaves of Heere kai balli (*Luffa acutangula*, Cucurbitaceae) are crushed and extracted juice can be applied on the swollen area.
2. Crush a hand full leaves of Hatthi (*Gossypium hirsutum*, Malvaceae) along with 2 cloves of Garlic (*Allium sativum*, Amaryllidaceae) and Jaggery. Apply this paste on the lesion.
3. Burn Raagi (*Eleusine coracana*, Poaceae) plant sticks and apply the ash.

Babesiosis

1. Equal quantities of Manthya (*Trigonella foenum-graecum*, Fabaceae), Avare (*Lablab purpurens*, Fabaceae), and Candy (kallu sakkare) is mixed in buttermilk or along with tender coconut water twice or thrice a day.
2. Banana (*Musa paradisiaca*, Musaceae) pseudo stem is crushed and juice is extracted, which is mixed with Jeera (*Cuminum cyminum*, Apiaceae) and Manthya (*Trigonella foenum-graecum*, Fabaceae). Give this formulation 2-3 times in a day for 3 days.

Mastitis

1. Equal quantities of Brahma dande (*Echinops echinatus*, Asteraceae), Sambrani (*Plectranthus amboinicus*, Lamiaceae) leaves are mixed with 7-8 Garlic (*Allium sativum*, Amaryllidaceae) cloves and crushed and apply this paste on the udder along with honey.

INDIGENOUS TRADITIONAL KNOWLEDGE AMONG LIVESTOCK KEEPERS OF KARNATAKA

2. Raw Turmeric (*Curcuma longa*, Zingiberaceae) paste is prepared along with Lemon (*Citrus aurantifolia*, Rutaceae) and applied on the udder during the initial stages.

Treatment of Dermatitis

1. Grind Mustard seeds (*Brassica juncea* L. Brassicaceae) into a fine paste using water and apply on the affected area.
2. Topical application of Tulasi (*Ocimum sanctum*, Lamiaceae) leaves juice along with salt.

Treatment of Cough and Fever

1. Dry Ginger (*Zingiber officinale*, Zingiberaceae) is crushed and applied it on and around nostrils.
2. One handful of Pepper (*Piper nigrum*, Piperaceae) is crushed with equal quantities of Green chili (*Capsicum annuum*, Solanaceae) and Garlic (*Allium sativum*, Amaryllidaceae). Give this formulation orally along with water every hour for a day.
3. Seven to eight spoons of Mustard seeds (*Brassica juncea* L., Brassicaceae) grinded along with salt in half a litre of water, give twice for three days.
4. About 4-5 pieces of roots of Nugge (*Moringa oleifera*, Moringa ceae) is grinded along with Pepper (*Piper nigrum*, Piperaceae) and given to the animal twice in a day along with hot water.

COASTAL ZONE- DAKSHINA KANNADA



Villages visited	Ajjavara, Nellur, Kemraje and Punacha
District livestock population	465252
Major Livestock species /breeds	Malnad Gidda, Cross bred Jersey, Holstein Friesian cows, Surti, Graded Murrah Buffalo Breeds
Number of Livestock keepers and Herbal healers interviewed	36 livestock keepers and 2 herbal healers
Number of medicinal plants and families	99 medicinal plants belongs to 41 families

Documentation of ITKs in health management of livestock

Treatment of indigestion

1. Five hundred ml juice of Adusoge (*Adhatoda vasica*, Acanthaceae) leaves given orally daily once in the morning for 3 days
2. Two to three pieces of dried Kaipura (*Atalantia monophylla*, Rutaceae) fruit once in a day until digestion becomes normal.
3. Make the paste of following ingredients – Four to five leaves of Veelyadele (*Piper betle*, Piperaceae) along with 2 Sooji menasu (*Capsicum annuum*, Solanaceae) one spoon of Jeera (*Cuminum cyminum*, Apiaceae), 4 spoons of Lemon (*Citrus aurantifolia*, Rutaceae) juice, 7-8 seeds of Omkaalu (*Trachyspermum ammi*, Apiaceae) and One slice of Onion (*Allium cepa*, Amaryllidaceae) along with honey and jaggery. Give this preparation orally 3 times a day.
4. Make a decoction of bark of Haale mara (*Alstonia scholaris*, Apocynaceae) and give it to the animals once in a day for 3 days.
5. Give seebe (*Psidium guajava*, Myrtaceae) leaves kashaya/ decoction about 300ml three times a day.
6. Give fermented fruit juice of Cashew (*Anacardium occidentale*, Anacardiaceae) about 250 ml twice in a day for 3 days.
7. Take one hand full of paddy, 2 table spoon of rock salt, along with 10-12 dried fruit of Pepper (*Piper nigrum*, Piperaceae) make it into a round ball, rub this over the tongue of the animals.

Lack of Appetite

1. Salt preserved Nelli kai (*Emblia officinalis*, Euphorbiaceae) pulp along with butter milk is given orally.
2. Eight to ten cloves of Garlic (*Allium sativum*, Amaryllidaceae), a piece of Ginger (*Zingiber officinale*, Zingiberaceae) few seeds of Omkaalu (*Trachyspermum ammi*, Apiaceae) and a spoon of dried Pepper (*Piper nigrum*, Piperaceae) powder along with jaggery as a paste is given twice or thrice in a day.
3. A handful leaves of Kaadu mallige (*Jasminum angustifolium*, Oleaceae) is given orally two times a day.

Bloat

1. Make a paste of two Garlic cloves (*Allium sativum*, Amaryllidaceae), 10-12 Pepper (*Piper Nigrum*, Piperaceae), a pinch of Asafoetida (*Ferulaassa - foetida* L, Apiaceae) along with a handful leaves of Aadumuttada gida (*Adhatoda vasica*, Acanthaceae) and jaggery in half a liter of goat milk give two times a day.
2. Give three spoons of Pepper (*Piper nigrum*, Piperaceae) powder, 2 -3 Veelyadele (*Piper beetle*, Piperaceae) with a spoon full of Salt in a glass of butter milk twice in a day.

Diarrhoea and Coccidiosis

1. Give coat of Pomegranate (*Punica granatum*, Lythraceae) fruit 2 to 3 pieces twice a day.
2. Four to five spoons of Lemon (*Citrus aurantifolia*, Rutaceae) juices mixed with 250ml of black tea and give orally three times a day.
3. Soak four spoons full of each Jeera (*Cuminum cyminum*, Apiaceae) and Kottambari (*Coriandrum sativum*, Apiaceae) seeds in water for four hours and feed it along with jaggery.

Constipation

1. Castor (*Ricinus communis*, Euphorbiaceae) oil of about 100 ml is given orally once in a day for 3 days
2. Prepare a decoction of Anile (*Terminalia chebula*, Combretaceae) leaves / Bark in half a litre of water and given orally two to three times a day.
3. A handful leaves of Hibiscus (*Hibiscus rosa-sinensis*, Malvaceae) and Ondelaga (*Centella asiatica*, Apiaceae) feed as such along with fodder.

Urinary tract problems

1. Prepare a decoction from Nelanelli (*Phyllanthus amarus*, Euphorbiaceae) (entire plant can be used) which is crushed and boiled in water and given twice or thrice in a day for 3 days.
2. A handful of Menthya (*Trigonella foenum-graecum*, Fabaceae) is powdered and given along with Jaggery once in a day for three days.

Induction of heat

1. Roots (100 g) of Uduri Beeru (*Asperagus recemosus*, Asparagaceae) boiled along with coconut (*Cocos nucifera*, Arecaceae) endosperm in a litre of water and mix with cooked rice. Give this orally once in the morning which will induce heat within 17 days.
2. Sugarcane (*Saccharum officinarum*, Poaceae) grass is given twice a day for 1 week which will induce heat.
3. Decoction (300 ml) prepared from the crushed bark of Ashoka (*Saraca asoca*, Fabaceae) twice a day for 3 days.
4. Crush 2-3 bulbs of Onion (*Allium cepa*,) along with 200 g of Jiggery. Give once in a day for 3 days.
5. Crush bark of Manjati Kette (*Adenantha pavonina*, Mimosaceae) and Pongaare katte (*Erythrina indica*, Fabaceae) in equal quantities and boil in water. Give this decoction for 3 days.
6. Feed eight to ten Vanilla (*Vanilla planifolia*, Orchidaceae) leaves once in a day for three consecutive days.

Post insemination care (to prevent metoestrus bleeding)

1. Give a decoction made from boiling 100g roots of Kepula (*Ixora coccinea*,

- Rubiaceae) crushed bark of Erpe (*Buchanania lanzan*, Anacardiaceae) and Bili hongare (*Erythrina indica*, Fabaceae) immediately after insemination for 3 days.
2. Grind Coconut (*Cocos nucifera*, Arecaceae) male flowers are ground into a paste along with 2 spoons of Jeera (*Cuminum cyminum*, Apiaceae) and give for 3 days after insemination for 3 months.
 3. Prepare a decoction from bark of Manjatti (*Adenantha pavonina*, Mimosaceae) and Erpe (*Buchanania lanzan*, Anacardiaceae) along with Jeera (*Cuminum cyminum*, Apiaceae) and give orally 3 days before or after insemination.

Treatment for Retention of placenta

1. A handful leaves of Kaadu basale (*Kalanchoe pinnata*, Crassulaceae) can given orally immediately after Parturition for 2 to 3 times.
2. Feed one full bowl of Huruli (*Macrotyloma uniflorum*, Fabaceae) daily after 7 months of pregnancy until Parturition.
3. Feed leaves of Bidiru (*Bambusa arundinacea*, Bambusaceae) or Kabbu (*Saccharum officinarum*, Poaceae) to treat retention of placenta.
4. Feed one kilogram of Jaggery along with a bucket full of water immediately after parturition.
5. Equal quantities of Onion (*Allium cepa*, Amaryllidaceae) and Jaggery helps in removing placenta.
6. Give five hundred ml of Coconut (*Cocos nucifera*, Arecaceae) oil is given orally after parturition
7. Feed a handful leaves of Andepaaje (*Ficus asperrima*, Mraceae) after Parturition.
8. Three hundred grams of Jeera (*Cuminum cyminum*, Apiaceae) is fried and can given orally along with Jaggery
9. *Musa paradisiaca* (Musaceae) Banana, pseudo-stem can be given for easy removal of placenta.
10. Two cups of strong black tea will help in removal of placenta.

To increase milk yield

1. Tender Coconut (*Cocos nucifera*, Arecaceae) endosperm is given along with equal quantities of Jeera (*Cuminum cyminum*, Apiaceae) and Jaggery.
2. Tuberos roots of Shataavari (*Asparagus racemosus*, Liliaceae) along with a bowl of Hesaru kaalu (*Vigna radiata*, Fabaceae) and Jaggery are given.
3. Cacao (*Cocoa theobroma*, Malvaceae) cocoa bean shells are fed once in a day.
4. Jackfruit (*Artocarpus heterophyllus*, Moraceae) is also known to increase milk yield.
5. Tuberos roots of Shataavari (*Asparagus racemosus*, Liliaceae) aerial parts of Purusha Rathna (*Hybanthus enneaspermus*, Violaceae) along with soaked Hesaru kaalu (*Vigna radiata*, Fabaceae) is proven to increase the milk yield.

Treatment for Bone fracture

1. A handful of *Ellu* (*Sesamum indicum*, Pedaliaceae) leaves juice mixed with 4-5 spoons of buffalo ghee can given orally once in a day for 7 days followed by topical application of paste for 30 days and tie a stick made of areca nut bark as a support.
2. Prepare a paste of Raktha phala with egg white and apply it on the fractured bone, dress it using a clean cotton cloth.

Treatment Wounds

1. Apply Neem (*Azadirachta indica*, Meliaceae) oil on the wounds.
2. Burn the seed of Ponne (*Calophyllum inophyllum*, Clusiaceae) and take its ash and apply along with Coconut (*Cocos nucifera*, Arecaceae) oil or Neem (*Azadirachta indica*, Meliaceae) oil.
3. Apply ash of Uttarane (*Achyranthes aspera*, Amaranthaceae) along with Jatyadi thailam until wound heals.
4. Shade dried leaves of Seetha phala (*Annona reticulata*, Annonaceae) powdered and applied along with Neem (*Azadirachta indica*, Meliaceae) oil.
5. Tulasi (*Ocimum sanctum*, Lamiaceae) juice is also a proven remedy to heal wounds.
6. Topical application of decoction of Chere mara bark (*Semecarpus anacardium* Anacardiaceae) and Haale mara (*Alstonia scholaris*, Apocynaceae) on the deep wounds.

Treatment of endo-parasites

1. Give fresh leaves of Pine apple (*Ananas comosus*, Bromiliaceae) along with 2 cloves of Garlic (*Allium sativum*, Amaryllidaceae) and 2 spoons of salt.
2. Crush a handful leaves of Haagala kai (*Momordica charantia*, Cucurbitaceae) and Ondelaga (*Centella asiatica*, Apiaceae) with Salt add Lemon juice (*Citrus aurantifolia*, Rutaceae) and mix it along with Ellenne (*Sesamum orientale*, Pedaliaceae). Give this preparation once in a day for 3 days.
3. Feed grated Coconut (*Cocos nucifera* L, Arecaceae) along with a handful of Kudane (*Solanum torvum*, Solanaceae) leaves and 2 cloves of Garlic *sativum*, Amaryllidaceae) for 3 days.

Treatment of ecto-parasites

1. Apply paste of Huruli (*Macrotyloma uniflorum*, Fabaceae) leaves along with salt all over the body to get rid of ticks.
2. Tobacco (*Nicotiana tabacum*, Solanaceae) leaves crushed along with lime in half litre of water and apply this formulation all over the body.
3. Topical application of Neem (*Azadirachta indica*, Meliaceae) oil, on the body
4. Apply the paste of Thogari (*Cajanus cajan*, Fabaceae) leaves all over the body.

5. Apply oil prepared from the bark of Honge tree (*Pongamia pinnata*, Fabaceae) over the body to get rid of ticks.

Treatment of poisonous bites

1. Scorpion bite: Apply the paste prepared from Cheeni kai (*Cucurbita maxima*, Cucurbitaceae) peduncle with Turmeric (*Curcuma longa*, Zingiberaceae) on the bitten area.
2. Two cloves of Garlic (*Allium sativum*, Amaryllidaceae), 2 spoons of Pepper (*Piper nigrum*, Piperaceae) and 2-3 leaves of Ekka (*Calotropis gigantea*, Asclepiadaceae) crushed together and give orally along with 250 ml of water.

Dog bite treatment

1. Prepare decoction of equal quantities of Datura plant (*Datura stramonium*, Solanaceae) roots, Konde (*Cassia fistula*, Fabaceae) and Bidiru (*Bambusa arundinacea*, Bambusaceae) tree bark and give to the animal for 3 days.
2. Crush up root of Ondelaga (*Centella asiatica*, Apiaceae) and apply it on the bitten place until the wound heals.

Treatment of broken horn

1. Apply burnt ash of Ponne (*Calophyllum inophyllum*, Clusiaceae) seeds on the broken horn or apply Ponne (*Calophyllum inophyllum*, Clusiaceae) seeds oil along with salt.
2. Topical application of ash of Uttarane (*Achyranthes aspera*, Amaranthaceae) aerial parts along with Jatyadi thailam.

Yoke gall

1. Prepare a mixture of equal quantities of Castor (*Ricinus communis*, Euphorbia ceae) oil along with Ghee of Pig and apply it on the Yoke gall region.
2. Apply 2:1 ratio of Lolesara (*Aloe vera*, Liliaceae) and Lemon (*Citrus aurantifolia*, Rutaceae) to the swollen portion.

Milk fever

Prepare decoction of Touch me not plant (*Mimosa pudica*, Fabaceae) roots and give 3 times a day for about 200 ml for 3 Days.

Foot and Mouth Disease

1. Boil equal quantities of Bark of Gandha (*Santalum album*, Santalaceae) and Raktha chandana (*Pterocarpus santalinus*, Fabaceae) along with Neem (*Azadirachta indica*, Meliaceae) oil and apply it on the hoof and wash it along with Salt water.
2. Application of Ellu (*Sesamum orientale*, Pedaliaceae) oil on the head of the the cow and feeding of Raagi (*Eleusine coracana*, Poaceae) on a daily basis prevents FMD.

3. Huli soppu (*Oxalis corniculata*, Oxalidaceae) is crushed and juicy extract is given to the animal 3 times a day for 3 days.
4. Wash wounds with warm Turmeric (*Curcuma longa*, Zingiberaceae) and salt water.
5. Prepare bedding made of Daddala (*Agave americana*, Agavaceae) Maruva (*Lagerstroemia flos-reginae*, Lythraceae) and Kepula (*Ixora coccinea*, Rubiaceae) areal parts.

Babesiosis

1. Prepare a decoction from bark of Manjatti (*Adenanthera pavonina*, Mimosaceae) and Erpe (*Buchanania lanzan*, Anacardiaceae) along with Jeera (*Cuminum cyminum*, Apiaceae) and give orally for 3 days.
2. Prepare a paste from soaked Menthya (*Trigonella foenum-graecum*, Fabaceae) seeds and mix it with Raagi (*Eleusine coracana*, Poaceae) ganji, keep it aside for 1 day and give it orally on the next day and continue for next three days.

Mastitis

1. Burnt dry Basari leaves (*Albizia odoratissima*, Mimosaceae) and powdered ash can applied on the udder along with buffalo butter.
2. Grind and apply the paste of Kaadu basale (*Kalanchoe pinnata*, Crassulaceae) along with rice on the udder.
3. Application of Lolesara (*Aloe vera*, Liliaceae) juice along with Turmeric (*Curcuma longa*, Zingiberaceae) during early stages of Mastitis.
4. Crush fresh leaves of Kumbala Kai (*Benincasa hispida*, Cucurbitaceae) and apply on the udder three times a day until it cures.

Treatment of Dermatitis

1. Application of Buffalo dung ash on the affected areas of cow and for buffalo apply cow dung ash.
2. Oral administration of Ganji (a traditional food) made of Chere tree bark (*Semecarpus anacardium*, Anacardiaceae) and Cashew (*Anacardium occidentale*, Anacardiaceae) nut outer coat for about 500 ml for 7 days.
3. Burn the seed of Ponne (*Calophyllum inophyllum*, Clusiaceae) and take its ash and apply along with Coconut (*Cocos nucifera L.*, Arecaceae) oil or Neem (*Azadirachta indica*, Meliaceae) oil.
4. Apply dried leaves powder of Seetha phala (*Annona reticulata*, Annonaceae) leaves along with Neem (*Azadirachta indica*, Meliaceae) oil.
5. Dermatitis due to ticks can be cured by topical application Thogari (*Cajanus cajan*, Fabaceae) leaves paste.
6. Apply ash of Uttarane (*Achyranthes aspera*, Amaranthaceae) along with Jatya-di thailam in the affected area.

Dislocation of bones

Crush a handful leaves of Choori mullu (*Zizyphus oenoplia*, Rhamnaceae) along with Jeera (*Cuminum cyminum*, Apiaceae), extract the juice using clean muslin or cotton cloth, put 6 to 7 drops of this preparation into the nostrils of the cow for 3 days.

Haemorrhagic septicemia

1. Apply burnt ash of Palm tree petiole on the tongue until it cures.
2. A bowl full of Thogari (*Cajanus cajan*, Fabaceae), half a bowl of Saasive (*Brassica juncea*, Cruciferae) seeds, 3-4 spoons of dried Seege kai (*Acacia pennata*, Mimosaceae) powder and equal quantities of Pepper (*Piper nigrum*, Piperaceae) and *Curcuma longa* (Turmeric, Zingiberaceae) powder in a liter of water and give orally for 3 days.

Treatment of Tail rot

1. Apply boiled cow dung on the switch of tail and tie a leaf of Daddala (*Agave americana*, Agavaceae)
2. Burn Naaga sampige (*Mesua nagassarium*, Clusiaceae) flowers and leaves; apply its ash on the tail.

Treatment for Cough and fever

1. Prepare a decoction of equal quantities of leaves of Kokke kodanchi (*Holarrhena pubescens*, Apocynaceae) and Pepper (*Piper nigrum*, Piperaceae) along with Salt and give orally for 5 days.
2. Crush and boil a handful of sooji menasu (*Capsicum annum*, Solanaceae) Omkaalu (*Trachyspermum ammi*, Apiaceae) and Garlic (*Allium sativum*, maryllidaceae), and give orally twice in for 3 days.

HILLY ZONE – CHIKKAMAGALURU



Villages visited	Chowlahiriyuru and Singatagere
District livestock population	526852
Major Livestock species/breeds	Hallikar, Amrithmahal, Crossbred cows along with sheep and goats
Number of Livestock keepers and Herbal healers interviewed	6 herbal healers, 60 live stock keepers
Number of medicinal plants and families	52 medicinal plants which belong to 23 families

Documentation of ITKs in health management of livestock

Treatment for indigestion

1. Boil a handful of Omkaalu (*Trachyspermum ammi*, Apiaceae) seeds in half a litre of water and give orally 3 times a day.
2. Two-three spoons of Omkaalu (*Trachyspermum ammi*, Apiaceae), 2 cloves of Garlic (*Allium sativum*, Amaryllidaceae), 5 grams of Asafoetida (*Ferula assa-foetida*, Apiaceae) a handful of Shiragatti (*Rubia cordifolia*, Rubiaceae) Tulasi (*Ocimum sanctum*, Lamiaceae), Tumble (*Leucas aspera*, Lamiaceae) leaves crushed altogether and made it into a ball and given orally once in a day for 3 days.
3. Boil equal quantities of Ginger (*Zingiber officinale*, Zingiberaceae), Garlic (*Allium sativum*, Amaryllidaceae), Pepper (*Piper nigrum*, Piperaceae) and a pinch of Asafoetida (*Ferula assa foetida*, Apiaceae) in half a cup of Castor (*Ricinus communis*, Euphorbiaceae) oil and a full cup of water. about a glass of this. Prepared decoction is given twice a day.

Bloat

1. Feed Bajakone (*Acorus calamus*, Araceae) along with Omkaalu (*Trachyspermum ammi*, Apiaceae) and Coconut (*Cocos nucifera*, Arecaceae).
2. Give 100 ml of Castor (*Ricinus communis*, Euphorbiaceae) oil 3 times a day.

Diarrhoea and Coccidiosis

1. Feed a hand full leaves of Huli soppu (*Oxalis corniculata*, Oxalidaceae), Acche soppu (*Euphorbia hirta*, Euphorbiaceae) and Dalimbe soppu (*Punica granatum*, Lythraceae) followed by 300 ml of sour butter milk (for sheep and goats).
2. Grind equal quantities of Pepper (*Piper nigrum*, Piperaceae), Jeera (*Cuminum cyminum*, Apiaceae), Garlic (*Allium sativum*, Amaryllidaceae), Nuge (*Moringa oleifera*, *Moringa oleifera*), Ekka (*Calotropis gigantea*, Asclepiadaceae) along with Gajjaga (*Caesalpinia crista*, Caesalpinaceae) and given orally once in a day for 2-3 days.
3. Prepare a paste of Muttidare muni (*Mimosa pudica*, Mimosaceae) leaves, Achche soppu (*Euphorbia hirta*, Euphorbiaceae) leaves, Maavina kai (*Mangifera indica*, Anacardiaceae) leaves along with Manthya (*Trigonella foenum-graecum*, Fabaceae) and Jeerige (*Cuminum cyminum*, Apiaceae) and given twice a day.

Constipation

1. Prepare a paste of Pepper (*Piper nigrum*, Piperaceae), Lavanga (*Syzygium aromaticum*, Myrtaceae) and Garlic (*Allium sativum*, Amaryllidaceae) in equal quantity along with Lolesara (*Aloe vera*, Liliaceae) gel and feed orally.
2. Equal quantities of Pepper (*Piper nigrum*, Piperaceae), Lavanga (*Syzygium aromaticum*, Myrtaceae) and Garlic (*Allium sativum*, Amaryllidaceae) mixed along with Lolesara (*Aloe vera*, Aloaceae) juice is given twice for 2 days.
3. Crush Mungara balli leaves (*Cissus quadrangularis*, Vitaceae), Onion (*Allium cepa*, Amaryllidaceae), Jaggery, Shunti (*Zingiber officinale*, Zingiberaceae) along with Pepper (*Piper nigrum*, Piperaceae) given orally once in a day for 2-3 days.

Urinary problems

1. Feed pseudo stem of Banana (*Musa paradisiaca*, Musaceae) to the animal as such or remove juice out of it and give orally for about 500 ml three times a day.
2. Give tender coconut (*Cocos nucifera*, Arecaceae) water four to five times a day.
3. Feed a handful of soaked seeds of Huruli (*Macrotyloma uniflorum*, Fabaceae) twice a day.

Induction of heat

Feed soaked Huruli Kaalu (*Macrotyloma uniflorum*, Fabaceae) seeds along with fodder.

Treatment for retention of placenta

Grind bili gulaganji and kempu gulaganji (*Abrus precatorius*, Fabaceae) roots in warm water and give orally for 3 days.

Treatment for bone fracture

1. Apply *Ricinus communis* (Castor, Euphorbiaceae) oil and butter along with *Ekka* (*Calotropis gigantea*, Apocynaceae) and gently massage on it.
2. Burn tamarind (*Tamarindus indica*, Fabaceae) leaves into ashes and mix Jaali (*Acacia farnesiana*, Mimosaceae) tree crushed leaves and pack it over the fractured bone.
3. Crush and prepare a paste of *Antrike* (*Dodonaea viscosa*, Sapindaceae) leaves with 2 raw eggs and apply it on the fractured bone and wrap it with a roll of gauze or clean dry cotton cloth.

Treatment of Wounds

1. Topical application of Castor (*Ricinus communis*, Euphorbiaceae) oil on the wounded region.
2. Maggot wounds: crush 2 bulbs of Garlic (*Allium sativum*, Amaryllidaceae), boil it along with coconut oil and apply on the wounds.

Treatment for poisonous bites

Grind Aadusoge (*Adhatoda vasica*, Acanthaceae) leaves in buttermilk and drenching of this preparation immediately will cause vomiting.

Treatment for broken horn

Topical application of paste of lime along with red soil.

Yoke gall

1. A handful of leaves of Heere kai balli (*Luffa acutangula*, Cucurbitaceae) are crushed and extracted juice applied on the swollen area.
2. Crush a hand full leaves of Hatthi (*Gossypium hirsutum*, Malvaceae) along with 2 cloves of Garlic (*Allium sativum*, Amaryllidaceae) and Jaggery. Apply this paste on the lesion.
3. Burn Raagi (*Eleusine coracana*, Poaceae) plant stems and apply the ash.

Babesiosis

1. Mix equal quantities of Manthya (*Trigonella foenum-graecum*, Fabaceae), Avare (*Lablab purpureus*, Fabaceae), and Candy (kallu sakkare) is mixed in buttermilk or along with tender coconut water and drenched twice or thrice a day.
2. Crush Banana (*Musa paradisiaca*, Musaceae) pseudo stem and extract the juice, and mix with Jeera (*Cuminum cyminum*, Apiaceae) and Manthya (*Trigonella foenum-graecum*, Fabaceae). Give this formulation 2-3 times in a day for 3 days.

Mastitis

1. Crush and mix equal quantities of Brahma dande (*Echinops echinatus*, Asteraceae), Sambrani (*Plectranthus amboinicus*, Lamiaceae) leaves are mixed with 7-8 Garlic (*Allium sativum*, Amaryllidaceae) cloves and applied on the udder along with honey.
2. Prepare raw turmeric (*Curcuma longa*, Zingiberaceae) paste along with Lemon (*Citrus aurantifolia*, Rutaceae) and apply on the udder during the initial stages.

Treatment of Dermatitis

1. Grind Mustard seeds (*Brassica juncea* L., Brassicaceae) into a fine paste using little and apply on the affected area.
2. Topical application of Tulasi (*Ocimum sanctum*, Lamiaceae) leaves juice along with salt.

Treatment for Cough and Fever

1. Crush dry Ginger (*Zingiber officinale*, Zingiberaceae) and apply it in and around nostrils.
2. Crush one handful of Pepper (*Piper nigrum*, Piperaceae) with equal quantities of Green chili (*Capsicum annum*, Solanaceae) and Garlic (*Allium sativum*, Amaryllidaceae). Give this formulation orally along with water every hour for a day.
3. Seven to eight spoons of roasted Mustard seeds (*Brassica juncea*, Brassicaceae) grinded along with salt in half a litre of water, given twice for three days.
4. Grind about 4-5 pieces of roots of Nuge (*Moringa oleifera*, *Moringa oleifera*) with Pepper (*Piper nigrum*, Piperaceae) and give to the animal twice in a day along with hot water.


Indigenous knowledge is extensively prevalent in traditional Indian lifestyle and rural livestock keepers have developed technologies, approaches and production systems based on knowledge gained through generations of experience, keen observations and needs.


TRADITIONAL LIVESTOCK PRACTICES IN DAIRY HERD MANAGEMENT


Heat detection	Animal will act restless and repeated mooing; Eats less and yield comparatively less milk. Mucous discharge from the vagina and vaginal area will be reddish. Mounts on another cow.
Breeding	If the animal comes into heat in the morning then mate the animal in the evening and if animal comes into heat during night then mate the animal next day morning.
Insemination	After insemination animal is not allowed to sleep or lie
Care during pregnancy	Separate the pregnant animal from the herd and give feed properly as per requirement and take care of feeding practices properly.
Feed during pregnancy	Feed should include following balanced protein and energy rich diet. Wheat bran, cotton seed or ground nut cake, Maize and all types of greens.
Facilitating delivery	Do not interfere with the natural process. Only if there is a serious problem, especially if it is first calving, assisted by pulling the legs very slowly till the head comes out.
Postnatal care	Vulval blood stains are removed and animal is washed in the sun or with warm water. A paste of turmeric and coconut oil or any other oil is smeared over the perineal region to prevent infestation or maggot formation. Feed Jaggery along with Copra and Bengal gram or A mixture of Neem, Bajra and agathi daily for a week which will help in cleaning of uterus.
Calf care	Immediately after birth lift the calf from its hind limb, clear all the mucous from its mouth and nose, if calf is not properly breathing give artificial respiration. Turmeric and coconut oil paste is applied on the navel to prevent infection. Keep the calf near mother and allow her to lick the calf. Tender golden hoof of the calf can be removed.
To improve vigor of bull calf	In new born male calves, hump area is twisted slightly and pulled upwards for better and prominent growth appearance.


MEDICINAL PLANTS USED IN ANIMAL HEALTH CARE AND MANAGEMENT


BELGAUM DISTRICT


Botanical name	<i>Citrullus colocynthis</i>	
Family	Cucurbitaceae	
Parts used	Seeds	
Vernacular name	Kaadukavadekai	
Medicinal uses	Treatment of indigestion, & bloat	
Life forms	Creeper	
Livestock	Cattle	


Botanical name	<i>Ricinus communis</i>	
Family	Euphorbiaceae	
Parts used	Leaves	
Vernacular name	Castor	
Medicinal uses	To treat bloat	
Life forms	Shrub	
Livestock	Cattle	


Botanical name	<i>Bambusa arundinacea</i>	
Family	Poaceae	
Parts used	Leaves	
Vernacular name	Bidiru	
Medicinal uses	Treatment for retention of placenta	
Life forms	Grass	
Livestock	Cattle	


Botanical name	<i>Cajanus cajan</i>	
Family	Fabaceae	
Parts used	Seeds	
Vernacular name	Togari	
Medicinal uses	Treatment for diarrhoea	
Life forms	Shrub	
Livestock	Cattle	


Botanical name	<i>Areca catechu</i>	
Family	Areceae	
Parts used	Nut	
Vernacular name	Adike	
Medicinal uses	Treatment for diarrhoea	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Sorghum bicolor</i>	
Family	Poaceae	
Parts used	Seeds	
Vernacular name	Jowar	
Medicinal uses	Treatment for diarrhoea	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Coriandrum sativum</i>	
Family	Apiaceae	
Parts used	Leaves	
Vernacular name	Coriander	
Medicinal uses	To induce heat and breeding	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Curcuma longa</i>	
Family	Zingiberaceae	
Parts used	Leaves	
Vernacular name	Turmeric	
Medicinal uses	To induce heat and breeding	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Vigna unguiculata</i>	
Family	Fabaceae	
Parts used	Seeds	
Vernacular name	Alsandi	
Medicinal uses	To induce heat and breeding	
Life forms	Creeper	
Livestock	Cattle	


Botanical name	<i>Thespesia populnea</i>	
Family	Malvaceae	
Parts used	Seeds	
Vernacular name	Bangali kai	
Medicinal uses	To induce heat and breeding	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Acacia farnesiana</i>	
Family	Mimosaceae	
Parts used	Leaves	
Vernacular name	Banni	
Medicinal uses	Treatment for repeat breeding problems	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Aloe vera</i>	
Family	Liliaceae	
Parts used	Leaves	
Vernacular name	Lolesara	
Medicinal uses	Treatment for indigestion & wounds	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Moringa oleifera</i>	
Family	Moringaceae	
Parts used	Leaves	
Vernacular name	Nugge	
Medicinal uses	Treatment for repeat breeding problems	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Aegle marmelos</i> L.	
Family	Rutaceae	
Parts used	Leaves	
Vernacular name	Bilwapatre	
Medicinal uses	Diarrhea and wounds	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Musa paradisiaca</i>	
Family	Musaceae	
Parts used	Stem	
Vernacular name	Baalegida	
Medicinal uses	Treatment for urinary disease	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Abelmoschus esculentus</i>	
Family	Malvaceae	
Parts used	Fruit	
Vernacular name	Bende gida	
Medicinal uses	Treatment for retention of placenta	
Life forms	Shrub	
Livestock	Cattle	


Botanical name	<i>Syzygium aromaticum</i>	
Family	Myrtaceae	
Parts used	Fruit	
Vernacular name	Lavanga	
Medicinal uses	Treatment for bone fracture	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Zornia gibbosa</i>	
Family	Fabaceae	
Parts used	Leaves	
Vernacular name	Harada hachaga Gida	
Medicinal uses	Treatment for bone fracture	
Life forms	Herb	
Livestock	Cattle	

Botanical name	<i>Luffa acutangula</i>	
Family	Cucurbitaceae	
Parts used	Leaves	
Vernacular name	Heere kai	
Medicinal uses	Treatment for wounds	
Life forms	Creeper	
Livestock	Cattle	


Botanical name	<i>Eucalyptus globulus</i>	
Family	Myrtaceae	
Parts used	Leaves	
Vernacular name	Neelagiri	
Medicinal uses	Treatment for fever	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Datura stramonium</i>	
Family	Solanaceae	
Parts used	Leaves	
Vernacular name	Madhugunika	
Medicinal uses	Treatment for fever	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Abrus precatorius</i>	
Family	Fabaceae	
Parts used	Leaves	
Vernacular name	Gulaganji	
Medicinal uses	Treatment for uterine prolapse	
Life forms	Creeper	
Livestock	Cattle	


Botanical name	<i>Cinnamomum zeylancua</i>	
Family	Lauraceae	
Parts used	Bark	
Vernacular name	Dalchini	
Medicinal uses	Treatment for bone fracture	
Life forms	Tree	
Livestock	Cattle	


BENGALURU RURAL DISTRICT


Botanical name	<i>Ferula asafoetida</i>	
Family	Apiaceae	
Parts used	Resin/Gum	
Vernacular name	Engu	
Medicinal uses	Treatment for indigestion, and wounds bloat	
Life forms	Shrub	
Livestock	Cattle and buffalo	


Botanical name	<i>Acorus calamus</i>	
Family	Araceae	
Parts used	Rhizome	
Vernacular name	Baje	
Medicinal uses	Treatment for indigestion	
Life forms	Herb	
Livestock	Cattle and buffalo	


Botanical name	<i>Phoenix sylvestris</i>	
Family	Areaceae	
Parts used	Roots	
Vernacular name	Echalu	
Medicinal uses	Treatment for diarrhea, coccidiosis and divertic	
Life forms	Tree	
Livestock	Cattle and buffalo	


Botanical name	<i>Tinospora cordifolia</i>	
Family	Menispermaceae	
Parts used	Leaves, stem	
Vernacular name	Amritha balli	
Medicinal uses	Treatment for fever	
Life forms	Creeper	
Livestock	Sheep and Goat	


Botanical name	<i>Allium sativum</i>	
Family	Amaryllidaceae	
Parts used	Bulb	
Vernacular name	Bellulli	
Medicinal uses	Treatment for lack of appetite, bloat, and wounds	
Life forms	Herb	
Livestock	Goat and sheep	


Botanical name	<i>Macrotyloma uniflorum</i>	
Family	Fabaceae	
Parts used	Seeds	
Vernacular name	Huruli	
Medicinal uses	Treatment for delayed parturition, and urinary problems	
Life forms	Herb	
Livestock	Cattle and buffalo	


Botanical name	<i>Bambusa arundinacea</i>	
Family	Poaceae	
Parts used	Leaves	
Vernacular name	Bidiru	
Medicinal uses	To remove placenta	
Life forms	Grass	
Livestock	Cattle and buffalo	


Botanical name	<i>Aloe vera</i>	
Family	Liliaceae	
Parts used	Leaves	
Vernacular name	Lolesara	
Medicinal uses	Treating wounds, & lack of appetite	
Life forms	Herb	
Livestock	Cattle and buffalo	


Botanical name	<i>Leucas aspera</i>	
Family	Lamiaceae	
Parts used	Leaves	
Vernacular name	Tumbegida	
Medicinal uses	To treat wounds, and poisons, fever, and cough	
Life forms	Herb	
Livestock	Cattle and buffalo	


Botanical name	<i>Cuminum cyminum</i>	
Family	Apiaceae	
Parts used	Seeds	
Vernacular name	Jirige	
Medicinal uses	To treat lack of appetite, & diarrhea	
Life forms	Herb	
Livestock	Cattle and buffalo	


Botanical name	<i>Trigonella foenum-graecum</i>	
Family	Fabaceae	
Parts used	Leaves	
Vernacular name	Menthya	
Medicinal uses	To treat diarrhea and increase milk	
Life forms	Shrub	
Livestock	Cattle, buffalo, goat and sheep	


Botanical name	<i>Euphorbia hirta</i>	
Family	Euphorbiaceae	
Parts used	Leaves	
Vernacular name	Acchesoppu	
Medicinal uses	To treat wound and remove placenta	
Life forms	Herb	
Livestock	Cattle, buffalo, goat and sheep	


Botanical name	<i>Pongamia pinnata</i>	
Family	Fabaceae	
Parts used	Bark, leaves and oil	
Vernacular name	Honge	
Medicinal uses	Treatment for bone fracture	
Life forms	Tree	
Livestock	Cattle and buffalo	


Botanical name	<i>Cassia fistula</i>	
Family	Caesalpinioideaceae	
Parts used	Bark, leaves and fruits	
Vernacular name	Kakkechakke	
Medicinal uses	Treatment for skin disease & jaundice	
Life forms	Tree	
Livestock	Cattle and buffalo	

Botanical name	<i>Azadirachta indica</i>	
Family	Meliaceae	
Parts used	Leaves	
Vernacular name	Bevinasoppu	
Medicinal uses	To treat swelling of shoulder	
Life forms	Tree	
Livestock	Bulls	


Botanical name	<i>Alstonia scholaris</i>	
Family	Apocynaceae	
Parts used	Leaves	
Vernacular name	Beppaalegida	
Medicinal uses	To treat fever and skin disorders	
Life forms	Tree	
Livestock	Cattle and buffalo	


Botanical name	<i>Phaseolus roxburghii</i>	
Family	Fabaceae	
Parts used	Pulse	
Vernacular name	Uddinabele	
Medicinal uses	To treat broken horn, to increase milk and semen	
Life forms	Creeper	
Livestock	Cattle and buffalo	


Botanical name	<i>Mimosa pudica</i>	
Family	Mimosaceae	
Parts used	Whole plant	
Vernacular name	Muttidaremuni	
Medicinal uses	Treatment for mastitis, bleeding and dysentery	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Citrus aurantifolia</i>	
Family	Rutaceae	
Parts used	Fruit	
Vernacular name	Lemon	
Medicinal uses	To treat mastitis, and indigestion	
Life forms	Shrub	
Livestock	Cattle	


BIDAR DISTRICT


Botanical name	<i>Sapindus mukorossi</i>	
Family	Sapindaceae	
Parts used	Fruit	
Vernacular name	Reetha	
Medicinal uses	Treatment for snake bite	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Lawsonia inermis</i> L.	
Family	Lythraceae	
Parts used	Leaves	
Vernacular name	Henna	
Medicinal uses	To treat mastitis	
Life forms	Shrub	
Livestock	Cattle	


Botanical name	<i>Terminalia chebula</i>	
Family	Combretaceae	
Parts used	Seeds	
Vernacular name	Alale kai	
Medicinal uses	To treat mastitis & Indigestion	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Momordica charantia</i>	
Family	Cucurbitaceae	
Parts used	Leaves	
Vernacular name	Bitter guard	
Medicinal uses	Treatment for bloat	
Life forms	Creeper	
Livestock	Cattle, buffalo goat and sheep	


Botanical name	<i>Mimosa pudica</i>	
Family	Mimosaceae	
Parts used	Entire plants	
Vernacular name	Multidaremuni	
Medicinal uses	Treatment for mastitis	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Trachyspermum ammi</i>	
Family	Apiaceae	
Parts used	Seeds	
Vernacular name	Ajwain	
Medicinal uses	To treat bloat and indigestion	
Life forms	Herb	
Livestock	Cattle, buffalo, goat and sheep	


Botanical name	<i>Musa paradisiaca</i>	
Family	Musaceae	
Parts used	Entire plant	
Vernacular name	Banana	
Medicinal uses	To treat foot and mouth disease	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Curcuma longa</i>	
Family	Zingiberaceae	
Parts used	Rhizome	
Vernacular name	Turmeric	
Medicinal uses	To treat paralysis	
Life forms	Herb	
Livestock	Cattle and buffalo,	


Botanical name	<i>Calotropis gigantea</i>	
Family	Asclepiadaceae	
Parts used	Leaves	
Vernacular name	Ekkaplant	
Medicinal uses	To treat maggots	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Piper nigrum</i>	
Family	Piperaceae	
Parts used	Fruits	
Vernacular name	Pepper	
Medicinal uses	To treat maggots	
Life forms	Creeper	
Livestock	Cattle	


Botanical name	<i>Ficus benghalensis</i>	
Family	Moraceae	
Parts used	Leaves	
Vernacular name	Banyan	
Medicinal uses	Treatment for corneal opacity, and fracture	
Life forms	Tree	
Livestock	Cattle	

Botanical name	<i>Ricinus communis</i>	
Family	Euphorbiaceae	
Parts used	Seeds	
Vernacular name	Castor	
Medicinal uses	To treat foot and mouth disease	
Life forms	Shrub	
Livestock	Cattle	


Botanical name	<i>Coriandrum sativum</i>	
Family	Apiaceae	
Parts used	Seeds	
Vernacular name	Coriander	
Medicinal uses	Treatment for bloat	
Life forms	Herb	
Livestock	Cattle and buffalo	


Botanical name	<i>Allium sativum</i>	
Family	Amaryllidaceae	
Parts used	Bulb	
Vernacular name	Garlic	
Medicinal uses	Treatment for bloat	
Life forms	Herb	
Livestock	Goat and Sheep	


Botanical name	<i>Lantana camara</i>	
Family	Verbenaceae	
Parts used	Leaves	
Vernacular name	Lambani	
Medicinal uses	To treat yoke galls on bullocks	
Life forms	Shrub	
Livestock	Bull	


Botanical name	<i>Argemone mexicana</i>	
Family	Papaveraceae	
Parts used	Leaves	
Vernacular name	Brahmadaani	
Medicinal uses	To treat corneal opacity	
Life forms	Herb	
Livestock	Cattle	


BIJAPUR DISTRICT


Botanical name	<i>Curcuma longa</i>	
Family	Zingiberaceae	
Parts used	Rhizome	
Vernacular name	Arashina	
Medicinal uses	Treatment for Mastitis	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Atalantia monophylla</i>	
Family	Rutaceae	
Parts used	Fruit	
Vernacular name	Kanchi/Kanchuhuli	
Medicinal uses	To treat diarrhoea	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Ricinus communis</i>	
Family	Euphorbiaceae	
Parts used	Seed	
Vernacular name	Castor (haralu)	
Medicinal uses	To treat broken horn, constipation and wounds	
Life forms	Shrub	
Livestock	Cattle	


Botanical name	<i>Aloe vera</i>	
Family	Liliaceae	
Parts used	Leaves	
Vernacular name	Lole sara	
Medicinal uses	To treat bone fracture, induce heat and mastitis	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Triticum aestivum</i>	
Family	Poaceae	
Parts used	Grain	
Vernacular name	Wheat (Godhi)	
Medicinal uses	To remove placenta	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Musa paradisiaca</i>	
Family	Musaceae	
Parts used	Pseudostem	
Vernacular name	Baalegida	
Medicinal uses	To treat wounds and urinary problems	
Life forms	Herb	
Livestock	Cattle, buffalo, sheep and goat	


Botanical name	<i>Camellia sinensis</i>	
Family	Theaceae	
Parts used	Leaves	
Vernacular name	Tea	
Medicinal uses	To treat fever and dysentery	
Life forms	Shrub	
Livestock	Cattle, buffalo, sheep and goat	

Botanical name	<i>Piper nigrum</i>	
Family	Piperaceae	
Parts used	Fruit	
Vernacular name	Kari menasu	
Medicinal uses	To treat fever, cough and indigestion	
Life forms	Creeper	
Livestock	Cattle, buffalo, sheep and goat	


Botanical name	<i>Citrus limon</i>	
Family	Rutaceae	
Parts used	Fruit	
Vernacular name	Nimbe	
Medicinal uses	To treat fever	
Life forms	Tree	
Livestock	Cattle, buffalo, sheep and goat	


Botanical name	<i>Bambusa vulgaris</i>	
Family	Poaceae	
Parts used	Leaves	
Vernacular name	Bidiru	
Medicinal uses	To remove placenta	
Life forms	Grass	
Livestock	Cattle, buffalo, sheep and goat	


Botanical name	<i>Vigna mungo</i>	
Family	Fabaceae	
Parts used	Gram	
Vernacular name	Uddinabele	
Medicinal uses	Treatment for bloat	
Life forms	Creeper	
Livestock	Cattle	


Botanical name	<i>Triumfetta rhomboidea</i>	
Family	Tiliaceae	
Parts used	Roots	
Vernacular name	Vatevategida	
Medicinal uses	Treatment for retention of placenta	
Life forms	Herb	
Livestock	Cattle	


CHICKAMAGALUR DISTRICT


Botanical name	<i>Zingiber officinale</i>	
Family	Zingiberaceae	
Parts used	Rhizome	
Vernacular name	Shunti	
Medicinal uses	Treatment for indigestion, cough, and lack of appetite	
Life forms	Herb	
Livestock	Cattle and buffalo	


Botanical name	<i>Syzygium aromaticum</i>	
Family	Myrtaceae	
Parts used	Flower buds	
Vernacular name	Lavanga	
Medicinal uses	Treatment for indigestion, mastitis, lack of appetite	
Life forms	Shrub	
Livestock	Goat and sheep	


Botanical name	<i>Piper nigrum</i> L.	
Family	Piperaceae	
Parts used	Fruit and dried unripe Fruits	
Vernacular name	Kaalumenasu	
Medicinal uses	To treat indigestion, constipation, and mastitis	
Life forms	Creeper	
Livestock	Cattle and buffalo	


Botanical name	<i>Cocos nucifera</i>	
Family	Areaceae	
Parts used	Nut and tender coconut	
Vernacular name	Tenginamara	
Medicinal uses	To treat indigestion, bloat, bone fracture, babesiosis, diarrhea, and milk fever	
Life forms	Tree	
Livestock	Goat and sheep	


Botanical name	<i>Macrotyloma uniflorum</i>	
Family	Fabaceae	
Parts used	Leaves and Grains	
Vernacular name	Huruligida	
Medicinal uses	To induce heat and breeding, care after insemination, for delayed parturition and to remove placenta.	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Aloe vera</i>	
Family	Liliaceae	
Parts used	Leaves	
Vernacular name	Lole rasa	
Medicinal uses	To treat bone fracture, induce heat, and mastitis	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Bambusa vulgaris</i>	
Family	Poaceae	
Parts used	Leaves	
Vernacular name	Bidiru	
Medicinal uses	To treat delayed parturition and to remove placenta	
Life forms	Grass	
Livestock	Cattle	


Botanical name	<i>Asparagus racemosus</i>	
Family	Liliaceae	
Parts used	Root	
Vernacular name	Shataavari	
Medicinal uses	To improve milk yield	
Life forms	Shrub	
Livestock	Cattle and buffalo	


Botanical name	<i>Ricinus communis</i>	
Family	Euphorbiaceae	
Parts used	Seeds and Leaves	
Vernacular name	Haralugida	
Medicinal uses	To treat wounds, bloat, and bone fracture	
Life forms	Shrub	
Livestock	Cattle, buffalo, goat and sheep	


Botanical name	<i>Calotropis procera</i>	
Family	Apocynaceae	
Parts used	Leaves and flowers	
Vernacular name	Ekkegida	
Medicinal uses	To treat bone fracture	
Life forms	Shrub	
Livestock	Cattle, goat and sheep	


Botanical name	<i>Azadirachta indica</i>	
Family	Meliaceae	
Parts used	Leaves	
Vernacular name	Bevu	
Medicinal uses	To treat endo-parasites as well as ecto-parasites	
Life forms	Tree	
Livestock	Cattle, buffalo, goat and sheep	


Botanical name	<i>Adhatoda vasica</i>	
Family	Acanthaceae	
Parts used	Leaves and roots	
Vernacular name	Aadusoge	
Medicinal uses	To treat cough and fever	
Life forms	Shrub	
Livestock	Cattle	


Botanical name	<i>Artocarpus heterophyllus</i>	
Family	Moraceae	
Parts used	Latex	
Vernacular name	Halasinamara	
Medicinal uses	To treat dog bite	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Plectranthus amboinicus</i>	
Family	Lamiaceae	
Parts used	Leaves	
Vernacular name	Sambrani	
Medicinal uses	To treat mastitis, fever, and allergies	
Life forms	Herb	
Livestock	Cattle, buffalo, goat and sheep	


Botanical name	<i>Allium sativum</i>	
Family	Amaryllidaceae	
Parts used	Bulb	
Vernacular name	Belluli	
Medicinal uses	To treat indigestion, lack of appetite, mastitis, and cough	
Life forms	Herb	
Livestock	Cattle, buffalo, goat and sheep	


Botanical name	<i>Trigonella foenum-graecum</i>	
Family	Fabaceae	
Parts used	Seeds	
Vernacular name	Mentya	
Medicinal uses	To treat indigestion, lack of appetite, and babesiosis	
Life forms	Herb	
Livestock	Cattle, buffalo, goat and sheep	


Botanical name	<i>Lablab purpureus</i>	
Family	Fabaceae	
Parts used	Seeds	
Vernacular name	Avaregida	
Medicinal uses	Treatment for babesiosis	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Acorus calamus</i> L.	
Family	Araceae	
Parts used	Rhizome	
Vernacular name	Bajekone	
Medicinal uses	To treat bloat	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Trachyspermum ammi</i>	
Family	Apiaceae	
Parts used	Seeds	
Vernacular name	Omkaalu	
Medicinal uses	Treatment for bloat	
Life forms	Herb	
Livestock	Cattle, buffalo, goat and sheep	


Botanical name	<i>Musa paradisiaca</i>	
Family	Musaceae	
Parts used	Pseudo stem	
Vernacular name	Baalegida	
Medicinal uses	To treat urinary problems	
Life forms	Herb	
Livestock	Cattle, buffalo, goat and sheep	


Botanical name	<i>Piper longum</i>	
Family	Piperaceae	
Parts used	Leaves	
Vernacular name	Ipligida	
Medicinal uses	To treat indigestion, bloat, & cough	
Life forms	Climber	
Livestock	Cattle and goats	


Botanical name	<i>Allium cepa</i>	
Family	Amaryllidaceae	
Parts used	Bulb	
Vernacular name	Eerulli	
Medicinal uses	To treat indigestion, & Lack of appetite	
Life forms	Herb	
Livestock	Cattle, buffalo, goat and sheep	


Botanical name	<i>Mimosa pudica</i>	
Family	Mimosaceae	
Parts used	Roots and leaves	
Vernacular name	Muttadare muni	
Medicinal uses	To treat coccidiosis bleeding	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Elettaria cardamomum</i>	
Family	Zingiberaceae	
Parts used	Seeds	
Vernacular name	Elakki	
Medicinal uses	To treat indigestion, & lack of appetite	
Life forms	Herb	
Livestock	Goat and sheep	


Botanical name	<i>Cuminum cyminum</i>	
Family	Apiaceae	
Parts used	Seeds	
Vernacular name	Jeerige	
Medicinal uses	To treat indigestion, & lack of appetite	
Life forms	Herb	
Livestock	Cattle, buffalo, goat and sheep	


Botanical name	<i>Euphorbia hirta</i>	
Family	Euphorbiaceae	
Parts used	Leaves	
Vernacular name	Acchesoppu	
Medicinal uses	To treat swelling of shoulder, wounds, and coccidiosis	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Cissus quadrangularis</i>	
Family	Vitaceae	
Parts used	Leaves	
Vernacular name	Mungaraballi	
Medicinal uses	To treat fractures	
Life forms	Creeper	
Livestock	Cattle	


Botanical name	<i>Ficus racemosa</i> L.	
Family	Moraceae	
Parts used	Milky sap	
Vernacular name	Atthimara	
Medicinal uses	To treat urinary problems, & babesiosis	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Curcuma longa</i>	
Family	Zingiberaceae	
Parts used	Rhizome	
Vernacular name	Arishina	
Medicinal uses	To treat mastitis, infection, and skin disease	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Abrus precatorius</i>	
Family	Fabaceae	
Parts used	Seeds, roots, leaves	
Vernacular name	Bili gulaganji	
Medicinal uses	To treat retention of placenta	
Life forms	Climber	
Livestock	Cattle	


Botanical name	<i>Abrus precatorius</i>	
Family	Fabaceae	
Parts used	Seeds, roots, leaves	
Vernacular name	Kempugulaganji	
Medicinal uses	To treat retention of placenta	
Life forms	Climber	
Livestock	Cattle	


Botanical name	<i>Moringa oleifera</i>	
Family	Moringaceae	
Parts used	Leaves	
Vernacular name	Nugge	
Medicinal uses	To treat wound, and fever	
Life forms	Tree	
Livestock	Sheep	


Botanical name	<i>Tinospora cordifolia</i>	
Family	Menispermaceae	
Parts used	stem and Leaves	
Vernacular name	Amrutaballi	
Medicinal uses	To treat fever	
Life forms	Climbing shrub	
Livestock	Cattle	

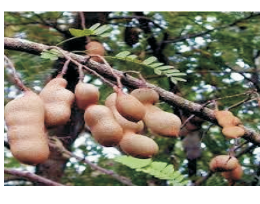
Botanical name	<i>Luffa acutangula</i>	
Family	Cucurbitaceae	
Parts used	Leaves	
Vernacular name	Heerekayi balli	
Medicinal uses	To treat swelling of shoulder	
Life forms	Creeper	
Livestock	Cattle	


Botanical name	<i>Eleusine coracana</i>	
Family	Poaceae	
Parts used	Grass	
Vernacular name	Raagi	
Medicinal uses	To treat swelling of shoulder	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Echinops echinatus</i>	
Family	Asteraceae	
Parts used	Whole plant	
Vernacular name	Brahmadande	
Medicinal uses	To treat mastitis	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Citrus limon</i>	
Family	Rutaceae	
Parts used	Fruit	
Vernacular name	Nimbe	
Medicinal uses	To treat mastitis and indigestion	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Prosopis juliflora</i>	
Family	Fabaceae	
Parts used	Bark	
Vernacular name	Jalimara	
Medicinal uses	To treat bone fracture	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Tamarindus indica</i>	
Family	Fabaceae	
Parts used	Bark	
Vernacular name	Hunasemara	
Medicinal uses	To treat bone fracture	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Oxalis corniculata</i>	
Family	Oxalidaceae	
Parts used	Leaves	
Vernacular name	Hulisoppu	
Medicinal uses	To treat scorpion bite and fever	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Punica granatum</i>	
Family	Lythraceae	
Parts used	Fruit	
Vernacular name	Daalimbe	
Medicinal uses	To treat diarrhoea	
Life forms	Shrub	
Livestock	Cattle, buffalo, goat and sheep	


Botanical name	<i>Trachyspermum ammi</i>	
Family	Apiaceae	
Parts used	Seeds	
Vernacular name	Ajvaana (Omkalu)	
Medicinal uses	To treat bloat and lack of appetite	
Life forms	Herb	
Livestock	Cattle, buffalo, goat and sheep	

Botanical name	<i>Caesalpinia crista</i>	
Family	Caesalpiniaaceae	
Parts used	Leaves	
Vernacular name	Gajjaga	
Medicinal uses	To treat endo-parasites	
Life forms	Herb	
Livestock	Sheep	


Botanical name	<i>Piper betle</i>	
Family	Piperaceae	
Parts used	Leaves	
Vernacular name	Veelyadele	
Medicinal uses	To treat cough	
Life forms	Creeper	
Livestock	Sheep	


Botanical name	<i>Arachis hypogaea</i>	
Family	Fabaceae	
Parts used	Nuts / seed	
Vernacular name	Shenga	
Medicinal uses	Nutritive food	
Life forms	Herb	
Livestock	Sheep	


Botanical name	<i>Rubia cordifolia</i>	
Family	Rubiaceae	
Parts used	Leaves	
Vernacular name	Siragathi	
Medicinal uses	Treatment for indigestion	
Life forms	Herb	
Livestock	Sheep	


Botanical name	<i>Gossypium hirsutum</i>	
Family	Malvaceae	
Parts used	Leaves	
Vernacular name	Hatthi	
Medicinal uses	To treat Yoke gall, and increase milk production	
Life forms	Shrub	
Livestock	Bull and cow	


GADAGA DISTRICT


Botanical name	<i>Foeniculum vulgare</i>	
Family	Apiaceae	
Parts used	Seeds	
Vernacular name	Badesoppu	
Medicinal uses	To treat lack of appetite	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Withania somnifera</i>	
Family	Solanaceae	
Parts used	Leaves	
Vernacular name	Ashwagandha	
Medicinal uses	To treat lack of appetite, and increase semen in bulls	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Cassia angustifolia</i>	
Family	Caesalpiniaceae	
Parts used	Leaves	
Vernacular name	Sonamukhi	
Medicinal uses	Treatment of indigestion	
Life forms	Shrub	
Livestock	Cattle	


Botanical name	<i>Ficus religiosa</i>	
Family	Moraceae	
Parts used	Leaves	
Vernacular name	Aralimara	
Medicinal uses	To treat lack of appetite and skin disease	
Life forms	Tree	
Livestock	Cattle	

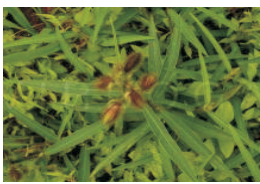
Botanical name	<i>Emblica officinalis</i>	
Family	Euphorbiaceae	
Parts used	Leaves	
Vernacular name	Nellikai	
Medicinal uses	To treat lack of appetite	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Terminalia bellirica</i>	
Family	Combretaceae	
Parts used	Leaves	
Vernacular name	Thaare	
Medicinal uses	To treat lack of appetite, & cough	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Ricinus communis</i>	
Family	Euphorbiaceae	
Parts used	Seeds	
Vernacular name	Haralu	
Medicinal uses	To treat bloat, constipation, and skin problems	
Life forms	Shrub	
Livestock	Cattle	


Botanical name	<i>Cucumis sativus</i>	
Family	Cucurbitaceae	
Parts used	Seeds	
Vernacular name	Southe kai	
Medicinal uses	To treat urinary problems	
Life forms	Creeper	
Livestock	Cattle	


Botanical name	<i>Cucurbita maxima</i>	
Family	Cucurbitaceae	
Parts used	Seeds	
Vernacular name	Kumbala kai	
Medicinal uses	To treat urinary problems	
Life forms	Creeper	
Livestock	Cattle	


Botanical name	<i>Crotalaria calycina</i>	
Family	Fabaceae	
Parts used	Leaves	
Vernacular name	Bekkinatharadu	
Medicinal uses	To treat urinary problems	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Abrus precatorius</i> L.	
Family	Fabaceae	
Parts used	Leaves	
Vernacular name	Gulaganji	
Medicinal uses	Treatment for retention of placenta	
Life forms	Climber	
Livestock	Cattle	


Botanical name	<i>Soymdia febrifuga</i>	
Family	Meliaceae	
Parts used	Leaves	
Vernacular name	Maamsarohinisasya	
Medicinal uses	To increase milk yield	
Life forms	Climber	
Livestock	Cattle	


Botanical name	<i>Holostemma ada-kodien</i>	
Family	Asclepiadaceae	
Parts used	Leaves	
Vernacular name	Jeevanthi	
Medicinal uses	To increase milk yield	
Life forms	Climber	
Livestock	Cattle	


Botanical name	<i>Tridax procumbens</i>	
Family	Asteraceae	
Parts used	Leaves	
Vernacular name	Teekesoppu	
Medicinal uses	To treat wounds, & stops bleeding	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Embelia ribes</i>	
Family	Myrsinaceae	
Parts used	Seeds	
Vernacular name	Vayuvilanga	
Medicinal uses	Treatment of endo-parasites	
Life forms	Climber	
Livestock	Cattle	

Botanical name	<i>Echinops echinatus</i>	
Family	Asteraceae	
Parts used	Leaves	
Vernacular name	Brahmadande	
Medicinal uses	Treatment of ecto-parasites	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Ocimum basilicum</i>	
Family	Lamiaceae	
Parts used	Leaves	
Vernacular name	Tulsi	
Medicinal uses	To treat cough and fever	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Achyranthes aspera</i>	
Family	Amaranthaceae	
Parts used	Leaves	
Vernacular name	Uttarani plant	
Medicinal uses	Treatment of poisonous bites	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Lannea coromandelica</i>	
Family	Anacardiaceae	
Parts used	Leaves	
Vernacular name	Kuratiga	
Medicinal uses	To treat babesiosis	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Carica papaya</i>	
Family	Caricaceae	
Parts used	Leaves	
Vernacular name	Papaya	
Medicinal uses	To treat cough and fever	
Life forms	Tree	
Livestock	Cattle	


GULBARGA DISTRICT


Botanical name	<i>Azadirachta indica</i>	
Family	Meliaceae	
Parts used	Leaves	
Vernacular name	Neem	
Medicinal uses	To clean uterus and physical fitness	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Pennisetum glaucum</i>	
Family	Poaceae	
Parts used	Seeds	
Vernacular name	Bajra	
Medicinal uses	To clean and to treat postpartum uterine prolapse	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Sesbania grandiflora</i>	
Family	Fabaceae	
Parts used	Leaves	
Vernacular name	Agase	
Medicinal uses	To clean and treat uterus, liver problems	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Curcuma longa</i>	
Family	Zingiberaceae	
Parts used	Rhizome	
Vernacular name	Turmeric	
Medicinal uses	To clean and to treat uterine infection	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Asparagus racemosus</i>	
Family	Liliaceae	
Parts used	Roots and leaves	
Vernacular name	Shatavari	
Medicinal uses	To treat postpartum uterine prolapse	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Withania somnifera</i>	
Family	Solanaceae	
Parts used	Roots	
Vernacular name	Ashwagandha	
Medicinal uses	To treat postpartum uterine prolapse	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Saraca asoca</i>	
Family	Caesalpinaceae	
Parts used	Bark	
Vernacular name	Ashoka	
Medicinal uses	To treat postpartum uterine prolapse	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Linum usitatissimum</i>	
Family	Linaceae	
Parts used	Seeds	
Vernacular name	Flax	
Medicinal uses	Treatment for retention of placenta	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Sorghum bicolor</i>	
Family	Poaceae	
Parts used	Millet	
Vernacular name	Sorghum	
Medicinal uses	To increase milk yield and to treat indigestion	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Ferula asafoetida</i>	
Family	Apiaceae	
Parts used	Resin	
Vernacular name	Ingu	
Medicinal uses	To treat indigestion, and bloat	
Life forms	Herb	
Livestock	Cattle, buffalo goat and sheep	


Botanical name	<i>Eleusine coracana</i>	
Family	Poaceae	
Parts used	Millet	
Vernacular name	Raagi	
Medicinal uses	To induce heat	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Oxalis corniculata</i>	
Family	Oxalidaceae	
Parts used	Leaves	
Vernacular name	Hulisoppu	
Medicinal uses	To treat diarrhea, and indigestion	
Life forms	Herb	
Livestock	Cattle	

Botanical name	<i>Vigna mungo</i>	
Family	Fabaceae	
Parts used	Seeds	
Vernacular name	Urad dal	
Medicinal uses	Treatment for diarrhea, and increase milk	
Life forms	Herb	
Livestock	Cattle, buffalo	


Botanical name	<i>Chloroxylon swietenia</i>	
Family	Rutaceae	
Parts used	Leaves	
Vernacular name	Channige	
Medicinal uses	To treat hemorrhagic septicemia	
Life forms	Shrub	
Livestock	Cattle	


Botanical name	<i>Datura stramonium</i>	
Family	Solanaceae	
Parts used	Leaves	
Vernacular name	Datura	
Medicinal uses	To treat hemorrhagic septicemia	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Aegle marmelos</i>	
Family	Rutaceae	
Parts used	Leaves	
Vernacular name	Bilwapatra	
Medicinal uses	To treat wounds, and fever	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Arachis hypogaea</i>	
Family	Fabaceae	
Parts used	Seeds and oil	
Vernacular name	Ground nut (kadale kai)	
Medicinal uses	To treat bloat, and improve milk	
Life forms	Herb	
Livestock	Cattle	


MANDYA DISTRICT


Botanical name	<i>Allium cepa</i>	
Family	Amaryllidaceae	
Parts used	Bulb	
Vernacular name	Erulli	
Medicinal uses	To treat indigestion, and lack of appetite, and bloat	
Life forms	Herb	
Livestock	Cattle, buffalo, goat and sheep	


Botanical name	<i>Moringa oleifera</i>	
Family	Moringaceae	
Parts used	Leaves	
Vernacular name	Nuggemara	
Medicinal uses	To treat indigestion, lack of appetite, bloat	
Life forms	Tree	
Livestock	Cattle and buffalo, goat and sheep	


Botanical name	<i>Ferula assa - foetida</i> L.	
Family	Apiaceae	
Parts used	Resin/ Gum	
Vernacular name	Hingu	
Medicinal uses	To treat indigestion, lack of appetite, and bloat	
Life forms	Herb	
Livestock	Cattle buffalo, goat and sheep	


Botanical name	<i>Coriandrum sativum</i> L.	
Family	Apiaceae	
Parts used	Seeds	
Vernacular name	Kottambari	
Medicinal uses	To treat indigestion, lack of appetite, bloat	
Life forms	Herb	
Livestock	Cattle and buffalo, goat and sheep	


Botanical name	<i>Gossypium hirsutum</i> L.	
Family	Malvaceae	
Parts used	Seeds	
Vernacular name	Cotton (Hatti)	
Medicinal uses	To remove placenta	
Life forms	Shrub	
Livestock	Cattle	


Botanical name	<i>Bambusa arundinacea</i>	
Family	Poaceae	
Parts used	Leaves	
Vernacular name	Bidiru	
Medicinal uses	To remove placenta	
Life forms	Grass	
Livestock	Cattle	


Botanical name	<i>Eleusine coracana</i>	
Family	Poaceae	
Parts used	Grass	
Vernacular name	Raagi	
Medicinal uses	To treat babesiosis, & to improve milk	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Aloe vera</i>	
Family	Liliaceae	
Parts used	Leaves	
Vernacular name	Lolesara	
Medicinal uses	To treat poisonous bites, & mastitis	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Aristolochia indica</i> L.	
Family	Aristolochiaceae	
Parts used	Roots, leaves	
Vernacular name	Eshwari balli	
Medicinal uses	To treat indigestion, and lack of appetite and bloat	
Life forms	Creeper	
Livestock	Cattle	


Botanical name	<i>Mimusops elengi</i>	
Family	Sapotaceae	
Parts used	Leaves	
Vernacular name	Bukuna	
Medicinal uses	To treat indigestion, lack of appetite and bloat	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Plectranthus amboinicus</i>	
Family	Lamiaceae	
Parts used	Leaves	
Vernacular name	Doddapatre	
Medicinal uses	To treat indigestion, lack of appetite and bloat	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Azadirachta indica</i>	
Family	Meliaceae	
Parts used	Leaves	
Vernacular name	Neem (Bevu)	
Medicinal uses	To treat indigestion, & lack of appetite	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Trigonella foenum - graecum</i>	
Family	Fabaceae	
Parts used	Leaves	
Vernacular name	Menthya	
Medicinal uses	To remove placenta, and diarrhea	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Momordica charantia</i> L.	
Family	Cucurbitaceae	
Parts used	Leaves	
Vernacular name	Haagala kai	
Medicinal uses	To treat indigestion, lack of appetite and bloat	
Life forms	Climber	
Livestock	Cattle	


Botanical name	<i>Leucas aspera</i>	
Family	Lamiaceae	
Parts used	Leaves	
Vernacular name	Tumbe	
Medicinal uses	To treat viral fever	
Life forms	Herb	
Livestock	Cattle	

Botanical name	<i>Ocimum basilicum</i> L.	
Family	Lamiaceae	
Parts used	Leaves	
Vernacular name	Kaadutulsi	
Medicinal uses	To treat ecto parasites, cough, & fever	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Citrus limon</i>	
Family	Rutaceae	
Parts used	Fruit	
Vernacular name	Nimbe	
Medicinal uses	To treat swelling of neck or throat	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Piper betle</i>	
Family	Piperaceae	
Parts used	Leaves	
Vernacular name	Veelyadele	
Medicinal uses	To treat indigestion, lack of appetite, cough	
Life forms	Creeper	
Livestock	Cattle	


Botanical name	<i>Curcuma longa</i> L.	
Family	Zingiberaceae	
Parts used	Rhizome	
Vernacular name	Turmeric	
Medicinal uses	To treat mastitis	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Piper nigrum</i> L.	
Family	Piperaceae	
Parts used	Seeds	
Vernacular name	Pepper	
Medicinal uses	To treat indigestion, eye problems, and cough	
Life forms	Creeper	
Livestock	Cattle	


DAKSHINA KANNADA DISTRICT


Botanical name	<i>Atalantia monophylla</i>	
Family	Rutaceae	
Parts used	Dried fruit	
Vernacular name	Kaipura/ kanchuhuli	
Medicinal uses	To treat indigestion and lack of appetite	
Life forms	Tree	
Livestock	Cattle, buffalo, sheep and goat	


Botanical name	<i>Anacardium occidentale</i>	
Family	Anacardiaceae	
Parts used	Fruit	
Vernacular name	Geru mara	
Medicinal uses	To treat indigestion and lack of appetite	
Life forms	Tree	
Livestock	Cattle, buffalo, sheep and goat	


Botanical name	<i>Adhatoda vasica</i>	
Family	Acanthaceae	
Parts used	Leaves and roots	
Vernacular name	Aadusoge	
Medicinal uses	To treat indigestion and lack of appetite	
Life forms	Shrub	
Livestock	Cattle, buffalo, sheep and goat	


Botanical name	<i>Punica granatum</i>	
Family	Lythraceae	
Parts used	Fruit	
Vernacular name	Daalimbe	
Medicinal uses	To treat diarrhea	
Life forms	Tree	
Livestock	Cattle, buffalo, sheep and goat	


Botanical name	<i>Saccharum officinarum</i>	
Family	Poaceae	
Parts used	Leaves	
Vernacular name	Kabbu	
Medicinal uses	To induce heat and breeding, & to remove placenta	
Life forms	Grass	
Livestock	Cattle	


Botanical name	<i>Cocos nucifera</i>	
Family	Arecaceae	
Parts used	Flowers and Endosperm	
Vernacular name	Tengu	
Medicinal uses	Post insemination care and to improve milk yield	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Cuminum cyminum</i>	
Family	Apiaceae	
Parts used	Seeds	
Vernacular name	Jeerige	
Medicinal uses	Post insemination care and to improve milk yield	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Ixora coccinea</i>	
Family	Rubiaceae	
Parts used	Entire plant	
Vernacular name	Kaadu kepula	
Medicinal uses	Post insemination care	
Life forms	Shrub	
Livestock	Cattle	


Botanical name	<i>Kalanchoe pinnata</i>	
Family	Crassulaceae	
Parts used	Leaves	
Vernacular name	Kaadubasale	
Medicinal uses	To remove placenta	
Life forms	Shrub	
Livestock	Cattle	


Botanical name	<i>Benincasa hispida</i>	
Family	Cucurbitaceae	
Parts used	Fruit	
Vernacular name	Boodu kumbala kai	
Medicinal uses	To remove placenta	
Life forms	Creeper	
Livestock	Cattle	


Botanical name	<i>Asparagus racemosus</i>	
Family	Liliaceae	
Parts used	Roots and Leaves	
Vernacular name	Shatavari	
Medicinal uses	To remove placenta	
Life forms	Climber	
Livestock	Cattle	


Botanical name	<i>Azadirachta indica</i>	
Family	Meliaceae	
Parts used	Leaves	
Vernacular name	Neem	
Medicinal uses	Treatment for wounds	
Life forms	Tree	
Livestock	Cattle, and Buffalo	


Botanical name	<i>Ananas comosus</i>	
Family	Bromeliaceae	
Parts used	Leaves	
Vernacular name	Ananaasu	
Medicinal uses	To treat endo parasites	
Life forms	Shrub	
Livestock	Cattle	

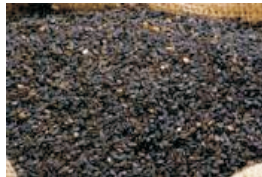
Botanical name	<i>Allium sativum</i>	
Family	Amaryllidaceae	
Parts used	Cloves	
Vernacular name	Bellulli	
Medicinal uses	To treat endo parasites, & wounds	
Life forms	Herb	
Livestock	Cattle, buffalo	


Botanical name	<i>Nicotiana tabacum</i>	
Family	Solanaceae	
Parts used	Leaves	
Vernacular name	Hogesoppu	
Medicinal uses	To treat ecto parasites	
Life forms	Shrub	
Livestock	Cattle, and Buffalo	


Botanical name	<i>Bambusa vulgaris</i>	
Family	Poaceae	
Parts used	Leaves	
Vernacular name	Bidiru	
Medicinal uses	To treat dog bite	
Life forms	Grass	
Livestock	Cattle, and buffalo	


Botanical name	<i>Coriandrum sativum</i>	
Family	Apiaceae	
Parts used	Seeds	
Vernacular name	Kothambari	
Medicinal uses	To stop bleeding, & babesiosis	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Calophyllum inophyllum</i>	
Family	Clusiaceae	
Parts used	Seeds	
Vernacular name	Ponne Kai	
Medicinal uses	To treat broken horn	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Sesamum orientale</i>	
Family	Pedaliaceae	
Parts used	Seeds	
Vernacular name	Ellu	
Medicinal uses	To treat foot and mouth disease	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Eleusine coracana</i>	
Family	Poaceae	
Parts used	Millets	
Vernacular name	Raagi	
Medicinal uses	To treat foot and mouth disease	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Albizia odoratissima</i>	
Family	Mimosaceae	
Parts used	Leaves	
Vernacular name	Basari soppu	
Medicinal uses	To treat mastitis	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Gloriosa superba</i>	
Family	Liliaceae	
Parts used	Creeper	
Vernacular name	Agni balli	
Medicinal uses	For removing maggots	
Life forms	Creeper	
Livestock	Cattle	


Botanical name	<i>Musa paradisiaca</i>	
Family	Musaceae	
Parts used	Pseudo stem	
Vernacular name	Baalegida	
Medicinal uses	To treat urinary problems	
Life forms	Shrub	
Livestock	Cattle	


Botanical name	<i>Dolichos biflorus</i>	
Family	Fabaceae	
Parts used	Seeds	
Vernacular name	Huruli	
Medicinal uses	To remove placenta	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Citrus limon</i>	
Family	Rutaceae	
Parts used	Fruit	
Vernacular name	Nimbe	
Medicinal uses	To treat endo parasites	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Momordica charantia</i>	
Family	Cucurbitaceae	
Parts used	Leaves	
Vernacular name	Haagal kai	
Medicinal uses	To treat endo parasites	
Life forms	Creeper	
Livestock	Cattle	


Botanical name	<i>Cucurbita maxima</i>	
Family	Cucurbitaceae	
Parts used	Peduncle	
Vernacular name	Cheeni kai	
Medicinal uses	To treat poisonous bites	
Life forms	Creeper	
Livestock	Cattle	


Botanical name	<i>Curcuma longa</i>	
Family	Zingiberaceae	
Parts used	Rhizome	
Vernacular name	Arashina	
Medicinal uses	To treat poisonous bites	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Coccinia grandis</i>	
Family	Cucurbitaceae	
Parts used	Leaves	
Vernacular name	Thonde kai	
Medicinal uses	To treat mastitis, & urinary infection	
Life forms	Creeper	
Livestock	Cattle	


Botanical name	<i>Vigna unguiculata</i>	
Family	Fabaceae	
Parts used	Leaves	
Vernacular name	Alasande	
Medicinal uses	To treat mastitis	
Life forms	Creeper	
Livestock	Cattle	


Botanical name	<i>Emblica officinalis</i>	
Family	Euphorbiaceae	
Parts used	Seeds	
Vernacular name	Nellikai	
Medicinal uses	To treat lack of appetite	
Life forms	Tree	
Livestock	Cattle, buffalo, sheep and goat	


Botanical name	<i>Piper betle</i>	
Family	Piperaceae	
Parts used	Leaves	
Vernacular name	Veelyadele	
Medicinal uses	To treat lack of appetite	
Life forms	Creeper	
Livestock	Cattle, buffalo, sheep and goat	

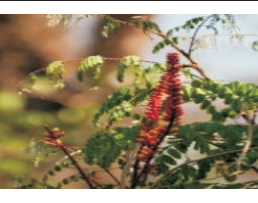
Botanical name	<i>Piper nigrum</i>	
Family	Piperaceae	
Parts used	Seeds	
Vernacular name	Kaalu menasu	
Medicinal uses	To treat lack of appetite	
Life forms	Creeper	
Livestock	Cattle, buffalo, sheep and goat	


Botanical name	<i>Zingiber officinale</i>	
Family	Zingiberaceae	
Parts used	Rhizome	
Vernacular name	Shunti	
Medicinal uses	To treat lack of appetite, & bloat	
Life forms	Herb	
Livestock	Cattle, buffalo, sheep and goat	


Botanical name	<i>Cuminum cyminum</i>	
Family	Apiaceae	
Parts used	Seeds	
Vernacular name	Jeerige	
Medicinal uses	To treat lack of appetite, bloat	
Life forms	Herb	
Livestock	Cattle, buffalo, sheep and goat	


Botanical name	<i>Mimosa pudica</i>	
Family	Mimosaceae	
Parts used	Roots	
Vernacular name	Muttidare muni	
Medicinal uses	To treat milk fever	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Oryza sativa</i>	
Family	Poaceae	
Parts used	Grain	
Vernacular name	Akki	
Medicinal uses	To treat mastitis	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Moullava spicata</i>	
Family	Caesalpinaceae	
Parts used	Leaves	
Vernacular name	Kodanchi	
Medicinal uses	To treat mastitis	
Life forms	Shrub	
Livestock	Cattle	


Botanical name	<i>Aloe vera</i>	
Family	Liliacea	
Parts used	Leaves	
Vernacular name	Lolesara	
Medicinal uses	To treat mastitis	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Basella alba</i>	
Family	Basellaceae	
Parts used	Leaves	
Vernacular name	Basale	
Medicinal uses	To treat mastitis, and indigestion	
Life forms	Creeper	
Livestock	Cattle	


Botanical name	<i>Artocarpus heterophyllus</i>	
Family	Moraceae	
Parts used	Fruit	
Vernacular name	Halasina mara	
Medicinal uses	To treat lack of appetite	
Life forms	Tree	
Livestock	Cattle	

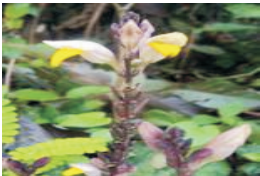
Botanical name	<i>Cucumis sativus</i>	
Family	Cucurbitaceae	
Parts used	Fruit	
Vernacular name	Soutekayi	
Medicinal uses	To remove placenta	
Life forms	Creeper	
Livestock	Cattle	


Botanical name	<i>Ficus religiosa</i>	
Family	Moraceae	
Parts used	Leaves, Flowers	
Vernacular name	Aralimara	
Medicinal uses	Used to treat eye problems, & infection	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Datura metel</i>	
Family	Solanaceae	
Parts used	Roots	
Vernacular name	Datura	
Medicinal uses	Treatment for dog bite	
Life forms	Shrub	
Livestock	Cattle	


Botanical name	<i>Ricinus communis</i>	
Family	Euphorbiaceae	
Parts used	Seeds	
Vernacular name	Haralu	
Medicinal uses	To treat yoke gall	
Life forms	Shrub	
Livestock	Bulls	


Botanical name	<i>Buchanania lanzan</i>	
Family	Anacardiaceae	
Parts used	Bark	
Vernacular name	Erpe	
Medicinal uses	For post insemination care	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Gymnostachyum febrifugum</i>	
Family	Acanthaceae	
Parts used	Leaves	
Vernacular name	Nelamuchchire	
Medicinal uses	To treat dermatitis	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Capsicum annum</i>	
Family	Solanaceae	
Parts used	Leaves	
Vernacular name	Menasu	
Medicinal uses	To treat fever	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Terminalia chebula</i>	
Family	Combretaceae	
Parts used	Fruit	
Vernacular name	Anile	
Medicinal uses	To treat constipation	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Phyllanthus maderaspatensis</i>	
Family	Euphorbiaceae	
Parts used	Entire plant	
Vernacular name	Nelanelli	
Medicinal uses	To treat urinary problems	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Couropita guianensis</i>	
Family	Lecythidaceae	
Parts used	Seeds	
Vernacular name	Shivalingabeeja	
Medicinal uses	To treat delayed parturition	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Ficus asperrima</i>	
Family	Moraceae	
Parts used	Leaves	
Vernacular name	Andepaajesoppu	
Medicinal uses	To remove placenta	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Achyranthes aspera</i>	
Family	Amaranthaceae	
Parts used	Leaves	
Vernacular name	Uttarane	
Medicinal uses	To treat wounds	
Life forms	Shrub	
Livestock	Cattle	


Botanical name	<i>Scleropyrum pentandrum</i>	
Family	Santalaceae	
Parts used	Leaves	
Vernacular name	Naaikooli soppu	
Medicinal uses	To treat mastitis	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Hibiscus rosa sinensis</i>	
Family	Malvaceae	
Parts used	Leaves	
Vernacular name	Daasavaala	
Medicinal uses	To treat constipation	
Life forms	Shrub	
Livestock	Cattle	


Botanical name	<i>Psidium guajava</i>	
Family	Myrtaceae	
Parts used	Leaves	
Vernacular name	Seebe	
Medicinal uses	To treat indigestion, lack of appetite	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Jasminum angustifolium</i>	
Family	Oleaceae	
Parts used	Leaves	
Vernacular name	Kaadumallige	
Medicinal uses	To treat indigestion, & lack of appetite	
Life forms	Creeper	
Livestock	Cattle	


Botanical name	<i>Hymenodictyon orixense</i>	
Family	Rubiaceae	
Parts used	Bark	
Vernacular name	Bandanaaru	
Medicinal uses	To treat urinary problems	
Life forms	Shrub	
Livestock	Cattle	


Botanical name	<i>Lagerstroemia flos-reginae</i>	
Family	Lythraceae	
Parts used	Leaves	
Vernacular name	Maruva	
Medicinal uses	Treatment for hoof problem	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Theobroma cacao</i>	
Family	Malvaceae	
Parts used	Leaves	
Vernacular name	Cocco	
Medicinal uses	To increase milk	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Centella asiatica</i>	
Family	Apiaceae	
Parts used	Entire plant	
Vernacular name	Ondelaga	
Medicinal uses	To treat endo parasites	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Asperagus recemosus</i>	
Family	Asparagaceae	
Parts used	Roots	
Vernacular name	Uduri beru	
Medicinal uses	To induce heat	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Oxalis corniculata</i>	
Family	Oxalidaceae	
Parts used	Roots	
Vernacular name	Huli soppu	
Medicinal uses	To treat foot and mouth disease	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Benincasa hispida</i>	
Family	Cucurbitaceae	
Parts used	Leaves	
Vernacular name	Kumbala kai	
Medicinal uses	To treat mastitis	
Life forms	Creeper	
Livestock	Cattle	


Botanical name	<i>Saraca asoca</i>	
Family	Caesalpinaceae	
Parts used	Bark	
Vernacular name	Ashoka mara	
Medicinal uses	To induce heat and breeding	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Annona reticulata</i>	
Family	Annonaceae	
Parts used	Leaves	
Vernacular name	Rama phala	
Medicinal uses	To treat wounds	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Pongamia pinnata</i>	
Family	Fabaceae	
Parts used	Bark and Leaves	
Vernacular name	Honge mara	
Medicinal uses	To treat ectoparasites	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Euphorbia tirucalli</i>	
Family	Euphorbiaceae	
Parts used	Leaves	
Vernacular name	Kolukalli	
Medicinal uses	To treat ectoparasites	
Life forms	Shrub	
Livestock	Cattle	


Botanical name	<i>Ziziphus oeuoplia</i>	
Family	Rhamnaceae	
Parts used	Leaves	
Vernacular name	Choori mullu gida	
Medicinal uses	To treat dislocation of bones	
Life forms	Shrub	
Livestock	Cattle	


Botanical name	<i>Erythrina indica</i>	
Family	Fabaceae	
Parts used	Bark	
Vernacular name	Pongaare	
Medicinal uses	To induce heat and breeding	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Ocimum sanctum</i>	
Family	Lamiaceae	
Parts used	Leaves	
Vernacular name	Tulsi	
Medicinal uses	To treat wounds	
Life forms	Shrub	
Livestock	Cattle, buffalo, sheep and goat	


Botanical name	<i>Cajanus cajan</i>	
Family	Fabaceae	
Parts used	Leaves and seeds	
Vernacular name	Togari	
Medicinal uses	To treat ecto parasites	
Life forms	Shrub	
Livestock	Cattle, buffalo, sheep and goat	


Botanical name	<i>Borassus flabellifer</i>	
Family	Arecaceae	
Parts used	Petiole base	
Vernacular name	Taale mara	
Medicinal uses	To treat haemorrhagic septicaemia	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Vigna radiata</i>	
Family	Fabaceae	
Parts used	Seeds	
Vernacular name	Bataani	
Medicinal uses	To improve milk	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Solanum torvum</i>	
Family	Solanaceae	
Parts used	Leaves	
Vernacular name	Kudane	
Medicinal uses	To remove endoparasites	
Life forms	Leaves, fruits	
Livestock	Cattle, buffalo, sheep and goat	


Botanical name	<i>Semecarpus anacardium</i>	
Family	Anacardiaceae	
Parts used	Bark	
Vernacular name	Chere mara	
Medicinal uses	To treat wounds	
Life forms	Tree	
Livestock	Cattle, buffalo, sheep and goat	


Botanical name	<i>Agave americana</i>	
Family	Agavaceae	
Parts used	Leaves	
Vernacular name	Daddoli	
Medicinal uses	Treatment for foot and mouth disease	
Life forms	Shrub	
Livestock	Cattle	

Botanical name	<i>Santalum album</i>	
Family	Santalaceae	
Parts used	Bark	
Vernacular name	Shri gandha	
Medicinal uses	To treat foot and mouth disease	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Pterocarpus santalinus</i>	
Family	Fabaceae	
Parts used	Bark	
Vernacular name	Chandana	
Medicinal uses	To treat foot and mouth disease	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Moringa oleifera</i>	
Family	Moringaceae	
Parts used	Roots	
Vernacular name	Nugge	
Medicinal uses	To treatment food and mouth disease	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Holarthena pubescens</i>	
Family	Apocynaceae	
Parts used	Leaves	
Vernacular name	Kokke kodanji	
Medicinal uses	To treat diarrhea	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Adenanthera pavonina</i>	
Family	Mimosaceae	
Parts used	Leaves	
Vernacular name	Manjatti	
Medicinal uses	To induce heat and breeding	
Life forms	Tree	
Livestock	Cattle	


SHIVAMOGGA DISTRICT


Botanical name	<i>Allium sativum</i>	
Family	Amaryllidaceae	
Parts used	Bulb	
Vernacular name	Garlic	
Medicinal uses	Treatment for indigestion, lack of appetite, bloat, wounds	
Life forms	Herb	
Livestock	Cattle, buffalo, sheep and goat	


Botanical name	<i>Trachyspermum ammi</i>	
Family	Apiaceae	
Parts used	Seeds	
Vernacular name	Omkaalu	
Medicinal uses	Treatment for indigestion, lack of appetite, bloat, and diarrhea	
Life forms	Herb	
Livestock	Cattle, buffalo, sheep and goat	


Botanical name	<i>Ferula assa-foetida</i>	
Family	Apiaceae	
Parts used	Resin/ Gum	
Vernacular name	Asafoetida eugu	
Medicinal uses	To treatment indigestion, lack of appetite, bloat	
Life forms	Herb	
Livestock	Cattle, buffalo, sheep and goat	


Botanical name	<i>Atalantia monophylla</i>	
Family	Rutaceae	
Parts used	Fruit	
Vernacular name	Kanchuhuli	
Medicinal uses	To treat indigestion, lack of appetite, and bloat	
Life forms	Tree	
Livestock	Cattle, buffalo, sheep and goat	


Botanical name	<i>Garcinia indica</i>	
Family	Clusiaceae	
Parts used	Fruit	
Vernacular name	Kokum	
Medicinal uses	To treat indigestion, lack of appetite, and bloat	
Life forms	Tree	
Livestock	Cattle, buffalo, sheep and goat	


Botanical name	<i>Plectranthus amboinicus</i>	
Family	Lamiaceae	
Parts used	Leaves	
Vernacular name	Dhodpatre	
Medicinal uses	To treat indigestion, lack of appetite, bloat	
Life forms	Herb	
Livestock	Cattle, buffalo, sheep and goat	


Botanical name	<i>Arachis hypogaea</i>	
Family	Fabaceae	
Parts used	Seeds	
Vernacular name	Peanut	
Medicinal uses	To treat constipation	
Life forms	Herb	
Livestock	Cattle, buffalo, sheep and goat	


Botanical name	<i>Ricinus communis</i>	
Family	Euphorbiaceae	
Parts used	Seeds, oil	
Vernacular name	Castor	
Medicinal uses	To treat constipation	
Life forms	Shrub	
Livestock	Cattle, buffalo, sheep and goat	


Botanical name	<i>Azadirachta indica</i>	
Family	Meliaceae	
Parts used	Leaves and oil	
Vernacular name	Kahibevu	
Medicinal uses	Treatment for insemination	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Bambusa arundinacea</i>	
Family	Bambusaceae	
Parts used	Leaves	
Vernacular name	Bidiru	
Medicinal uses	To remove placenta	
Life forms	Grass	
Livestock	Cattle	


Botanical name	<i>Trachyspermum ammi</i>	
Family	Apiaceae	
Parts used	Seeds	
Vernacular name	Ajvaana	
Medicinal uses	To treat mastitis, indigestion	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Amaranthus retroflexus</i>	
Family	Amaranthaceae	
Parts used	Roots, stalk	
Vernacular name	Harive	
Medicinal uses	Treatment for kidney stone	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Macrotyloma uniflorum</i>	
Family	Fabaceae	
Parts used	Leaves and grains	
Vernacular name	Huruligida	
Medicinal uses	Treatment for kidney stone	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Ensete superbum</i>	
Family	Musaceae	
Parts used	Pseudo stem	
Vernacular name	Kaadubaale	
Medicinal uses	Treatment for kidney stone	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Hibiscus platanifolius</i>	
Family	Malvaceae	
Parts used	Leaves	
Vernacular name	Bili Daasavaala	
Medicinal uses	Improve general health	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Chromolaena odorata</i>	
Family	Asteraceae	
Parts used	Leaves	
Vernacular name	Communist gida	
Medicinal uses	To treat wounds	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Citrus aurantifolia</i>	
Family	Rutaceae	
Parts used	Fruit	
Vernacular name	Nimbegida	
Medicinal uses	To remove endo parasites	
Life forms	Shrub	
Livestock	Cattle	


Botanical name	<i>Curcuma longa</i>	
Family	Zingiberaceae	
Parts used	Roots	
Vernacular name	Turmeric	
Medicinal uses	To treat broken horn, & skin disease	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Allium cepa</i>	
Family	Amaryllidaceae	
Parts used	Bulb	
Vernacular name	Onion	
Medicinal uses	To treat cough and cold	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Cocos nucifera</i>	
Family	Arecaceae	
Parts used	Tender nut	
Vernacular name	Coconut palm	
Medicinal uses	To treat babesiosis	
Life forms	Palm	
Livestock	Cattle	


Botanical name	<i>Mimosa pudica</i>	
Family	Mimosaceae	
Parts used	Entire plant	
Vernacular name	Muttidare muni gida	
Medicinal uses	To treat babesiosis	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Tagetes-erecta</i>	
Family	Asteraceae	
Parts used	Leaves	
Vernacular name	Chenduhuvagida	
Medicinal uses	To treat maggot wound	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Maranta arundinacea</i>	
Family	Marantaceae	
Parts used	Rhizome	
Vernacular name	Arrow root	
Medicinal uses	To treat maggots	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Cuminum cyminum</i>	
Family	Apiaceae	
Parts used	Seeds	
Vernacular name	Jeera	
Medicinal uses	To treat indigestion	
Life forms	Herb	
Livestock	Cattle	

Botanical name	<i>Cyclea peltata</i>	
Family	Menispermaceae	
Parts used	Roots	
Vernacular name	Haadegedde	
Medicinal uses	To treat diarrhea and coccidiosis	
Life forms	Creeper	
Livestock	Cattle	


Botanical name	<i>Buchanania lanzan</i>	
Family	Anacardiaceae	
Parts used	Leaves	
Vernacular name	Maradisoppu	
Medicinal uses	To treat broken leg	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Piper nigrum L.</i>	
Family	Piperaceae	
Parts used	Seeds	
Vernacular name	Pepper	
Medicinal uses	To treat cold, fever	
Life forms	Climber	
Livestock	Cattle, buffalo, goat and sheep	


Botanical name	<i>Zingiber officinale</i>	
Family	Zingiberaceae	
Parts used	Rhizome	
Vernacular name	Ginger	
Medicinal uses	To treat cold	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Eleusine coracana</i>	
Family	Poaceae	
Parts used	Millet	
Vernacular name	Raagi	
Medicinal uses	To treat food and mouth disease	
Life forms	Herb	
Livestock	Cattle	


TUMKUR DISTRICT


Botanical name	<i>Phyllanthus maderaspatensis</i>	
Family	Euphorbiaceae	
Parts used	Entire plant	
Vernacular name	Nelanelli	
Medicinal uses	Treatment for indigestion	
Life forms	Herb	
Livestock	Cattle, buffalo, sheep and goat	


Botanical name	<i>Withania somnifera</i> L.	
Family	Solanaceae	
Parts used	Leaves	
Vernacular name	Hire maddinagida	
Medicinal uses	Treatment for bloat	
Life forms	Herb	
Livestock	Cattle, buffalo, sheep and goat	


Botanical name	<i>Abutilon indicum</i>	
Family	Malvaceae	
Parts used	Leaves	
Vernacular name	Neladurve	
Medicinal uses	To treat bloat	
Life forms	Shrub	
Livestock	Cattle, buffalo, sheep and goat	


Botanical name	<i>Dodonaea viscosa</i>	
Family	Sapindaceae	
Parts used	Leaves, gum	
Vernacular name	Bandrei	
Medicinal uses	To treat bone fracture	
Life forms	Herb	
Livestock	Cattle, buffalo, sheep and goat	


Botanical name	<i>Ficus benghalensis</i>	
Family	Moraceae	
Parts used	Aerial roots, leaf	
Vernacular name	Aladamara	
Medicinal uses	To treat diarrhoea and coccidiosis	
Life forms	Tree	
Livestock	Cattle, buffalo, sheep and goat	


Botanical name	<i>Eugenia jambos</i>	
Family	Myrtaceae	
Parts used	Bark	
Vernacular name	Jambu nerale	
Medicinal uses	To treat diarrhoea and coccidiosis	
Life forms	Tree	
Livestock	Cattle, buffalo, sheep and goat	


Botanical name	<i>Ficus racemosa</i>	
Family	Moraceae	
Parts used	Bark	
Vernacular name	Atthi	
Medicinal uses	To treat diarrhoea and coccidiosis	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Limonia acidissima</i>	
Family	Rutaceae	
Parts used	Bark	
Vernacular name	Baeladamara	
Medicinal uses	To treat diarrhoea and coccidiosis	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Cassia auriculata</i>	
Family	Caesalpinaceae	
Parts used	Bark	
Vernacular name	Thangadi	
Medicinal uses	To treat diarrhoea, coccidiosis, and repeat breeding problem	
Life forms	Shrub	
Livestock	Cattle	


Botanical name	<i>Musa paradisiaca</i>	
Family	Musaceae	
Parts used	Stem	
Vernacular name	Putta bale	
Medicinal uses	To treat diarrhoea and coccidiosis	
Life forms	Shrub	
Livestock	Cattle	


Botanical name	<i>Guizotia abyssinica</i>	
Family	Asteraceae	
Parts used	Seeds	
Vernacular name	Huchchellu	
Medicinal uses	To induce heat and Breeding, treatment for bone fracture	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Mucuna pruriens</i>	
Family	Fabaceae	
Parts used	Leaves	
Vernacular name	Nasugunnikayi	
Medicinal uses	To induce heat and Breeding	
Life forms	Shrub	
Livestock	Cattle	


Botanical name	<i>Magnolia champaca</i>	
Family	Magnoliaceae	
Parts used	Bark	
Vernacular name	Sampige tree	
Medicinal uses	To induce heat and breeding	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Aegle marmelos</i>	
Family	Rutaceae	
Parts used	Leaves	
Vernacular name	Bilwa patre	
Medicinal uses	Treatment for repeat of breeding problem, cough and fever	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Solanum erianthum</i>	
Family	Solanaceae	
Parts used	Leaves	
Vernacular name	Chowdangi	
Medicinal uses	To treat nerve paralysis	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Eleusine coracana</i>	
Family	Poaceae	
Parts used	Millet	
Vernacular name	Raagi	
Medicinal uses	Treatment for repeat breeding problem	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Euphorbia hirta</i>	
Family	Euphorbiaceae	
Parts used	Leaves	
Vernacular name	Achche soppu	
Medicinal uses	Treatment for retention of placenta	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Carica papaya</i>	
Family	Passifloraceae	
Parts used	Leaves	
Vernacular name	Papaya	
Medicinal uses	Treatment for retention of placenta	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Argyreia cuneata</i>	
Family	Convolvulaceae	
Parts used	Leaves	
Vernacular name	Kallana	
Medicinal uses	Treatment for retention of placenta	
Life forms	Shrub	
Livestock	Cattle	


Botanical name	<i>Lablab purpureus</i>	
Family	Fabaceae	
Parts used	Seeds	
Vernacular name	Avare kaalu	
Medicinal uses	To increase milk yield	
Life forms	Shrub	
Livestock	Cattle	


Botanical name	<i>Jasminum auriculatum</i>	
Family	Oleaceae	
Parts used	Leaves and Roots	
Vernacular name	Sooji mallige	
Medicinal uses	To treat cough and fever	
Life forms	Shrub	
Livestock	Cattle	


Botanical name	<i>Premna serratifolia</i>	
Family	Verbenaceae	
Parts used	Leaves	
Vernacular name	Eji plant	
Medicinal uses	Treatment of wounds	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Cajanus cajan</i>	
Family	Fabaceae	
Parts used	Leaves	
Vernacular name	Thogari plant	
Medicinal uses	To treat cough and fever	
Life forms	Shrub	
Livestock	Cattle	


Botanical name	<i>Cassia fistula</i>	
Family	Caesalpiniaceae	
Parts used	Leaves	
Vernacular name	Kakke gida	
Medicinal uses	Treatment of wounds	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Cynodon dactylon</i>	
Family	Poaceae	
Parts used	Grass	
Vernacular name	Garike	
Medicinal uses	To treat cough and fever	
Life forms	Grass	
Livestock	Cattle	


Botanical name	<i>Holoptelea integrifolia</i>	
Family	Ulmaceae	
Parts used	Leaves	
Vernacular name	Tapsi	
Medicinal uses	To treat tail rot	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Allium sativum</i>	
Family	Amaryllidaceae	
Parts used	Bulb	
Vernacular name	Garlic	
Medicinal uses	To remove end-parasites	
Life forms	Herb	
Livestock	Cattle	


Botanical name	<i>Piper nigrum</i>	
Family	Piperaceae	
Parts used	Fruit	
Vernacular name	Pepper	
Medicinal uses	To remove endo-parasites & sprain	
Life forms	Climber	
Livestock	Cattle	


Botanical name	<i>Cipadessa baccifera</i>	
Family	Meliaceae	
Parts used	Leaves	
Vernacular name	Narachalu soppu	
Medicinal uses	To treat mastitis	
Life forms	Shrub	
Livestock	Cattle	


Botanical name	<i>Tinospora cordifolia</i>	
Family	Menispermaceae	
Parts used	Leaves	
Vernacular name	Amrutha balli	
Medicinal uses	To treat sprain	
Life forms	Climber	
Livestock	Cattle	


Botanical name	<i>Antidesma menasu</i>	
Family	Euphorbiaceae	
Parts used	Leaves	
Vernacular name	Baavina soppu	
Medicinal uses	To treat mastitis	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Azadirachta indica</i>	
Family	Meliaceae	
Parts used	Bark, leaf, oil	
Vernacular name	Bevu	
Medicinal uses	Treatment of poisonous bites	
Life forms	Tree	
Livestock	Cattle	


Botanical name	<i>Adhatoda vasica</i>	
Family	Acanthaceae	
Parts used	Leaves	
Vernacular name	Aadu muttagidaga	
Medicinal uses	Treatment of poisonous bites	
Life forms	Shrub	
Livestock	Cattle	

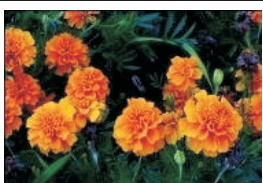
Botanical name	<i>Aristolochia indica</i>	
Family	Aristolochiaceae	
Parts used	Leaves	
Vernacular name	Eshwari balli	
Medicinal uses	Treatment of poisonous bites	
Life forms	Creeper	
Livestock	Cattle	

Botanical name	<i>Madhuca longifolia</i>	
Family	Sapotaceae	
Parts used	Leaves	
Vernacular name	Eppe mullu	
Medicinal uses	To treat yoke gall	
Life forms	Tree	
Livestock	Cattle	

Botanical name	<i>Pongamia pinnata</i>	
Family	Fabaceae	
Parts used	Leaves, bark, oil	
Vernacular name	Honge	
Medicinal uses	To treat tail rot, wounds & maggots	
Life forms	Tree	
Livestock	Cattle	

Botanical name	<i>Piper betle</i>	
Family	Piperaceae	
Parts used	Leaves	
Vernacular name	Veelya	
Medicinal uses	To treat sprain cough, & indigestion	
Life forms	Creeper	
Livestock	Cattle	

Botanical name	<i>Calotropis procera</i>	
Family	Asclepiadaceae	
Parts used	Milk, leaf	
Vernacular name	Ekka plant	
Medicinal uses	To remove maggots	
Life forms	shrub	
Livestock	Cattle	

Botanical name	<i>Tagetes erecta</i>	
Family	Asteraceae	
Parts used	Leaves	
Vernacular name	Chenduhuva	
Medicinal uses	To remove maggots	
Life forms	Herb	
Livestock	Cattle	

Photographs showing the interaction with traditional healers and farmers during survey



PHOTOGRAPHS SHOWING TRADITIONAL PRACTICES AND INTERACTION WITH LIVESTOCK FARMERS



LIST OF RESOURCE PERSONS FOR ITK AND PRACTICES IN LIVESTOCK

Sl.No.	Name	Contact number	Village
1.	Diwakar nayak. Ermetty	9632241855	Nellur - Kemraje
2.	Kiran Rai Menala	9481847965	Ajjavara
3.	Prema vasanth Bhat, Doddadka	9448725806	Thodikaana
4.	Vasanth Bhat	-----	Thodikaana
5.	Rathnakara Posavalike	9481377255	Punacha
6.	Ram Prasad	9663183244	Nellur-Kemraje
7.	Janardhan Nayak	9448725547	Nellur-Kemraje
8.	Chandrashekar .A	9449567058	Ajjavara
9.	Shivanarayana Bhat	9741837883	Punacha
10.	Jayantha .P	9481023877	Punacha
11.	Krupa Sharma	8105722896	Punacha
12.	Devi Prasad	9448363951	Punacha
13.	Achyutha Bhat	9449335977	Punacha
14.	Radhakrishna .M	9480791356	Ajjavara
15.	Jayarama.M	944862567	Ajjavara
16.	Umesha	9480791357	Ajjavara
17.	Bharathi	944862567	Punacha
18.	Sunitha Jayanth	8861785764	Punacha
19.	Narayana Patil	8861499728	Ajjavara
20.	Savitha	9663772400	Punacha
21.	Shivananda	---	Duddha
22.	Papanna	---	Duddha
23.	Narsimha Gowda	---	Duddha
24.	Dhodchennayya	---	Ucchchegowdana Koplu
25.	Rudresh	---	Duddha
26.	Puttaswame Gowda	---	Duddha
27.	Kallamma	---	Duddha
28.	Hanish	9620509908, 227918 (08183)	City Muncipal Council
29.	Hucchappa	---	Agrahara
30.	Girish	---	Beleyuru
31.	Hanish	---	Bhimmen Village
32.	Ramesha	---	Yelakund
33.	Kempayya	---	Yelakund
34.	Ramanna	9008103718	Chowlahiriyuru
35.	H.M.Meenakshamma W/O. K.Yugadipanya	---	Chowlahiriyuru
36.	Geetha	---	Chowlahiriyuru
37.	Maralu Siddashwara Guruji	9485768473	Chowlahiriyuru
38.	Kallamma H.K.	---	Chowlahiriyuru
39.	Ravi S/o. Tammaiah	8722240183	Chowlahiriyuru
40.	Sureshappa	9902479668	Chowlahiriyuru
41.	Puttappa	---	Chowlahiriyuru
42.	Malleshappa.B	9481577303	Chowlahiriyuru
43.	Chidananda	9743847730	Chowlahiriyuru
44.	Shashikumar	7353278102	Chowlahiriyuru
45.	Timmappa	8748018038	Chowlahiriyuru
46.	Revanna	9743921819	Chowlahiriyuru
47.	Basavarajappa	---	Chowlahiriyuru
48.	Devarajmaralappa	9632560552	Chowlahiriyuru
49.	Puttamma	9900110784	Chowlahiriyuru
50.	Jademallappa	9611977780	Chowlahiriyuru
51.	Satyanna	9902706830	Chowlahiriyuru

Sl.No.	Name	Contact number	Village
52.	Chandrappa	8971859672	Chowlahiriyuru
53.	Manjappa	9731759697	Chowlahiriyuru
54.	Rajappa Puttappa	9148668271	Chowlahiriyuru
55.	Rajappa	9535334063	Chowlahiriyuru
56.	Rajanna	7353855860	Chowlahiriyuru
57.	Neelakantappa	8496001713	Chowlahiriyuru
58.	Kallesh.C	9880333507	Singatagere
59.	Beerappa		Singatagere
60.	Nagarajappa	7996397391	Singatagere
61.	Thontadharya.S.S.	8494962918	Singatagere
62.	Rama Krishna	----	Tigolla Halli
63.	Kenche Gowdru	8151893430	T.Bekuppe
64.	Prabhavati	9148259970	T.Bekuppe
65.	Raju	9591674688	T.Golla Halli
66.	Venkatalakshmi	9731953813	T.Golla Halli
67.	Shinasidde Gowda	9740438125	T.Golla Halli
68.	Jayarama	9901770157	T.Golla Halli
69.	Huyile Gowda	9632829104	T.Golla Halli
70.	Bomme Gowda	---	
71.	Rame Gowda	---	
72.	Narase Gowda	---	Narayapura
73.	Chandrsha	7259592735	T.Golla Halli
74.	Ramesha	9008557339	T.Golla Halli
75.	Shivamade Gowda	9980162395	T.Bekuppe
76.	Bharata	---	T.Golla Halli
77.	Chandra, Sundramma	7348895957	T.Golla Halli
78.	Shivanna	9972660217	
79.	Siddappa	---	Anchibare
80.	Madevamma	9945795855	
81.	Maibubasaba tengala mashakasaba	9731635737	Kalagurti
82.	Gaousakana F/o. Yasimakhana	---	Kalagurti
83.	Sharanappa Pasara	---	Kalagurti
84.	Mallanna Guttedara Bagodi	---	Kalagurti
85.	Mahimada Sahukara Teli	---	Kalagurti
86.	Lala Ahammad Dandoti	---	Kalagurti
87.	Chandru Doddamani	---	Kalagurti
88.	Channayya Swamy	---	Kalagurti
89.	Sharanappa Sahukara Prasara	---	Kalagurti
90.	Sharanappa Gowdra Jeevaagini	---	Kalagurti
91.	Chandrakanta	---	Kalagurti
92.	Mashaka Khan	---	Kalagurti
93.	Kasimkhana Parana	---	Kalagurti
94.	Sabanna Natigera	---	Kalagurti
95.	Ajairo Sahukara	---	Kalagurti
96.	Basavaraja Pasara	---	Kalagurti
97.	Mahibuba Sa	---	Kalagurti
98.	Devajala RaThoda	---	Kalagurti
99.	Naganna Ambanna Pujari	---	Kalagurti
100.	Hanamantappa Kumbara	---	Kalagurti

INTELLECTUAL PROPERTY RIGHTS IN THE PROTECTION OF LIVESTOCK RESOURCES AND TRADITIONAL KNOWLEDGE

Tradable bio-resources of livestock origin

Livestock produce such as milk, meat, wool and egg, skin and their products particularly with unique characteristics and genetic material of animals, covering semen, egg and live animals, DNA molecules, RNA, proteins and other micro physical genetic materials are tradable bioresources. As already detailed genetic resources of Karnataka have many unique characters. The genes responsible for them will be of high value in the IPR era under access and benefit sharing mechanism. The livestock with unique traits like disease resistance, heat tolerance etc will serve as a useful genetic resource for developing breeds having desirable traits. In the biotechnology and IPR era genes for unique traits will be of great use for genetic improvement of livestock worldwide. Amrithmahal cattle milk is used in the Ayurvedic system of medicine for treatment of gastritis. Malnad Gidda milk is found to have high level of lactoferrin content which is an important antimicrobial substance present in milk. The mutton of Bannur sheep is well known for its quality and taste. Suitability of Dharwadi buffalo milk for famous peda and khoa making is well known. Indigenous cattle are producing milk with A₂ type casein which is beneficial to health. Indigenous cattle are reported to produce milk with higher level of Omega 3 fatty acid and low cholesterol. Indigenous livestock are mostly reared on extensive system of rearing whose meat is tend to have lower level of cholesterol. In Ayurvedic system of medicine particularly in Panchagavya treatment the blend of five products viz. ghee, milk, curd, cow dung and cow's urine obtained from indigenous cows (All these five products are individually called 'Gavya' and collectively termed as 'Panchagavya') are extensively used for treatment for various ailments. Each 'Gavya' from indigenous cows particularly those raised based on grazing is also extensively used in Ayurvedic system of medicine. In the Ayurvedic system of medicine abundant literature regarding the use of indigenous cows-urine for treatment of skin-disorders, G.I. disorders and hemorrhoids are available. The anti-microbial, bio-availability enhancer, free-radical scavenging property of indigenous cows-urine has been reported by various researchers. The novel use of cow-urine as activity enhancer and availability facilitator for bioactive molecules, including anti-infective agents has been patented in US (Patent No. 6410059). The invention has direct implication in drastically reducing the dosage of antibiotics, drugs and anti-infective agent while increasing the efficiency of absorption of bio-active molecules, thereby reducing the cost of treatment and also the side-effects due to toxicity. The invention relating to a novel pharmaceutical composition comprising an effective amount of bio-active fraction from cow-urine distillate as a bioavailability facilitator and pharmaceutically acceptable additive selected from anti-cancer compounds, drugs, therapeutic and nutraceutic agents, ions and similar molecules which are targeted to the living systems has also been patented in USA (Patent No. 6896907, 7235262). Use of bioactive fraction from cow urine distillate

(gomutra) a bio enhancer of anti-infective, anti cancer agents and nutrients as also been reported by researchers. Indigenous cows urine has also been obtained by researchers. The use of re-distilled indigenous cow's urine distillate (RCUD) for protecting and/or repairing DNA from oxidative damages has been patented (US Patent, 7718360). Many breeds have differential resistance to different diseases thus make them suitable as model animals for research. The genes responsible for all the unique traits in our livestock have the potential to be tradable bio-resource. In order to utilize our livestock and poultry resources effectively in the IPR era it is absolutely necessary to identify the unique traits and genes responsible for their unique traits. It is very important to conserve and improve our indigenous breeds particularly in the IPR era. The Booroola gene is patented in many countries including Netherlands, Australia, which has a large effect on litter size of sheep, can be traced back to Bengal sheep which were imported from Calcutta and crossed with Merinos (Kohler-Rollefson, 2005) which clearly indicates the utility of our livestock genetic resources. There is a need to have periodical estimation of breed wise basic population data should be generated so as to establish "Early Warning" and "Response Systems" for animal genetic resources.

Intensive versus small holder livestock production system

The conflict between intensive system of livestock rearing and the sustainable technological innovations generated by livestock keepers based on native livestock genetic resources and traditional knowledge (TK) associated with them will pose important challenge for technology driven productivity enhancement of livestock in developing countries. In the present knowledge based global economy, technology driven growth in livestock sector helped dominant players to corner the benefits at the cost of smallholders in under developed and developing countries particularly in poultry and pig industry which led to many challenges pertaining to control of technologies. Generally the animal breeding and production takes place within the national boundaries as per customary laws and knowledge; whereas the livestock products are marketed at global level. Therefore, national and international as well as regional laws and Intellectual Property Rights (IP) and global commitments are relevant to development of livestock sector. In the present knowledge based global economy protection of intellectual property (IP) is critical for technology development and diffusion in all fields including livestock sector (Ramesha *et al.*, 2010). International conventions and treaties together with the rapid developments in biotechnology have led to new conditions for the access of genetic resources and TK. The Convention of Biological Diversity (CBD) and the requirements under WTO/TRIPS have led to stricter mechanisms for access to genetic resources, benefit sharing and control of genetic resources as well as the new regimes for protection of biological innovations. This new environment has created both threats and opportunities for biodiversity rich developing countries. The future development of livestock sector depends on adoption of new and innovative production and processing technologies, and proper market tie-ups. Diversification and high value produce will add new dimensions to this sector. A paradigm shift is required in livestock sector from production orientation to quality and cost orientation in the WTO era (Ramesha, 2011).

In the recent past livestock farming in developing countries have changed rapidly and become technology intensive, similar to that had taken place in the plant sector during 1980's. The increased exploitation of animal genetic resources from developing countries is also becoming a major concern. The challenge for biodiversity rich countries is to guard against bio-piracy of their indigenous animal genetic resources, and safeguard associated traditional knowledge of livestock keepers and traditional healers. Another concern is the export of genetic material to countries that did not ratify the Convention on Biodiversity.

Indigenous livestock and IPR regime

The proliferation of free trade agreements, both multilateral and bilateral, has led to an unprecedented growth in international trade in livestock products. Under Trade Related Intellectual Property Rights (TRIPs) any country ratifying the Global Agreement on Trade and Tariffs (GATT) and becoming a member of the World Trade Organization (WTO) must establish minimum standards for intellectual property rights. Under TRIPs Article 27.3, members must provide various forms of intellectual property, many of which are relevant to livestock sector. Intellectual Property (IP) is a category of property that confers rights over intangible creations of human intellect. IP rights as a collective term which includes a) patents b) trademarks, trade names and service marks c) geographical indications d) trade secrets e) industrial designs f) layout designs (topographies) of integrated circuits g) protection of plant varieties and h) copyright and related rights and trade secrets. Under TRIPs agreement provision is made for plant variety protection under patents or a sui generis system, or a combination of both. There is no comparable system for animals. Under TRIPs neither prior informed consent (or benefit sharing) nor is protection of traditional knowledge mandated. With the advent of genetic engineering and novel multilateral IPR agreements a new era of gene hunting has started. This has alarmed and threatened the general public and raised economic, legal and ethical concerns (Rothschild *et al.*, 2003).

A paradigm shift is required in livestock sector from production orientation to quality and cost orientation in the WTO era. At the international level, Convention on Biological Diversity (CBD) of United Nations and the Trade Related Intellectual Property Rights (TRIPs) Agreement of World Trade Organization are the two major agreements governing access and rights over genetic resources. India is signatory to both CBD and TRIPs Agreement and also ratified Global Plan of Action on Animal Genetic Resources adopted in September 2007, it is obligatory for India to develop suitable legislation to protect and improve livestock biodiversity and associated traditional knowledge. The CBD is a legally binding international instrument, applying to all biological diversity. It recognizes the sovereignty of nations over their genetic resources, including the capacity to establish conditions of access by other nations and a fair/equitable sharing of benefits from the use of such resources. As such, the animal genetic resources have not been the objects of much specific consideration within the CBD, and no consideration has been given to arrangements that meet the special nature and distinctive features of livestock sector. The main objectives of the Biological Diversity Act (2002) of India which complies with CBD are conservation of biological diversity; sustainable use of its components and fair and equitable sharing of the benefits arising out of

the use of biological resources and knowledge. Traditional knowledge (TK) associated with biological resources including livestock are integral part of the resource itself. In India patent applications have to disclose the source of genetic material and associated TK in relevant cases. According to the Biodiversity Act (2002), Non-Indian citizens, Non Resident Indians and Association or Organization which is not incorporated or registered in India or registered and incorporated in India but having any Non-Indian participation in its share capital or management are barred from any biological resources of India or knowledge associated thereto for research or for commercial utilization or for bio-survey and bio-utilization without prior permission of National Biodiversity Authority (NBA).

Bio-prospecting and bio-piracy

Bio-prospecting is the exploration, extraction and screening of biodiversity and traditional knowledge for commercially valuable genetic and biochemical resources. Commercially important products derived from biodiversity are of great economic value. Bio-piracy is stealing of knowledge from traditional and indigenous communities or individuals. There was a controversy over bio-piracy of the unique dwarf Indian cattle breed “Vechur” from Kerala. Roslin Institute and the PPL Therapeutics (Scotland) Ltd. has 14 patent applications with the European Patent Office (EPO) and one of these (Patent application EP 0765390) for the Gene Construct of Bovine alpha – lactalbumin is based on studies in *Bos indicus*. Biodiversity rich countries like India should promote bio-prospecting to upgrade local capabilities and to prevent biopiracy. In India patent applications have to disclose the source of genetic material and associated Traditional Knowledge (TK) in relevant cases (Ramesha *et al.*, 2008, 2010).

Patenting in livestock sector

Patenting of life forms is the most controversial aspect even among WTO members. Patents represent the largest form of Intellectual property (IP) and their development is regulated by laws differing from country to country. These laws and their interpretations are subject to change, especially when new technologies are introduced. Any product or process or design which involves an inventive, novel and non-obvious step capable of industrial application could be patented. A patent represents a legal monopoly granted by a country's government to an inventor, permitting the patent owner to prohibit anyone else from making, using or selling this invention for a specific period of time (presently 20 years).

Mega biodiversity countries provide genetic resources for modern animal breeding and biotechnology industry. The genetic resources have been transferred freely to other countries in the past; under the understanding that these are common heritage of humanity. With the development of modern biotechnology, there is possibility that our breeds/varieties may be genetically altered and the new variety/breed may later be substituted for the original breed/variety from which it was developed. There is a threat of bio-piracy with regard to native livestock breeds and associated traditional knowledge. If proper controls and checks are not included in the system of IP protection relating to AnGR, there is a danger of Multi National Companies (MNCs) becoming

owners of breeds/varieties originating from biodiversity rich countries. Patent protection will discourage the natural selection that, at present, takes place at farmers' level.

In the livestock sector, patents have been granted for gene sequences with utility such as genetic markers. A New Zealand company, Agmark, has claimed a patent on the "Booroola" gene, which regulates the ovulation rate in sheep. The Booroola gene can be traced back to Bengal sheep, which were imported from Kolkata and crossed with Merinos (Kohler-Rollefson, 2005). The patent covers animals that are produced in a breeding programme in which the DNA test has been used, but not those animals that carry the gene naturally. The open question is whether the patent also covers the offspring of the animals that have been tested for the presence of the gene. Another notable patent application is one by Monsanto for a series of twelve patents on pig breeding. One of the first conflicts in quantitative animal breeding resulted from a patent entitled "Method of Bovine Herd Management" granted to the Cornell Research Foundation (Cornell University) in the USA in 1994 and Canada in 1998. The invention is for the "test-day model" and includes the gathering of data, mathematical treatment and the use of the data by dairy producers (Rothschild *et al.*, 2003; Scholtz and Mamabolo, 2006). The novelty and non-obviousness of the patent has been seriously questioned. The practices of gathering, manipulating and using data by dairy producers have existed for nearly 100 years (Schaeffer, 2002). In South Africa, these principles have been in use since 1917. The patent therefore claims rights to a practice that has been public knowledge for a long time. The novel idea within the patent is the specific mathematical model and procedures that were developed for the analysis of test day yields. In European Union and some other countries patents can also be granted on normal animals, which have merely been subjected to certain techniques like a gene diagnosis, or a process for determining the animal's sex. The European Patent Office granted patent on Dolly the cloned sheep to the Roslin Institute in Edinburgh (Patent application EP 849 990) in 2001. The US Company XY Inc. was in 2005 granted patent EP 1257168, which covers a method for selecting sperms by sex for the artificial insemination of mammals. This has got implication for using sexed semen in livestock for producing young ones of desired sex. The first European patent on genetically manipulated dairy cows was granted in 2007. Under patent number EP 1330552 "inventors" from Belgium and New Zealand claim processes for breeding cows, which give more milk or milk with altered constituents. The cows are produced either by marker assisted breeding and bred normally, or by having more milk genes additionally incorporated into their genome.

All applications of genomics, animal genetic resources and associated traditional knowledge are potentially the subject matter of intellectual property claims. With respect to gene-based innovation, the most significant IPR is patents. Products of nature were not patentable, but now "isolated and purified" natural materials e.g., DNA, RNA, Expressed sequence Tags, Single Nucleotide Polymorphisms (SNPs), oligonucleotides, DNA markers, hormones, proteins, recombinant vectors and even (non-manipulated) bacteria are patentable in India subject to satisfying the criteria's of patentability. Raw sequences with no known

use are not patentable. In India biological material such as recombinant DNA, plasmids and process of manufacturing thereof are patentable provided they are produced by substantial human intervention. DNA sequences are patentable provided they are isolated and purified from its natural environment and utility is proven. In US and Canada nucleic acid database tools are patentable. Sequence analysis tools are also patentable subject to meeting the criteria of patentability. Appropriate patent regimes have the potential to foster innovation in animal biotechnology and the transfer of gene-based technologies. Mega-biodiversity countries want disclosure of source and country of origin of the biological resource and of the traditional knowledge used in the invention, disclosure of evidence of prior informed consent under the relevant national regime and disclosure of evidence of benefit sharing under the relevant national regime to be included in the patent application. Genetic resources represent the basic building blocks for the development of improved varieties, breeds. Identification of genes for unique characteristics like disease resistance, heat tolerance, ability to survive and thrive under stressful and low input conditions etc. in local breeds will go long way not only in the advancement of science and livestock production, but also pave way for patenting of gene sequences for these traits (Ramesha *et al.*, 2007, 2010a).

Patenting of livestock breeds

Biotechnology is providing the capability to produce novel genetically modified organisms (plants, microorganisms and animals) which are commercially valuable and industrially useful. Patent protection for these innovations is being sought in many countries. Under TRIPs agreement it is not possible to have a valid patent claim which claims an essentially biological process as such (e.g. a method comprising mating a bull from one cattle breed with a cow from another cattle breed to produce a cross-bred calf). Nor is it possible to have a valid patent claim with scope so narrow as to cover only a group of animals comprising an "animal variety" as such. Animals and animal varieties per se are not patentable in South Africa. Hungary is one of the few countries that grant patent protection for animal breeds (WIPO, 1995). In the case of Australia in terms of patentability of higher life forms, such as animals, they are not treated any differently by the Australian Patent Office from the way in which lower life forms are treated. This is probably the reason why the East African Boran cattle breed could be patented in Australia (Scholtz and Mamabolo, 2006). The practice in New Zealand is similar to that of the Australian Patent Office. In general patents to animals are also allowable in Japan. In contrast to these countries, animals (whether transgenic or otherwise) are not patentable in countries such as Argentina, Brazil and China (Blattman *et al.*, 2002) and India. The Bulgarian Law for Protection of New Plant Varieties and animal breeds has been enforced since 1996.

Indian IPR scenario in livestock sector

India is signatory to CBD and TRIPs Agreement and also ratified Global Plan of Action on Animal Genetic Resources it is obligatory for India to develop suitable legislation to protect and improve livestock biodiversity and associated traditional knowledge. In order to comply with CBD India has enacted Biological

Diversity Act (2002). In India private ownership of livestock is common and the public ownership is rare. The owner of the animal has the right to use the genetic resources in breeding and can have control over who is receiving genetic material from his/her animals. However, it is difficult in secondary and further generations to have control over gene flow. In case of poultry, generally farmers are given hybrids by commercial producers. In the modern IPR era, it is essential to provide certain rights such as access to natural resources, grazing rights, participatory decision making in the plans or programmes affecting ANGR to livestock keepers through a sui generis system which will help in protecting native livestock and their sustainable use.

Accreditation of indigenous livestock breeds by way of registration is warranted (Yadav, 2003). Under the Central Herd Registration Scheme of the Department of Animal Husbandry & Dairying, at present, the animals belonging to Hariana, Gir, Kankrej and Ongole breeds of cattle and Murrah, Surti, Mehsana and Jaffrabadi breeds of buffalo are registered depending on the confirmation to breed characteristics and prescribed milk production norm. Owners of registered animals are provided certificate and prizes/incentives to encourage conservation of indigenous breeds and production of high quality cows and buffaloes. Recognising the need for an authentic national documentation system of valuable sovereign genetic resource with known characteristics, Indian Council of Agricultural Research (ICAR) initiated a mechanism for “Registration of Animal Germplasm” at National Bureau of Animal Genetic Resources (NBAGR), Karnal (<http://www.nbagr.res.in>). This would help to provide protection to the valuable animal genetic diversity and facilitate its access for genetic improvement of animal breeds.

Both the herd registration scheme and breed registration system developed by ICAR lack legal enforcement authority. There is an urgent need to develop a suitable legally binding sui generis system and establishment of Animal Genetic Resources Authority of India for protecting the interests of livestock keepers and animal breeders through a law comparable to the Protection of Plant Varieties and Farmers' Rights Act, 2001 and PVP and FR Rules 2003 with due consideration for the special characteristics of AnGR (Ramesha *et al.*, 2007, 2008, 2010a, b). Such an authority will be a boon for conservation and sustainable use of native livestock genetic resources.

Indian livestock keepers are rich in Traditional knowledge (TK). TK associated with biological resources is an intangible component of the resource itself. TK has the potential of being translated into commercial benefits by providing leads for development of useful products and processes. The valuable leads provided by traditional knowledge save time, money and investment of modern biotech industry into any research and product development. Hence, a share of benefits must accrue to creators and holders of TK. It might be worth giving attention to the need and possibility for developing a “clearing-house” mechanism to operate at the Dept. of Animal Husbandry and to the possibility of conducting an IPR audit. The Jeevani (herbal medicine derived from the leaves of the *Arogyapaacha* plant based on TK of Kani tribe) case highlights the possibility of benefit sharing TK associated with local livestock breeds.

Livestock products and process technologies will provide higher market through value addition. IPR laws also have a bearing on the development and diffusion of technologies in the field of production as well as in processing. It has a major role to play in technology development and diffusion aimed at value addition to livestock produce. The traditional knowledge in the sector could be used effectively for bringing benefit to India in the form of benefit shearing in the IP regime.

Trademarks

Trademarks are signs or symbols registered by a manufacturer/producer or merchant to identify goods and services. A trademark can be a word, phrase, symbol, design, or a combination there of. Many countries also recognize “collective marks” and “certification marks”. Collective Marks are a sign which distinguish the origin of a product, method of production and distinctive characteristics of goods or services. A collective mark may be owned by an institution or cooperative or a public entity and used by members of the organization, example- “AAA”. Certification marks – like CE (European conformity) and The Good-housekeeping seal of approval – “certify” that products or services meet a particular standard of quality, regional origin or the like, even though the products may come from various unrelated companies. Certification marks- are a sign used to denote the origin of the product that meets set standards and specifications. Certification marks are similar to collective marks except that users of certification marks should not necessarily be members of the organization that owns the mark, example- “Wool Mark”. Genetic material per se cannot be protected or covered by a trademark. A trademark can be a useful value addition tool. The trademark can improve the value of a product. For example, semen straws, dairy products from a reputed company with trademark may fetch higher price.

Geographical Indications

Geographical Indications (GIs) are signs or expressions used on goods to indicate that a product or service originates in a country/region or specific place where a given quality, reputation or other characteristic of the good is essentially attributable to its geographical origin. There is scope for utilizing GI based on unique characteristics of products produced from a breed in a geographical area due to natural conditions and unique production system. Both Trademarks and GIs are used to identify the products and help to create wealth and improve competitive position of businesses. A Trademark puts emphasis on the producer or a manufacturer of a product, whereas a GI highlights the geographical origin of a product and the characteristics derived from it. GI does not protect the breed or genetic material per se but add commercial value to the animals of a breed reared in a particular region. They may be used as a value addition mechanism. Origin-based marketing in which control over production processes remains with the livestock keepers can empower livestock keepers versus corporate

interests and provide greater earning power. Geographical indications prevent others, except the producers of goods from the original region from using that particular geographical indication incorrectly as a trademark for other products than those from the area. Trademarks and geographical indications could be used for value addition and thus aid to protect registered breeds. In France Bresse breed of chicken is produced in the Bresse geographical area only as defined by law under protected designation of origin (Verrier *et al.*, 2005) and sold at 50-60 per cent higher price. Similarly, to save the Sambucana sheep from extinction, a consortium was set up and a special brand name for guaranteed Sambucana meat was set up in Italy. Roquefort cheese can be made only from the milk of the Lacaune sheep breed. Geographical indications are used to protect interest of livestock keepers in developing countries also like Karoo lamb (South Africa) and Chos Malal goat meat (Argentina). Roquefort cheese can be made only from the milk of the Lacaune sheep breed. Chilika buffaloes with typical curd made from its milk, and Banni, Dharwari buffaloes with typically flavoured milk products are other examples, which could be considered for protection (Ramesha *et al.*, 2008).

Registration of Darjeeling tea-cultivated in 87 designated locations in the Darjeeling region helped to prevent misappropriation and improved marketing position and income. Ethiopia produces some of the finest coffee in the world but gained very little as there was a problem of misappropriation, but filing of trade mark applications in 36 countries and securing protection in 30 countries helped to differentiate the Ethiopian fine coffee from the coffee of other countries. This helped to build confidence and improve bargaining position of coffee producers and exporters from Ethiopia and increased the price of Ethiopian coffee and income of coffee producers, which resulted in a positive improvement in the living standard of farmers.

Trade Secrets

Trade Secrets (in certain circumstances and jurisdictions called know-how) provide protection against unauthorized disclosure or use of confidential information (of a technical or commercial nature). To be protected as a trade secret, the intellectual property must, of course, be kept secret, and must also confer some sort of commercial advantage to the holder. Enforcement of IP rights for trade secrets is possible when a competitor has misappropriated and/or stolen the trade secret. Trade secrets are important in animal and fish breeding where commercial breeders want to keep their nucleus stock and the pedigree information (and other information) away from their competitors. A point often raised is when one should file for a patent or maintain the information as a trade secret. What is important to note is that patents and trade secrets are not in conflict with each other but are complimentary IP assets. Depending upon the nature of the know-how; or the invention, the organization may choose to either file a patent or to continue to hold as a trade secret.

Need For a Sui Generis System

There is an urgent need for legally binding internationally accepted system for access and sharing of benefits from the use of AnGR and associated traditional knowledge. There is a need for recognition of community rights over knowledge and biodiversity. In the modern biotechnology era, there is danger of animal genetic material from biodiversity rich countries being exploited by others including large international companies.

Note: This chapter includes part of presentation and publications of the first author in different conferences/seminars and also reports submitted to Karnataka Biodiversity Authority with update information.

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