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PANCHGAVYA (COWPATHY): AN OVERVIEW

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ABSTRACT

Panchgavya is a term used to describe five major substances, obtained from cow, which include cow's urine, milk, ghee, curd and dung. All the five products possess medicinal properties against many disorders and are used for the medicinal purpose singly or in combination with some other herbs. This kind of treatment is called Panchgavya therapy or cowpathy. It is a system of medicine just like as homeopathy, allopathy or naturopathy. The ancient ayurvedic literature (Vir Charak Samhita, Sushrut, Gad Nigrah) suggests a number of pharmacological applications of the substances obtained from Panchgavya. These substances are abundantly used in Ayurveda for treatment of several disorders such as leucoderma, hyperlipidemia, arthritis, renal disorders, dietary disorders, gastrointestinal track disorders, acidity, asthma etc. These remedies seem to be potent anticancer and anti HIV agents. Recently the cow urine has been granted U.S. Patents (No. 6410059 and 6896907) for its medicinal properties, particularly for its use along with antibiotics for the control of bacterial infection and fight against cancers. The Panchgavya products also show many other applications viz. excellent agricultural applications in the form of biofertilizers, vermicompost and biopesticides, which improves soil fertility and provide food grains free from the health hazards of using chemical fertilizers/pesticides. A systematic work needs to be carried out on chemical nature, biological activity, microbiology and pharmaceutical aspects and mechanism of bioactive compounds in Panchgavya. In the past due emphasis has not been given to the cow therapy which needs attention of scientific community.

KEYWORDS: Cowpathy, Panchgavya, cow urine, milk, dung, *ghee*, curd.

INTRODUCTION

Historically, Maharshi Vasishtha served the divine "Kamdhenu" Cow and Maharshi Dhanvantari offered to mankind a wonder medicine "Panchgavya" (a combination of cow urine, milk, dung, *ghee* and curd). In Sanskrit, all these five products are individually called "Gavya" and collectively termed as "Panchgavya". Panchgavya had reverence in the scripts of Vedas (divine scripts of Indian wisdom) and Vrkshyurveda (Vrksha means plants and Ayurveda means health system). Indian cow breeds are unique and distinct species, both in their appearance and characteristics. Cow is the backbone of Indian culture and rural economy, and sustains our life, represent cattle wealth and bio-diversity. It is known as "Kamdhenu" and "Gaumata" because of its nourishing nature like mother, the giver of all providing riches to humanity and is a

store of medicines. The Ayurveda, the ancient Indian system of medicine, has detail mentions of importance of cow's milk, curd, *ghee*, urine in the treatment of various human ailments. Every product has distinct qualities and uses in health, agriculture and other fields (Caraka-Samhita, 1981, Susruta Samhita, 1985; Tietze, 1996; Chauhan, 2000, 2001, 2002 a,b, 2004a,b, 2005; Fulzele *et al.*, 2001, 2003; Joshi, 2002; Nautiyal, 2002; Garg and Chauhan, 2003a,b; Achliya *et al.*, 2004; Saxena *et al.*, 2004, Singh and Chauhan, 2004). Panchgavya has many beneficial implications in agriculture, organic farming as good quality natural manure and biopesticides, as alternate energy resources and high medicinal values. Bio-fertilizer and pest repellants obtained from cow urine and dung restores micro-nutrients and fertility of the soil and provides food free from health hazards of chemical fertilizers and pesticides. No other fertilizer in the world is as cheap and harmless as dung fertilizer. Dung and urine also provide valuable alternate source of energy in the form of biogas, fuel and electricity.

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Scientists/clinicians are facing problems in modern allopathic treatment due to the multiple drug resistance in microorganisms, presence of antibiotic residues in food chain and/or associated allergies and autoimmune disorders in man and animals. Immunity is reducing drastically as a result of the environmental pollution, use of agrochemicals in agriculture and presence of pesticides, heavy metals, fungal toxins etc. in the food chain. Deficient functioning of macrophages leads to inefficacy of antibiotic drugs, development of resistance in bacteria, recurrent infections, and or decreased immune status of an individual. As per WHO, the twentieth century wonder drugs "antibiotics" will not remain useful and become almost ineffective by the year 2020. In these circumstances one has to think over the alternative therapeutic approaches to control the infections (Garg and Chauhan, 2003a; Chauhan, 2005).

Two US patents have been granted to Indian scientists on establishing the bioenhancing properties of cow urine, its use in tuberculous patients and fight cancers, thus opening a new era in medical science. Cow urine along with the antibiotics also prevents the development of resistance in microorganisms against the antibiotics. Several scientists from different laboratories of CSIR, AIIMS, G.B. Pant University of Agriculture and Technology, Pantnagar, and IVRI, besides NGOs and other Institutes are working on different medicinal properties of cow urine and other Panchgavya products. In fact there are several medicinal preparations available with NGOs who are also marketing cowpathy drugs under license and some of the NGOs are even not able to cope up with the demand of the public. Several students of M.Sc., M.V.Sc., M.D. and/or Ph.D. are working on the medicinal properties of cow urine and other products of cows (Chauhan, 2005). Panchgavya products have been found to be beneficial in curing several human ailments and enhance the body's immunity and resistance to fight the infections. In poultry cow urine enhances the immunocompetence of birds and provides better protection along with vaccination and increases egg production and egg quality. It is a common belief that Panchgavya from younger cows is more effective than the older, but it is not true. All the products from older cows or young cows are equally effective.

Cow urine as such and/or after addition of neem leaves is a wonderful biopesticides which do not accumulate in the food chain and as such do not have the harmful effects like chemical pesticides. Cow dung is excellent farmyard manure and if processed into vermi-compost, very small amount is sufficient for a large field. Though, the end user claims are many but scientific validation of those claims is required. The people frustrated from the heavy medication of allopathy

are using cowpathy drugs and being benefited by the Panchgavya products. However, scientific validation of Panchgavya products is required for its worldwide acceptance and popularity in terms of agricultural, energy resource, nutritious and medicinal applications so as to exploit the optimal power of Panchgavya for the service of mankind. Regardless of scientific validation, people are using and getting benefits of it.

The overview highlights the salient points describing the wide applications, benefits, uses and importance of Panchgavya in our day to day life, well supported by the known scientific facts. The authors have compiled the information with ultimate goal of popularizing "Panchgavya Therapy / Chikitsa" as an alternate prophylactic / therapeutic approach for sound livestock and poultry health along with human health and as devotion in the services of the "Holy Cow" which is central to the bio-chain.

COW DUNG

Cow dung has been considered as a Gold Mine due its wide applications in the field of agriculture, energy resource, environmental protection and therapeutic applications. Its important uses are:

Fuel: Dung as fuel is well known for rural kitchen. Cow dung patties (*gootte*) are used for cooking. Roasting of potato, sweet potato in it is still considered the best fuel as against electric oven. Traditional wisdom says that in burning these cow dung cakes, the temperature never rises beyond a certain point, ensuring overheating does not destroy the nutrients in the food. Besides, the smoke of *gobar* clears the air of germs.

Gobar Gas Plants: Gobar has also been successfully used to produce bio-gas (methane) and generate electricity for consumer use. Biogas is used in cooking, for lighting in homes and streets. It can be used for driving self-combustion engines for various uses like running a generator to produce electricity. The slurry (residue) could also be used for production of manure, which when spread on crops acts as an excellent fertilizer. Dung for Bio-gas and its slurry for manure is providing renewable cooking energy and slurry for compost.

Fertilizer: Cow dung is the best fertilizer. Composting makes it even more powerful fertilizer. It is rich in nitrogen.

Organic farming: Different types of bio-fertilizers using cow dung and urine and vegetative waste have been developed using compost method and vermiculture. Cow dung keeps the rotting compost antiseptic. The

digester turns the dung into sterile compost and all worms get killed. With use of 1 kg of cow dung with 15/16 kg of Biomass and similar quantity of soil from the fields, 30 kg of good compost is made. This is also approved by National Bank for Agriculture and Rural Development (NABARD). Vermi Compost from cow's dung exhibits excellent plant growth promotion property.

Panchgavya spray has been found effective on all the crops under evaluation than the foliar spray of recommended nutrients and growth regulators and found advantageous since it recorded higher growth and productivity than with no Panchgavya spray. Degraded soil is improved by layer of soil and bio-mass with sprinkling of fresh dung slurry for composting. Cow dung along with sea water and yeast has been exploited as a liquid catalyst. It is claimed that it is capable of greening degraded land. Not only good compost is made but valuable organisms like earthworms are also generated as in due course which keep on working all through. Individually or system as a whole, biogas slurry with Panchgavya combination is adjudged as the best organic nutritional practice for the sustainability of crops by positive impacts on overall performance on growth, productivity and quality of crops, the soil health and economics. Modern day ecologists are saying that as compared to chemical fertilizer, which damages the land in the long run, cow dung actually improves the health of the soil.

Seed protector: Covering seeds in dung before planting helps to protect against pests. It is an excellent conditioner for the soil.

Floor coating: Mixed with mud and water serves to coat the floors and walls in mud houses. As a mud additive it dries up slippery mud puddles and improves water absorption of mud. Anti-septic property is also the attribute of cow dung, which is mixed with clay to form a plastering medium for mud huts. Thin coating of dung for cooking place, *havan kund*, *havan* platform, mud house, floors, walls provide antiseptic surface.

Mud brick additive: Mud and cow dung ashes become like cement, by improved resistance to disintegration. It is a proven fact that mud huts plastered with cow dung keep insects and reptiles away. This is the reason why people in the countryside still store grain in huge earthen pots plastered with cow dung and urine to keep it free from insect manifestations.

Smoke producer: Smoldering cow patties keep away mosquitoes. Apparently, the traditional Indian village system of wiping the floor daily with a mixture of water and fresh cow dung assures that flies will not settle there.

Heat source: Cow dung is naturally hot and compost makes it hotter. It can be put in glass house to warm them or run pipes through it to get hot water.

Pot cleaner: Pots can be cleaned using cow dung in the same way one uses brass polish or soap. It absorbs oil and fat. Dung ash is a very good cleaning agent for utensils and can avoid use of chemicals like vim, which leave residual effect.

Pond pH balancer: Thrown into pond neutralizes acid.

Purifier: Possesses natural antiseptic qualities.

Pest Control: Dung ash also helps in controlling pests.

Environment Protection: Cow dung from a single cow in its life span can produce 4500 liters of biogas which is equivalent to burning 6,80,00,000 tons of wood. This will help us save 14 crore trees from cutting and burning and thus give environment protection. Fertilizers from cow dung acts as effective pollution controllers for soil, water and air.

Scientific studies show that *gobar* has been found to be resistant to solar radiation. Experts say that pyramid shaped hump of cow absorbs solar energy. Press reports have appeared mentioning that houses coated with cow dung plaster are saved from Nuclear radiation i.e. get protected from atomic emissions. Our own Nuclear Department should experiment in their laboratories for the scientific facts.

Dung, when sprayed on garbage and waste dump, within a few hours makes these free from all foul odors and even flies are not attracted.

Experiments are being made near Indore to fill cattle horns (of dead animals) with dung. These are buried underground before winter and in autumn they are taken out. 25/30 gms of this enriched dung is mixed with 10 liters of rain water and sprayed which gives good result

Therapeutic uses of cow dung

Skin tonic: Mixed with crushed neem leaves and smeared on skin - good for boils and heat rashes.

Tooth polish: Toothaches gets removed, so instead of toothpaste which is made of chemicals & dead bones of animals it is a good alternative.

Through many experiments on cow dung the famous Italian scientist Prof. G.E. Bea God has proven the fresh cow dung kills the germs of Malaria and T.B.

It has been observed that smoke from ashes actually increases our eyelids to close and open so many times that lot of water from the eyes comes out which increases the vision life of a person to old age also.

Cow dung is superior to other dung because it is antiseptic and has prophylactic (disease preventive) properties. It destroys micro-organisms that cause disease, fermentation and putrefaction. Other dungs need to be composted to be purified. It should be kept in mind that fresh cow dung is pure but once it has laid on the ground awhile, it starts to change. Cow dung as described in our Scriptures is definite indication of prosperity evident from *Gobar-dhan Puja*, next day of *Deepawali* (a very popular festival of India during Oct. or Nov.).

COW URINE

Cow urine has many beneficial properties particularly in the areas of agriculture and therapeutics. It has also been observed during the scientific research that the urine of Indian cows is highly effective and interestingly almost nil or few medicinal properties are present in the urine of crossbred, exotic cows, buffaloes, etc. Recent researches showed that cow urine enhances the immune status of an individual through activating the macrophages and augmenting their engulfment power as well as bactericidal activity. Its major implications are as follows:

Agriculture: Distillation waste (plant herbage after distillation) and cow's urine have been used for production of vermicompost. Addition of cow's urine in composting pits led to production of superior quality vermicompost with higher concentrations of major macro- and micro-nutrients and was found to be superior in terms of useful microflora (fungi, bacteria and actinomycetes). Application of this vermicompost in pots significantly improved the yields of leucerne (*Medicago sativa*). Cow urine acts like a disinfectant and thus purifies atmosphere and improves the fertility of the land.

Biopesticides: Cow urine as such and/or after addition of neem leaves is a wonderful biopesticide. Such biopesticides are safe to use, do not accumulate in the food chain and as such do not have the harmful effects like chemical pesticides. In 10 litres of cattle urine, about 2 kg of Neem Leaves are soaked with some other vegetable matter and can be used in proportion of 1:50 for spraying. Cow dung mixed with cow urine makes excellent manure and a natural pesticide. Pest Repellent prepared from cow urine and Neem leaves exhibits excellent insecticidal, fungicidal and pesticidal properties and also exerts excellent plant growth promotion property

Electricity and Kitchen fuel: Urine utility has been explored for generating small power to run electronic clock and efforts are on to light torch light bulb. Cow

and urine also mixed with mud and straw to make dried cakes that fuel kitchen fires. When this becomes successful, each house in rural and urban area having no electricity can have light without any recurring cost. It is possible that further intensive research efforts may make it possible to use this source of energy for illumination of a small space in villages.

Therapeutic Uses of cow urine

Cow urine has been described in 'Sushrita Samhita' and 'Ashtanga Sangraha' to be the most effective substance/secretion of animal origin with innumerable therapeutic values. Taken in measured quantities, cow urine or *gau mutra* has a unique place in Ayurveda and is suggested for improving general health. Exploring its antimicrobial activities, it is being used to produce a whole range of Ayurvedic drugs. Cow urine therapy has a long history. Some recognized it as water of life in Vedas, sacred Hindu writing, which is said to be the oldest books in Asia, it is mentioned as "Amrita" (beverages of immortality), the nector of the God.

The urine of the cow contains all beneficial elements in it. Hence it is natural and universal medicine that fulfills the deficiency of elements and reduces the increased elements in the body and it is the quality of the urine, which helps in curing even the most incurable diseases. Cow urine contains 24 types of salts and the medicines made from cow urine are used to cure several diseases. Cow urine contents are water 95%, urea 2.5%, minerals, salt, hormones, and enzymes-2.5%. It contains iron, calcium, phosphorus, salts, carbonic acid, potash, nitrogen, ammonia, manganese, iron, sulphur, phosphates, potassium, urea, uric acid, amino acids, enzymes, cytokine and lactose etc. (Bhadauria, 2002). Copper has the power to destroy diseases and act as an antidote. Cytokines and amino acids might play a role in immune enhancement. *Gomutra* singularly has got all such chemical properties, potentialities and constituents that are capable of removing all the ill effects, imbalances in the body (Bartnett, 1988; Chauhan *et al.*, 2001; Chauhan, 2003a). Urine kills the number of drug resistant bacteria and viruses and cures some untreatable diseases like cancers.

Most of the medicines are made by distilling urine and collecting vapors. The ark (distillate) is useful for many diseases. A number of ailments could be treated and this therapy is being used even for dreaded diseases like cancer, AIDS, diabetes and skin problems. Practitioners of Ayurvedic medicine (from India) routinely use urine as a remedy. It is antibacterial antifungal, antiviral antineoplastic (anticancer), anticonvulsive, antispasmodic and non-toxic. Improvements have been shown or reported with those

suffering from flu, sinus, allergies, colds, ear infection, rheumatoid arthritis, aging, bacterial/viral infections, snake bites, chemical intoxication, chicken pox, enteritis, constipation, edema, baldness, hepatitis, leprosy, obesity, gastric ulcer, depression, heart disease, hypertension, burns, tuberculosis, asthma, tetanus, Parkinson disease, small pox, morning sickness, fever, eczema fatigue, etc. It is also used as a diuretic, laxative and for treatment of chronic malaria, headaches and fever. It is proved as a universal curer of blood disorders, leucorrhoea and even leprosy. The urine of the cow cleans the intestines and removes the deposited material. Hence diseases like fever, mouth and skin diseases menstruation disorders, asthma, giddiness, increase of cough and urinary irregularities in man are cured by its regular use without any side effects. The urine of cow is better, pungent, piquant, spicy, warm and full of all the five types of elixirs. There is evidence that the urine of the cow works as the best appetizer. It smoothens and nourishes the heart and adds to the power of wisdom of man, and increases their physical strength as well. It increases life span and purifies blood from all sorts of impurities. In India drinking of cow urine has been practiced for thousands of years. It has been experimentally proved that among all sorts of urines, the urine of the Indian cows is most effective thus it is universal medicine for mankind and cures various sorts of disorders (Saxena *et al.*, 2004; Chauhan, 2004).

Skin diseases: It is also very helpful in all kind of skin problems, itching, sunburns, eczema, psoriasis, acne, etc. It also renders the hair soft and clean. Cow urine is entirely sterile after secretion and has antiseptic effect.

Stomach, kidney and heart diseases: Cow dung and urine are the best cures for stomach diseases, heart diseases, kidney ailments and tuberculosis. Cow's urine is prescribed as an ingredient of various plasters and mixtures (sometimes with fermented wine) or alone, as an antidote for obesity, as a purgative; for eliminating vermin from an ulcer; *vayu* disorders, abdominal dropsy and many other diseases.

Stones: It can be used for stones (kidney, gall bladder etc.). A glass of fresh cow urine should be taken as a first thing in the morning for 21 days. Uric acid in cow urine dissolves these stones to a manageable size.

Diabetes: For diabetic youngsters it controls sugar level and keeps fit.

Liver problems: Daily doses of 1 to 2 ounces of warm cow urine are used to treat cirrhosis of the liver. Urine

as such and or mixed with honey/salt is also administered for Liver and other problems.

Jaundice: Antimony sulfide and cow urine taken internally are used to cure malignant jaundice.

Athletes feet: It has a cure for athletes feet. It has been observed that people cleaning the cow milk barn by bare foot don't suffer from athletes foot.

Immunostimulant: Cow's Urine has immunostimulant activity in plants and animals.

Anticonvulsant agent: A herbal preparation popular in Nigeria is based on cow's urine and some herbs known as cow urine concoction (CUC). Over fifty chemical compounds have been identified in CUC. Its major pharmacological actions are anticonvulsant and hypoglycemic effects.

Cysts: For the case of sebaceous cysts (large swellings that exude a fatty liquid on bursting), incision followed by washing with cow's urine is prescribed. Another treatment is the surgical incision and the removal of fat followed by cauterization of the wound. Cow urine acts like a disinfectant and prophylactic agent and thus purifies atmosphere.

Bioenhancer: A cow urine distillate fraction has been identified as a bioenhancer of the activities of commonly used antibiotics, anti-fungal and anti-cancer drugs. The activity of Rifampicin, a front-line anti-tubercular drug used against tuberculosis, increases by about 5-7 folds against *E. coli* and 3-11 folds against Gram-positive bacteria. Potency of 'Taxol' (paclitaxel) has been observed to get increase against MCF-7, a human breast cancer cell line in *in-vitro* assays (US Patent No. 6,410,059). (The Hindu, 4 July, 2002; The Indian Express, 4 July, 2002)

Bioenhancers are substances, which do not possess drug activity of their own but promote and augment the bioactivity or bioavailability or the uptake of drugs in combination therapy. Such bioenhancers have been earlier isolated only from plant sources. It has been found that cow urine also act as a bioenhancer and increases the efficacy of the antibiotics against infectious agents. Bio enhancement has also been observed with other drugs viz. Ampicillin, Isoniazid, Clotrimazole, Cyanocobalamine etc. Bioenhancer activity has been found to reduce the antibiotic dose per day and duration of treatment in tuberculosis patients (Joshi, 2002).

Anti-cancer properties: Cow urine possesses anti-

cancer properties. Research works carried out by Go-Vigyan Anusandhan Kendra (cow science research center) at Nagpur revealed the beneficial properties of cow urine in the treatment of cancers. Further extensive research on cow urine therapy against fighting carried out by Scientists of Central Institute of Medicinal and Aromatic Plants (CIMAP), CSIR center at Lucknow, along with collaboration with Go-Vigyan Anusandhan Kendra, Nagpur confirmed this milestone achievement. Studies highlight the role of cow urine in treating cancers and that cow urine enhances the efficacy and potency of anti-cancer drugs. Recently, this significant achievement has been validated by the grant of U.S. patent (No. 6896907) in the field of treatment of cancers (Amar Ujala, July, 19, 2005). The Indigenous cow urine contains "*Rasayan*" *tatva*, which is responsible to modulate immune system and act as bioenhancer. Scientists have proved that the pesticides even at very low doses cause apoptosis (cell suicide) in lymphocytes of blood and tissues through fragmentation of DNA. Cow urine helps the lymphocytes to survive and not to commit suicide. It also repairs the damaged DNA and thus is effective for the cancer therapy (Ambwani, 2004).

The above two U.S. Patents have attracted global attention. US Patents to Indian Scientists on Cow urine therapy made realize that all traditional practices from Indian systems of medicine have a strong scientific base. The cow urine, the best therapy that can cure disorders, is non-toxic and can be obtained free of cost through domestication of cow. It is an important ingredient of Panchgavya, which has been tested by various workers for its immunomodulatory properties and have been reported that it enhances both cellular and humoral immune response (Kumar, 2001; Chauhan *et al.*, 2004). *In-vivo* cow urine treatment to developing chicks marginally upregulated the lymphocyte proliferation activity (Prabhakar *et al.*, 2004). Chauhan *et al.* (2001) studied the immunomodulatory effect of *kamdhenu ark* prepared from cow urine in mice and found that cow urine enhances both T and B cell proliferation and also increases the level of IgG, IgA and IgM antibodies titres. It also increases the secretion of interleukin-1 and 2 (Chauhan *et al.*, 2004). The level of both IL-1 and 2 in mice got increased by 30.9 and 11.0%, respectively and in rats these levels were increased significantly by 14.75 and 33.6%, respectively. *Kamdehnu ark*, a drug made from urine of zebu cattle has been reported to be a potent and safe immunomodulator, which increases both humoral and cell mediated immunity in mice (Kumar *et al.* 2004). Prabhakar (2004) reported that the cow urine had protective effect on lymphocytes of birds undergoing apoptosis and suggested the exploitation through experimental trails for specific use of cow urine as an adjunct to vaccination. It enhances the activity of

macrophages and reduces apoptosis in lymphocytes, thus is helpful in prevention and control of bacterial infections. Thus not only maintain the immunity of body but also modulate it in the positive direction to an optimum level.

Kumar *et al.* (2004) reported the prevention of pathogenic effect of free radicals through cow urine therapy. These radicals cause damage to various tissues and attack enzymes, fat and proteins disrupting normal cell activities or cell membranes, producing a chain reaction of destruction leading to the ageing process of a person. By regular use of cow urine one can get the charm of a youth as it prevents the free radicals formation.

Garg *et al.* (2004) reported beneficial effects of cow urine on serum biochemical profile (total serum protein, glucose, calcium, and cholesterol) of laying birds. Gupta (2003) also reported its usefulness as antimicrobial agent, positive effect on body weight gain, hematological profiles, immunomodulatory effect on both humoral and cellular immune responses, and healing of surgical wound in experimental rats. Garg *et al.* (2004) reported that the cow urine has capabilities to potentiate the egg production of the birds and it can be used as a feed additive for layer birds in order to get good quality eggs. Distilled cow urine protects DNA and repairs it rapidly as observed after damage due to actinomycin-D and pesticides. It protects chromosomal aberrations by mitocycin in human leukocyte (Datta, 2001).

For the treatment of wounds on body surface local (topical) application of antiseptic powder or lotion is recommended but in ancient Hindu mythology use of cow urine as antiseptic is found. Maheshwari *et al.* (2004) observed that the cow urine is having antiseptic properties in wound healing and that the healing times is somewhat less in comparison to wounds on which antiseptic cream was applied. Administration of fresh cow urine orally showed added effect on wound healing by virtue of its antiseptic and immunologically modifying properties in dogs, the healing process was observed a bit faster than the group of dogs which were not given fresh cow urine orally.

Urine enemas work very well in cleansing the colon and in providing a direct immune stimulant effect. Can be used as ear and eye drops for treating ear infections, conjunctivitis and glaucoma. Sniffing cow urine is useful in sinusitis and other nose problems like rhinitis and colds. Orally taking the middle stream of morning urine is a good tonic and preventative in minor illnesses. Gargling with urine is helpful in throat ache and also in cold. Vaginal douche is helpful in cure of infections. For, massaging/rubbing one can use either fresh or old urine. Old urine (4 to 8 days) is generally more effective in

massaging and nourishes the body through the skin and helps against increased heartbeat. Fresh urine as an after-shave gives a beautiful soft skin. Hair and scalp massage can sometimes stimulates new hair growth. Footbaths can be used for any skin and nail problems of the feet (athletes foot, ringworm etc. However, the biological activity of the cow urine needs to be explored scientifically.

COW MILK

According to Hindu mythology as well as the Indian traditional medical practices (both the classical systems like Ayurveda and Siddha and the oral practices of the rural villagers) cow milk has rejuvenatory health protecting and health promoting properties and hence has been said as the best one among vitalisers. The cow milk is a healthy food because of low calorie, low cholesterol and high micro-nutrients/vitamins. Compared to buffalo milk it has high moisture, carotene, thiamine, riboflavin, vitamin C, sodium potassium; and on other hand is low in protein, energy (kilocalories), calcium, phosphorous, fat and cholesterol. These properties serve unique purposes. Buffalo milk may be richer but it is the cow milk that sharpens intellect, gives swiftness of body, stability of emotions and a serene nature to the one who drinks it. Cow milk is an integral part of balanced diet (Gopalan *et al.*, 1993; Nautiyal, 2002; Singh and Agarwal, 2004; Cow Milk is Amrit": A publication of the Love 4 Cow Trust).

Cow milk is beneficial because

Nutritious: Cows milk contains substances like carotenes, vitamin A, vitamins of B complex group and vitamin C. It also contains substances like flavones, sterols and phenols. All these chemical agents delay the processes involved in aging. It is known that the fatty acids and amino acids present in the fat of cow milk are different than those in buffalo milk. These components render cow milk very nutritious and growth promoting for infants and children. The use of milk proteins as nutritional supplements to enhance dietary protein quality is very feasible as they can provide lysine and tryptophan, the limiting amino acids of wheat and maize proteins. A 250 ml serving of cow milk contains riboflavin equivalent to 50% of the daily requirement of a pre-school child.

Bio-Protective Role in Human Health: Milk plays an important role in meeting the requirements of many essential nutrients, and hence milk is considered as a protective food. The proteins of milk are of a high biological value. The digestibility of milk proteins is rated higher (96%) than that of plant proteins (74-78%). It is easily digestible, the amino acids composition makes

its protein easily digestible, and reaching the nerves of the brain it acts as a brain tonic and is good for kidney. Lactose favors the absorption of calcium and phosphorous and the synthesis of some B complex vitamins in the small intestine. The lactic acid bacilli present in milk are important. Lactose, the principal milk sugar, promotes the growth of lactic acid producing bacteria in intestine thus creates a desirable condition that inhibits the growth of proteolytic and putrefying bacteria in the intestine and may increase the solubilization and absorption of calcium. Lactose also promotes the utilization of magnesium and phosphorus

The milk proteins are useful in the diet of patients suffering from liver and gall bladder diseases, hyperlipidaemia and diabetes. The easy digestibility of milk fat makes it a valuable dietary constituent in diseases of stomach, intestine, liver, gall bladder, kidney and disorders of fat digestion. Milk fat is reported to have antibacterial and fungicidal activity against gram-negative bacteria and certain moulds. Milk fat has a protective effect against human tooth decay ascribed in part to adsorption of milk fat onto the enamel surface and in part to antimicrobial effect of milk fatty acids.

Kidney disorders: The low content of protein in cows milk from buffalo milk makes it ideal for infants and people with renal disorders. Patients with impaired kidney functions rely on protein with high biological value for relieving strain on the excretory function of the kidney.

Immunity: It is a rich source of vitamins like B₂, B₃ and vitamin A which help increasing immunity. It is a good source of zinc, which is required for synthesis of insulin by the pancreas and for immunity function. The substances in milk which have an antimicrobial effect are immunoglobulins, lactoferrin, lysozyme, lactoperoxidase and vitamin B₁₂-binding protein. The immunoglobulins, mainly IgA are not broken down by the digestive enzymes. Thus, they not only act against the microorganisms in the intestine but also prevent the absorption of foreign proteins. Lactoferrin is an iron binding glycoprotein that occurs in cow milk at a level of 0.2 mg/ml. A number of milk enzymes viz. lactoperoxidase, xanthin oxidase and lysozyme are involved in antibacterial mechanisms. Several peptides with opium like (sleep inducing) activity have been extracted from the degradation products of milk proteins viz. β -casomorphins (from β -casein), exorphin (from μ_{s1} casein), β -lactostensin (from lactoglobulin) and serorphin (from serum albumin) which can prolong gastrointestinal transit time exerting anti-diarrhoeal effect. Certain peptides from casein stimulate the production of immunoglobulins. Immune-stimulatory

peptides from milk can stimulate the phagocytic activities of murine and human macrophages and enhance resistance against certain bacteria.

Vision: Its yellow substance "Carotene" (Vitamin A) increases the visual strength. Vitamin A deficiency is a major cause of widespread blindness among children in India. A 250 ml serving of cow milk contain vitamin A sufficient to meet 75% daily vitamin A requirement of pre-school child.

Ulcers: It helps in reducing acidity, a common problem today and thus reduces chances of peptic ulcer.

Anti-cancer properties: Cow milk fat component is potential anti-carcinogenic agent, which help in reducing chances of colon, breast and skin cancer. A specific fatty acid (a cis-trans isomer of linoleic acid) has been identified in milk fat, which appears to be an inhibitor of cancerous growth. Conjugated linoleic acid (CLA) in cow milk prevents the uncontrolled spread of cancer-affected cells.

CLA in mouse models has been shown to protect against the induction and proliferation of chemically-induced skin, stomach, colon, prostate and mammary tumors. It has drawn a great deal of attention among dairy, medical and nutrition scientists. Other components of milk fat also have biological effects with anti-cancer properties. Among these, sphingomyelin, a component of the milk fat globule membrane, and thus particularly rich in buttermilk, contains the biologically-active components ceramide and sphingosine. CLA fed before puberty may impart long-lasting protection against induction and proliferation of tumors. Research suggests that CLA can decrease the amount of fat in the blood the amount stored in the body. These effects could help in the fight against two other major killers, heart disease and obesity.

Heart ailments: It contains practically half the fat content of buffalo milk thus reduces the risk of coronary heart diseases. It is specifically beneficial to heart patients by reducing formation of serum cholesterol. It has been suggested that the regular intake of milk keeps blood vessels healthy.

Obesity: Low fat content helps one keep fit and to check obesity. Unique physical, chemical and biological properties of milk fat contribute to the ease of digestibility compared with other fats. Milk turns down the tendency of the fat cells to store the day's calories, and increases the amount frittered away as heat. Calcium is a critical signaling agent, helping all sorts of cells figure out what they need to do. Apparently, the type of cell that listens

when calcium talks is the fat cell. When there's plenty of calcium in the blood, fat cells get the message to quit storing fat and start burning it. Calcium pills aren't a perfect substitute for the complex package of nutrients found in milk.

Natural anti-oxidants: It is one of the best natural anti-oxidants and thus neutralizes the oxidative stress produced in body through action on free radicals. A skin care cream containing cream or *ghee* from cow's milk is said to render the skin fair and smooth.

Absorption of nutrients: Less phosphorous content of cows milk allows better absorption of calcium. Calcium and Phosphorus in cow milk help in balanced absorption of nutrients and are good for healthy growth especially for children. Potassium helps in development of healthy mind. Studies show that milk and products may decrease the risk of osteoporosis through their effects on growth.

Diabetes: It not only helps against diabetes but also has good sugar for diabetic patients. Milk consumption, therefore, enables the diabetic person to obtain the biologically highly valuable milk proteins without running the risk of rise in blood glucose levels. Being high in water content can be supplied both as food and fluid.

Anemia: A distinct advantage of cows milk over human milk is that it's a better source of vitamin K which prevents hemorrhagic disease of newborn. Folic acid prevents anemia and neural tube defects in newborn

Tonic for health: It is best for infant feeding after mother's milk and a good supplementary food for adults. It is a fine blend of all the nutrients necessary for growth and development of young once. There is general agreement that breast milk of the mother is the best food for infant. Human colostrum is rich in immunologic factors, which prevent infection in the newborn babies. However, changing social and cultural patterns have led to change from breast to formula feed especially among urban elites and working mothers. Cow milk is the best alternative option in such a situation. Also, milk is the first food a child takes to survive and is the best and most complete of all foods. It has more minerals and vitamin K except iron and copper, than human milk to meet the nutritional requirements of young infants. Cow milk contains tonic, is energetic and conducive to heart and brain, and advances age and potency.

Dietary pattern varies widely in different parts of world depending upon socio-economic status, customs,

taboos etc. but milk surpasses all these barriers, as it is the only food widely available and acceptable. In Mahabharata Yaksha asked Yudhishthira "What is nectar?" Yudhishthira replied "Cow's milk is nectar." In India, boiled whole cow's milk is routinely used.

The milk of cow can be used in various forms as other milk. Skimmed milk powder supplemented with vitamin A, D and pyridoxine, forms a comparatively cheap food of high nutritive value. It is useful for the treatment of malnutrition, the nephritic syndrome and the cirrhosis of liver. Toned milk is a useful source of proteins for malnourished children and pregnant women. When cow milk is heated (as in pasteurization), homogenized or acidified to produce a softer curd/*dahi*, the protein is used by infants as efficiently as is the protein of human milk. Other products are *Khoa* (*Mava*) *Chhana* (cottage cheese), *Yoghurt*, *Lassi* (Butter milk) and *Ghee* (Clarified butter: Butter-fat). Dairy products can supercharge almost any diet. It has been observed that dieters who got dairy products lost 70% more weight than those who avoided it

Cow milk, a source of microbial wealth

Agriculture: Improving soil fertility is one of the most common tactics to increase agricultural and forest production. Plant beneficial bacteria from cow milk have been isolated and inoculation of seeds or soil with these beneficial microorganisms for crop improvement has been practiced for a number of years. Milk of Sahiwal cow was found superior to human, Holstein cow and buffalo. The 3 strains *Bacillus lentimorbus* NBRI0725, *Bacillus subtilis* NBRI1205, and *Bacillus lentimorbus* NBRI3009 isolated from Sahiwal cow milk have the ability to control phytopathogenic fungi and promote plant growth under field conditions, increases tolerance for abiotic stresses, and solubilise phosphate under abiotic stress conditions. Screening of bacterial strains isolated from milk under *in vitro* conditions possesses the ability to suppress plant pathogenic fungi viz. *Colletotrichum falcatum*, *Sclerotium rolfsii*, *Alternaria solani*, *Phytophthora palmivora*, *Sclerotinia sclerotiorum*, *Aspergillus niger*, *Curvularia lunata*, *Pythium aphanidermatum*.

Press mud is a "waste" product obtained during sugar manufacture. Utilizing fermentation of press mud and/or spent wash, and bacteria isolated from Sahiwal cow milk resulted into an value addition product, useful for enhancing growth of wide range of plants representing economically important horticulture, floriculture, and agronomic crops in the range of 10-60%. Global patent application (NF404/2001) has been filed by CSIR. It can help in economizing crop production and maintenance of soil structure, fertility and healthy ecosystem.

Milk is one food for which there seems to be no adequate substitute. Man uses milk of many animals as his food. The cow is the most important of all these animals as supplier of food. Cow milk is being used in many processes of medicinal and spiritual purposes from a very early period of time. It is being used as essential part of "*Panchamrit*", which is distributed, as *prasad* after *pooja*. Cow milk of our country is far better and has better quality than other exotic breeds. Therefore, we should make every for the rational use of milk and get it popularized so that more number of people get aware and become benefited.

COW CURD (*DAHI*)

Cow Curd (*dahi*) or *Matha* (whey or butter milk) prepared from indigenous cow is milk is considered as digestive, nutritive and useful in gastrointestinal ailments by checking or controlling the growth of harmful organism. Curd from cow milk is considered "*Vatanashak*" and blood purifier. If it is taken with sugar, it is useful in "*Pitta*" induced disorders and cures the blood related problems. Whey of cow (Butter milk) is known as "*Tridoshnashak*" and found useful in piles and other gastrointestinal disorders. (Singh and Chauhan, 2004). Since ancient times curd has been used either with sugar (powdered sugar) or with black salt and *zira*. People take whey after food for good digestion. Whey/butter milk is very low in fat but has large amount of beneficial bacteria or their breakthrough products in the form of amino acids, peptides, vitamins, minerals etc., which are nutritionally useful in human and animal health. These bacteria attach on the intestinal surface and further multiply there. *Lactobacillus acidophilus* bacteria plays vital role, making the whey more useful. It has been exploited as probiotic to control animal diseases: by improving in intestinal microbial balance. In animal health also the whey with salts is given to neonatal calves to treat the diarrhea and to get rid of intestinal parasites. Even in adult animals, particularly the milched buffaloes, it is being given to enhance their production. Similarly along with concentrate, whey is given to bullocks to increase their draught power.

Most research showed that use of probiotic as feed additive is quite beneficial. With the help of probiotics, there is a hope to control infections in a non-drug manner. It will also reduce the consumption of antibiotics in animal husbandry. The residues of antibiotics in milk, egg or poultry meat are the cause of several deleterious effects in man including allergy and resistance of infections. Such problems will be reduced after the use of probiotics particularly in the form of cow curd. However, there is still need of a huge amount of research work to scientifically validate and revalidate the indigenous cow curd/*matha* as probiotics.

COW GHEE (BUTTER-FAT)

- Cow *ghee* (butter-fat) is traditionally believed to improve memory, voice, vision, intelligence and body's resistance to infections.
- It exhibits antichollesic activity, and immunostimulant activity.
- Ayurvedic practitioners believe that cow's milk and *ghee* are memory enhancers.
- Cow *ghee* is helpful for eye sight and improves digestion. It is '*Tridosh Nashak*', energetic, brain tonic, tonic, fragrant, *madhuri*, cold and over all the best of the '*ghee*' (butter milk). It has anti-ageing factors.
- A formulation containing cow *ghee*, honey, vitamins and a non-fat fraction of cow milk is being attempted as a micronutrient.
- The modern doctors recommend not to use any fat except cow *ghee* by a cholesterol patient. The use of cow *ghee* does not increase cholesterol and has no bad effect on heart.
- Cow butter is a blood purifier and increases the beauty.
- Cow *ghee* promotes healing of wounds.
- It is helpful in preventing and controlling paralysis and asthma.
- The *ghee* obtained from cow milk is very much useful for persons having weak eyesight.
- Cow *ghee* as well as urine has been seen to stimulate immune processes in experimental animals.
- *Ghee* as a Suppository Base: Cow *ghee*, in combination with some other bases, has been seen to serve as an excellent material for preparation of suppositories.
- A Panchgavya Ayurvedic formulation containing *E. officinalis*, *G. glabra*, and cow *ghee* have been evaluated for its effect on pentobarbital-induced sleeping time, pentylenetetrazol-induced seizures, maximal electroshock-induced seizures, spontaneous motor activity, rota-rod performance (motor coordination) and antagonism to amphetamine in mice. The formulation did not show neurotoxicity. The results suggest that the Panchgavya formulation is sedative in nature.
- 10 gms of cow *ghee* used in fire sacrifice produces one ton of oxygen. When cow *ghee* is burned with rice it produces Etholine oxide, propylene oxide, ethelene oxide and formaldehyde, which give immunity against bacteria, which are used in operation theatre. Propylene oxide induces rain.
- Cow *ghee* has immense power to protect human body from the ill effect of radioactive waves thus can save the environment from atomic radiation.

Fulzele *et al.* (2001, 2003) demonstrated the immunostimulant potential of cow *ghee* in Panchgavya formulations, as indicated by increase in neutrophil adhesion, haemagglutination (HA) titre and delayed type hypersensitivity (DTH) responses in rats. Achliya *et al.* (2004) suggested that the panchagavya Ayurvedic formulation containing *E. officinalis*, *G. glabra*, and cow's *ghee* is sedative in nature.

INSTITUTIONS INVOLVED IN PANCHGAVYA

Love-Cow Trust, New Delhi: The trust propagates and promotes virtues of cow and its traditional place in Indian culture and economy with the objective is to document the scientific and traditional knowledge and encourage research and development in the area of Panchgavya. The Trust is running a quarterly journal titled "The Indian Cow". A Panchgavya Professionals Club (PGPC) of scientists and researchers has been set up.

Go-Vigyan Anusandhan Kendra (cow science research centre) in Nagpur (Maharashtra): It is a registered research and development organization working in the field of health, agriculture and cattle protection. The main R&D activities involves formulation and development of medicines from Panchgavya and their clinical trials and animal experimentation; physico-chemical and microbiological analysis of Panchgavya and related products; field trials of organic manure made of cow dung and urine; studies on pest repellent activity of products derived from plant and Panchgavya products and other activities related to benefits of Panchgavya. Organization has obtained very promising results for various diseases from formulation based on Panchgavya

The product, cow-urine distillate (CUD), having bioenhancing properties, which got US patent, was the result of a joint enterprise by the centrally funded CSIR and the Vishwa Hindu Parishad's Go-Vigyan Anusandhan Kendra (cow science research centre) in Nagpur. A manufacturing unit of "Panchgavya Ayurveda Medicine" is commissioned at Sevadham Deolapar, Nagpur (INDIA).

The Cow Urine Therapy and Research Institute, Indore (MP): It claims that cow's urine can cure diabetes, blood pressure, acidity, asthma, psoriasis, eczema, AIDS, piles, prostate problems, arthritis and migraine. This gau-mutra (cow urine) distillate is already being sold across the counter as '*Kamadhenu Ark*'. According to a news report, cow urine is already being sold in 200 outlets in Indore. In December 2000, a 'National Workshop on Scientific Dimensions of Gauseva' was held in Indore.

There is a '*Gaumutra Hospital*' in Lucknow (U.P.).

'Gau Seva Ayog', Gujarat: The Gujarat government has in place a 'Gau Seva Ayog' that hopes to improve cow reverence and promote the benefits of its excretions viz. cow dung and urine revolution" and other ingredients of Panchgavya.

Kanpur Gaushala Society: At the Krishi Expo 2002, an agricultural fair held in June in New Delhi, there was a stall where every product-tea, toothpaste, hair oil, porridge, tonics, fertilisers, insecticides, 'beauty' soap, antidandruff shampoo, incense sticks-was manufactured from Panchgavya. The producer was the Kanpur Gaushala Society. Also few stalls in *Kissan Mela* and *Pashu Vigyan Pradarshini*, 2004 at IVRI, Izatnagar were highlighting the Panchgavya products for various therapies.

Cow Therapy Society Pantnagar (UP): The society was established in the year 2003 with an aim of servicing the cow and promoting Panchgavya. The society is actively engaged in research and extension activities in the field of Panchgavya and the service of the cow regularly organizes cow therapy camps and has linkages with other Institutes promoting Panchgavya. The society has published a book entitled "Govansh Avam Manav Swasthaya". The information on Panchgavya and cow is scattered in the literature and many a times these are not published for the want of good journal or magazine. To popularize this scientific endeavor for the benefit of common people, the society has launched an International Journal of Cow Sciences (IJCS) with an aim to publish research works and technical articles of high standards on cowpathy, Panchgavya and the cow, with wide circulation so as to popularize the wide applications and benefits of cow and its virtues throughout the world.

IMPORTANT PRODUCTS OF PANCHGAVYA AND THEIR USES

- Kamdhenu Medohar Ark: For obesity problems
- Kamdhenu Harde Churna: For acidity, gas trouble, constipation and other related trouble.
- Kamdhenu Malish Tel (Oil): Highly effective in different types of arthritis and useful for body massage.
- Kamdhenu Ashtamangal Ghrut Good: Nervine tonic improves memory, promotes concentration. Good health supplement for children and elder person.
- Kamdhenu Jatyadi Ghrut/Ghee: Useful in infected and cut wounds, ulceration. Also useful in fistula and bed sore. Enhances wound-healing process, presumably by promoting cell-division. A combination of *ghee* and herbal antibiotic is more advantageous.
- Kamdhenu Kshar Churna: Effective in various types of cough, bronchitis and asthma. Also helpful in Gastro intestinal disorders.
- Kamdhenu Chandanadi Yamak: Useful in burns, boils and skin rashes.
- Kamdhenu Kushmandavaleh: Highly effective in acidity, and gastric ulcer. Useful in Jaundice as a liver tonic.
- Kamdhenu Hingawadya Ghrut: Relieves fullness of abdomen and regulates bowel movement. Helpful in thread worm infestations.
- Kamdhenu Kasisadi Tela: Highly effective on piles, bleeding piles and helps in healing fissure and Fistula.
- Kamdhenu Arshohar Marham: Highly effective in piles, also heals and relieves fissures and fistula.
- Kamdhenu Asava: Relieves from cough and cold, useful in asthma and leucoderma.
- Kamdhenu Bal Pal Rasa: Acts as nervine tonic, improves health and promotes proper growth for children below 15 years of age.
- Kamdhenu Nari Sanjeevani: Very useful in ladies problems like menstruation, weakness etc.
- Kamdhenu Pramehari: Effective in general debility.
- Kamdhenu Tela: Useful in all diseases of nose, ear and eye.
- Kamdhenu Vibhitikavaleha: Effective in asthma and all conditions of cough.
- Kamdhenu Pathyadi Vatika: Removes bad breath and cures mouth ulcers.
- Kamdhenu Panchagavya Ghrut: Useful in chronic fever, anaemic conditions, chronic disorders and psychosomatic disorders
- Kamdhenu Tikiya: Improves skin complexion and adds Luster to the skin.
- Kamdhenu Isab Tikiya: Useful in all skin disease.
- Kamdhenu Dant Rakshak: Very useful for dental care. Effective in gingivitis, pyorrhea, protects gums and removes bad breath.
- Kamdhenu Ubatan (Face-pack): Helpful in vulgaris. Improves luster of skin and tones up face look.
- Kamdhenu Keshnikhar: Highly effective in alopecia and dandruff, regular application improves condition of hair and prevents premature graying of hair and falling.
- Kamdhenu Dhup: Purifies air in the room. Used during 'Puja' and at any other time whenever desired.
- Ashtamangal Ghrita: Contain Cow's *Ghee*, Brahmi (calamus bach), saindhava (chloride of sodium), sayssurea (kuth), mustard, anatmul (Indian sarsaparilla), long pepper and a few more herbs. Administration of the formulation in children enhances their memory power. It is also useful as a therapy for senile dementia.

- Kamdhenu Marham (ointment containing cow's urine and ark made from cow dung along with some herbs): Effective in various eczematous conditions, psoriasis treatment, infective wounds etc. Some Ayurvedic physicians also export this formulation.
- Kamdhenu Shwitrashak Vati and Lepa (prepared from non-volatile solids of cow's urine and herbs): Highly effective in leucoderma and alopecia areata.
- Kamdhenu Ghanvati / Arka: Useful in all diseases as it increases body's immunological defences. It is highly effective against several skin infections and is seen to be effective against renal disorders. A volatile fraction of cow's urine prepared by distillation process is available as 'ark', and a residue remaining after removal of volatile matter and water from cow's urine is vati.
- Kamdhenu Takrarishtha (prepared by fermentation of buttermilk along with some herbs): Relieves constipation, regulates bowels, useful in piles, worm infection, diarrhoea and dehydrated condition. Effective principally against micro-organisms which cause food poisoning.
- Shwitra Nashak Vati and Shwitra Nashak Lep
- Kamdhenu Agricultural Products: Wormi Compost and Kamdhenu Pest Repellent.
- A mixture of two volumes of *ghee*, five volumes each of curd and milk, 40 of urine and 48 of dung, two per cent of common salt and 0.01 % of baker's yeast - was found to be the most effective and economical, to suppress pathogen.

HOW TO PROMOTE PANCHGAVYA

- The use of *Gobar* (cow dung) and *Gomutra* (cow urine) of indigenous breeds of cattle should be promoted extensively by educating farmers the benefits of different manures/bio-fertilisers, composts, pest-repellents, pesticides and biogas to understand the economic prospects of their own resources and as a long term measure for sustainable and healthy agriculture production at reduced costs.
- Centers should be established and recognized for promotion of the production and use of Panchagavya as an alternative source of energy, such as *Gobar* gas, alternative methods of farming, and to initiate, undertake and promote research and innovations in the field of utility and contribution of cow, its progeny and other cattle to the agriculture and bio-diversity including bio- energy and bio-fertilizers etc. for bio-friendly environment.
- Proper attention should be given on Panchgavya therapy for inducing protection against several diseases in the livestock/poultry populations. There should be a drive for the verification of clinical and medicinal claims made in ancient literature related to health sciences (medicinal properties) of Panchgavya products.
- Comparative chemical, microbiological and immunological analysis of Panchgavya of various indigenous cattle breeds with special reference to their agricultural, medicinal and nutritional significance should be evaluated scientifically.
- The drug control authorities should, after thorough examination, include such products in Indian pharmacopoeia so that their production and quality may be suitably standardized.
- A sound data-base or data-collection system be developed for economic contribution of cattle products and bi-products.
- Panchgavya need to be emphasized in Veterinary College, Research Institutes Universities and Hospitals. Research programmes should be undertaken, encouraged and supported in national institutions, universities and non-government institutions. Krishi Vigyan Kendras and non-government organizations (NGOs) should be encouraged for promoting Panchgavya.
- Integrated and coordinated approach should be made for promoting scientific outlook and research on Panchgavya through information sharing by organizing conferences, seminars, workshops, exhibitions and orientation programmes.
- Mass communication by publishing literature, research/popular articles, books, periodicals, journals, producing films and documentaries, conducting training programmes and launching web-site(s) on the implications of Panchgavya.
- Special R&D fund should be created to encourage both public and private sector institutions to undertake result-oriented and time-bound projects in these areas.
- The *gaushalas*, the *gau sadans*, maintain even the non-milking, old and sick cows along with those that are physically handicapped and need human care and attention for survival. These should be enhanced and motivated for evolution of better manures, pesticides and medicines and motivated for becoming self-sustaining by selling or properly utilizing the dung and urine from even dry cattle. Complete veterinary cover should be provided to these societies.
- Efforts must be made to upgrade indigenous cow breeds with suitable other indigenous breeds. Special draught breeds of cattle should be developed and improved genetically, so that this valuable source of energy remains available to the farmer, especially the small and marginal farmers.

- The availability of cow milk, cow curd, cow *ghee*, setting up of *gobar* gas plants, large scale organic farming etc. should be ensured. Manufacturing units, transportation and marketing of panchgavya products should be facilitated and strengthened.
- Development and evaluation of technology for optimal production and efficacy of cattle and cattle products (dung cake and biogas) and their best utilization as source of mechanical, thermal, and electrical energy along with agricultural and medicinal benefits from cattle should be promoted.
- Efficacy and utility of radiation-preventing ability of cow dung should be explored in details.
- The benefits of taking cow milk should be propagated. Cow milk should be separately labelled and marketed on a large scale.
- Utilization of cow milk as immunogen transmission vehicles through hyper-immune cow should be explored. In this hyper-immune state, the antigens find their way into the milk of the cow, which when administered to humans, especially children, render them immune to the particular disease.
- Draught animal power usage for agricultural purposes as well as for transport needs to be restored, by developing improved ploughing implements and harnesses.
- For ensuring availability of labeled cow milk, cow curd and cow *ghee* to satisfy consumer needs and demands.
- Use of oestrogens/oxytocin and similar drugs increasing the yield of milk of cows should be banned for reasons of health of cows.
- Slaughter of cow and its progeny, should be prohibited.
- The use of bullocks in ploughing and bullock-driven tractors, generation of power through indigenous electrical equipment and carts should be encouraged.
- Encouragement should be given to research in cow urine therapy such as that done by the Govigyan Anusandan Kendra, Nagpur and CSIR at Lucknow and other centers, which led to the grant of U.S. Patents.
- For this rewards is to be given against future production of milk, bio-fertilisers, bio-pesticides, vermi-composting, generating bio-energy and Panchgavya medicines etc. which may also help solve the problem of working capital.

CONCLUSION

Cow is Central to our life and bio-diversity. Its progeny and its Panchgavya have wide applications and have the potential for sustainable agriculture production, health and nutrition of humans, production of bio-

fertilizers, production of non-conventional energy and for maintaining the bio-diversity of the ecosystem. The area has tremendous potential which has not been exploited. By the use of chemical fertilizers, pesticides and exploitation of ground water the food grain production levels have been obtained at a higher cost but at the cost of the fertility and health of soil and also the quality of the food produced. The only remedy to restore the balance is organic farming and the cow and its progeny and other animals could provide the solution. The rearing of cow and its progeny is a viable alternative for removing poverty in the rural and semi-urban areas and providing employment opportunities for a long term sustainable economic growth. The knowledge about cow's contribution to the economy, medicinal and scientific value of Panchgavya is not known by all besides the non-availability of the labeled cowpathy products. By following the future strategies/measures, the tremendous cattle wealth of the country can be propagated in its proper perspective. Therefore, efforts need to be made for public awareness about the "virtues of cow" and its "Panchgavya". Now people need information and data based on research. Most of the tested practices of cow therapy, Panchgavya, Agnihotra and milk miracles are rejected as myth or mythological adventures. It is therefore necessary to blend science, spirituality and wisdom. Such a blending has resulted in US patents and many more patents are awaiting ahead. Grant of a U.S. Patents to Panchgavya products has given the ultimate stamp of approval for Indian Since the livestock sector has great potential for poverty alleviation utmost importance should be given for future research in this field. Therefore, establishment of research and development centers in medicinal, agricultural, pharmaceutical, nutritional, environmental, technological areas and socio-economic utility of *Godhan* (cow and its progeny) should be given priority. The Panchgavya theory of Ayurveda should gain popularity not only in traditional families but also in highly educated and scientific society. An integrated approach is necessary to promote the highly valuable virtues and wide applications of Panchgavya.

Thus it can be inferred that Panchgavya/Cowpathy, a new version of ancient science, is definitely a promising formulation in the years to come. Therefore, educating people about the benefits of cow and Panchgavya can provide solution to problems of shortage of food grains, fuel, shelter, good health, nutrition, eradication of poverty, and unemployment and as alternate source of energy.

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