



PROPULSE

INTERNATIONAL YEAR OF MILLETS

Millets are ancestral crops with high nutritional value, and have been a staple food for centuries

They play an important role in our well-being and the environment

Agriculture is the backbone of Indian economy and millets can help us address multiple challenges we face today, including food security and poverty alleviation

Let us encourage millet cultivation and do our bit to improve agriculture and the livelihood of rural household

NAGRONEX® ESF



Phytobiotic Growth Promoter



Essential oils and their benefits in poultry

Dr. Ajay Chalikwar

Zonal Technical Manager,
Provet Pharma Private Limited,
Chennai, India

INTRODUCTION

Resistance of pathogenic bacteria to commonly used anti-microbials has forced the poultry industry to explore alternative solutions like prebiotics, probiotics, organic acids, bacteriophages, anti-microbial peptides, lysozymes, lactoferrins, phytonutrients / essential oils (Eos), etc.



One of the safest and efficient alternatives is essential oils, also called as zoo-technical additives. Essential oils are less toxic and typically more residue-free compared to synthetic antibiotics, thereby ensuring animal welfare and food safety. Recently, use of essential oils along with short chain fatty acids (SCFAs) in broilers, layers and breeders has gained importance.

Quality of essential oils depends on environmental condition, climate, harvesting time, part of the plant, soil type and extraction method. Essential oils can be obtained through various methods like fermentation, extraction or expression but most common method is steam distillation (Raut and Karuppaiyil, 2014).

OVERVIEW OF ESSENTIAL OILS

The term “essential” does not mean that these are essential (Oyen and Dung, 1999) but denotes the essence (flavour) they obtain from different parts of the plants like root, stem, bark, fruit, flower, etc. Currently, there are over 3,000 known essential oils with

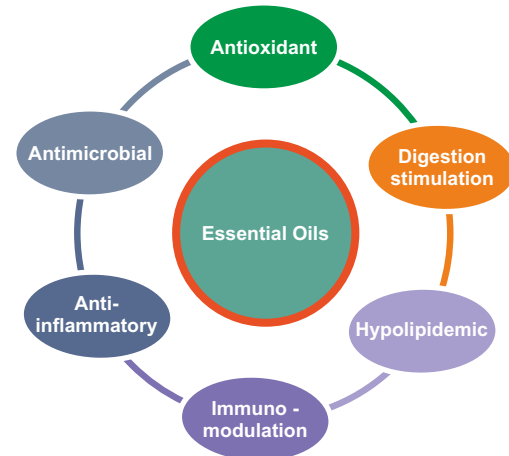


Fig. 1. Actions of essential oils

approximately 300 being commercially relevant (Diaz-Sanchez *et al.*, 2015).

Essential oils are a mixture of fragrant and volatile compounds, sensitive to heat and light and are chemically comprised of two major classes, namely terpenes and phenylpropanes (Cooke *et al.*, 1998).

Essential oil constituents are quickly absorbed after oral administration and are either metabolized or eliminated by the kidneys in the form of glucuronides or exhaled as CO_2 .

Their accumulation in the body is unlikely due to rapid clearance and short half-lives (Lee *et al.*, 2004). Essential oils are found to have antibacterial, antifungal, antiviral and also exhibit antioxidant, anti-inflammatory, anti-carcinogenic, digestion stimulating & hypolipidemic activities (Viuda-Martos *et al.*, 2010). Besides, other beneficial effects of essential oils include appetite stimulation, improvement of endogenous digestive enzyme secretion and immune response activation.

Recently, essential oils along with SCFAs are used to improve body weight gain, feed conversion, egg production and disease resistance in poultry. As essential oils are highly reactive and possess strong odour & taste, they need to undergo micro-encapsulation process which will help them in sustaining pelleting temperature and increasing their shelf life.

PROPERTIES & ACTIVITIES

Antimicrobial activity

Antibacterial activity is not an outcome of a specific mode of action but it is a cumulative effect of various mechanisms which are dependent on pH, chemical structure, presence of functional groups (Farag *et al.*, 1989), dose of active ingredient and quorum of microbes (Burt, 2004). Essential oils are very effective against Salmonella, *E. coli*, Clostridium and other pathogenic bacteria, (Cosentino *et al.*, 1999) virus and fungi (Smith-Palmer *et al.*, 1998). Cinnamaldehyde, Carvacrol, Citral, Thymol and Eugenol exerts fair antibacterial effect (Dormans and Deans, 2000). Essential oils can potentially reduce the incidence of Salmonella in broiler carcasses and in the broiler house with a positive impact on food safety (Bento *et al.*, 2013).

Table 1. Actions of Essential Oil Components

Components	Mode of Action
Terpenoids & Phenolics	Bacterial Cell membrane disruption
Phenols & Flavonoids	Metal ion chelation
Alkaloids	Bacterial growth inhibition

(Cowan, 1999)

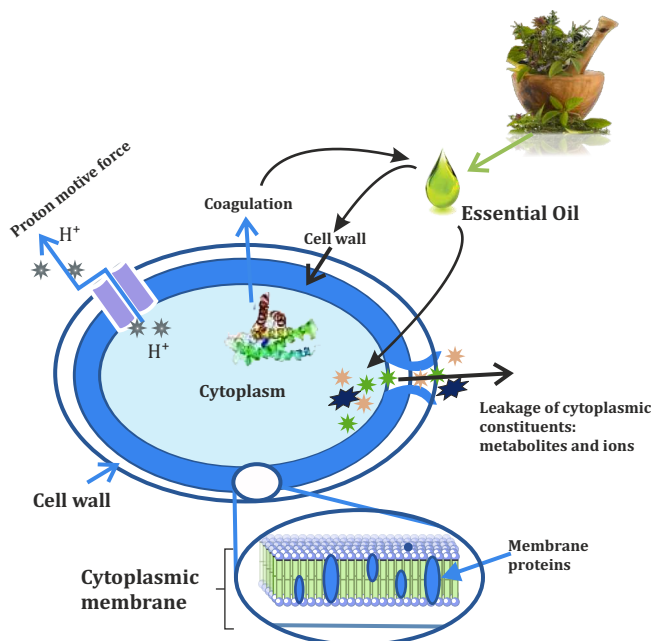


Fig. 2. Antimicrobial activity, by affecting different elements of the pathogen

Cinnamaldehyde exerts antifungal activity by acting on sulfhydryl groups (Kurita *et al.*, 1979) and inhibits fungal cell wall synthesis (Bang *et al.*, 2000) which is necessary for fungal growth. Microbes use quorum-sensing to orchestrate collective population behaviour including bio-film formation and/or virulence factors secretion which is dependent upon the production and release of specific chemicals / signals at a population-wide scale. Phytochemicals derived from medicinal plants of the Myrtaceae family like Clove, Guava, Eucalyptus (Musthafa *et al.*, 2017) and Cinnamaldehyde (Pande *et al.*, 2013) inhibit quorum sensing and overcome the increasing virulence factors of pathogenic bacteria.

Antiparasitic activity

Essential oils are potent botanical products which either interfere directly with parasitic metabolism or indirectly by enhancing the host immune response and antioxidant defence system for the effective control and eradication of parasitic invasion. They also help in reducing intestinal lesions and faecal oocyst shedding in the litter. Phenols have oocysticidal action, control coccidiosis infection (Williams, 1997) and endoparasites in the gut.

It has been suggested that EOs are an effective alternative to coccidio- stats, on the basis of improvements in performance & significant reduction in the post infection faecal blood discharge. Carvacrol and Thymol have anti-coccidial action against *E. tenella* and mixed *Eimeria spp.* Infection (Oviedo-Rondon, 2003).

Antioxidant property

Essential oils have an inherent ability to donate electrons to the free radicals produced during the process of lipid peroxidation (Fernandez-Pancho *et al.*, 2008). They increase the keeping quality of meat by attenuating oxidative injury and improving redox balance in blood, muscles and tissues. They also influence the in vivo antioxidant defence systems such as Superoxide dismutase and Glutathione peroxidase. Phenolic EOs have potent antioxidant activity than Vitamin E, Vitamin C & Vitamin A and improve the hepatic concentration of Coenzyme Q10 (Rice-Evans *et al.*, 1997). Thymol, Carvacrol and other essential oils can act as antioxidants in egg and meat of chickens when introduced in the diets (Lee *et al.*, 2004). Supplementation of Carvacrol, Capsaicin and Cinnamaldehyde can increase the number of goblet cells and secretion of mucin on the surface of villi, providing better protection against invading infectious agents.

Stimulation of Digestion

Essential Oils improve digestion by stimulating secretion of bile, mucus and various digestive juices like trypsin, amylase and jejunal chyme (Manzanilla *et al.*, 2004). They significantly increase the villus width and surface area, indicative of improved nutrient absorption (Geyra *et al.*, 2001) and performance (Choct, 2009) and reduce the adherence of pathogens. Cinnamaldehyde helps to increase the bile secretion (Harada and Yano, 1975).

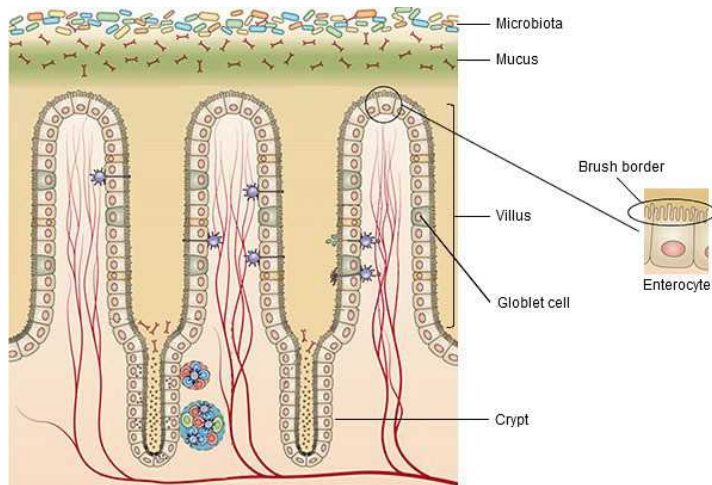


Fig. 3. Stimulation of digestion by improving villi and microvilli growth

Anti-inflammatory activity

Essential oils have been used traditionally for centuries to alleviate symptoms associated with eczema, dermatitis and other pronounced irritations (Kamatou and Viljoen, 2010). The major EO substances having anti-inflammatory abilities are the terpenoids and flavonoids. They suppress metabolism of inflammatory prostaglandins and reduce inflammatory conditions (Craig, 2001). Other essential oils (eucalyptus, rosemary, lavender, millefolia) and other plants (pine, clove and myrrh) have been used in mixed formulations as anti-inflammatory agents (Darsham and Doreswamug, 2004). They contain phenolic compounds that are known to possess strong anti-inflammatory properties. These substances suppress the metabolism of inflammatory prostaglandins.

Lipid metabolism

The hypolipidemic effect of essential oils is carried out through the inhibition of HMG-CoA reductase activity, a key regulatory enzyme in cholesterol synthesis (Crowell, 1999). Essential oils significantly reduce serum cholesterol level of broilers (Gopi *et al.*, 2012).

Immunomodulatory activity

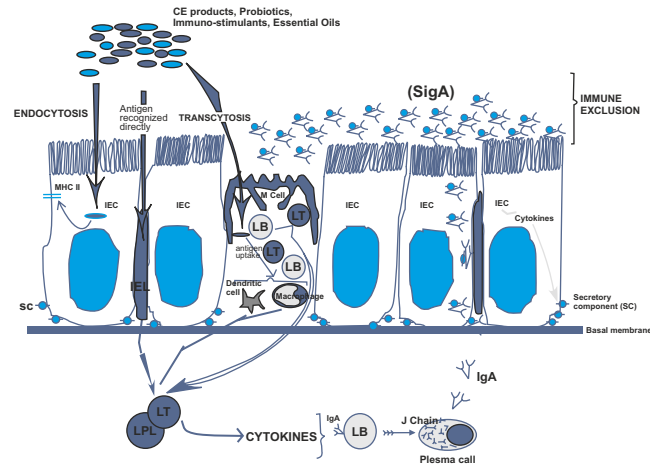


Fig. 4. Immunomodulatory activity of Essential Oils

This activity is a result of optimizing production of interleukins, γ interferons and $\text{TNF } \alpha$. Essential oils increase phagocytic activity of macrophages and Antigen Presenting Cells (APC) (Hanieh *et al.*, 2010). Another mode of improving immunity is through increasing weight and activity of immune organs like bursa of fabricius and spleen (Rahimi *et al.*, 2011).

There will be an increase in IgG, IgA, IgM, CD3 and CD4 serum levels and ND titre values when birds are provided with essential oils (Rezaei-Moghadam *et al.*, 2012). It is well known that many diseases, that have immunomodulated components, can be treated by administration of biological compounds that activate key pathways in the immune system. They strengthen the defence and immune mechanisms of the body and can be used for stimulating the non-specific immune response (Awaad *et al.*, 1999).

Positive effect on gut microbiota

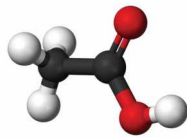
Many essential oils stimulate growth of beneficial microbes and reduce the number of pathogenic bacteria in gut (Wenk, 2000). Similarly, Capsaicin, Carvacrol and Cinnamaldehyde will have a positive impact on gut microbiota and growth performance (Jamroz *et al.*, 2005). Activity of intestinal microbiota leads to synthesis of SCFAs as a result of digestion of indigestible fibre which provides additional source of energy for the host (Li *et al.*, 2012). Essential oils also increase the proportion of SCFAs, butyrate in the caecum which is known to provide energy to colonic mucosa (Roediger, 1980) and thus have potentially important implications for intestinal immunity (Hamer *et al.*, 2008).

Effect on Growth Performance

Dietary essential oils may act not only on intestinal microflora, but also on nutrient utilization (Bento *et al.*, 2013) in broilers, layers and breeders. Essential oils improve growth performance by stimulating the secretion of digestive enzymes leading to improved nutrient digestion, rate of gut passage or feed intake (Jamroz *et al.*, 2005).

SHORT CHAIN FATTY ACIDS

Short chain fatty acids (SCFA) with sodium, potassium and calcium salts are commonly used for controlling susceptible pathogenic bacteria particularly gram negative ones. Butyric, propionic, formic and acetic acids are commonly used SCFAs in poultry for performance elevation. Salts / uncoated SCFAs will get neutralized easily in the foregut and very less antibacterial activity will be retained due to their dissociation but gut acidification will be taken care to some extent.



Coated or esterified SCFAs / organic acids are used which are more resistant against being neutralized in the foregut and provide good action in the hind gut against susceptible bacteria but acid available in undissociated form in the hind gut is highly variable. The use of organic acids has been reported to protect the young chicks by competitive exclusion (Mansoub *et al.*, 2011), enhancement of nutrient utilization, growth, feed conversion efficiency, immunity and performance in broiler and laying hens (Luckstadt and Mellor, 2011). SCFAs are also involved in prevention of diarrhoea (water and Na^+ absorption), pH control within the gastrointestinal tract, and defence against pathogens (colonization resistance). SCFAs are helpful in decreasing intestinal *E. coli* and *Salmonella spp.* (Hassan *et al.*, 2010).

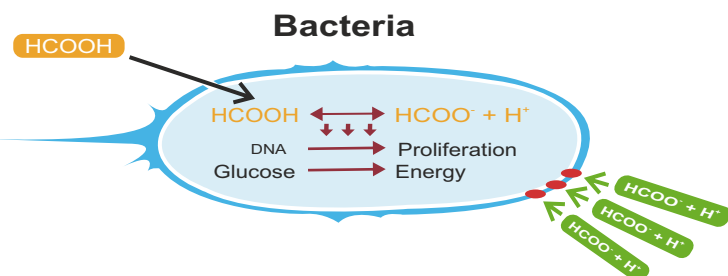


Fig. 5. Mode of action of short chain fatty acids / organic acids

It has been shown that SCFAs inhibit the growth of *Salmonella* (Van Immerseel *et al.*, 2003), *Aspergillus* (M.A. Coaker *et al.*, 2006) and *Penicillium* (Mariko ERA, 2015). SCFAs reduce cytoplasmic pH and stop metabolic activities of susceptible bacteria. SCFAs will cause death of susceptible organisms by acting on cytoplasmic membrane by neutralizing its electrochemical potential and increasing its permeability. Once hydrogen ion is injected through the lipopolysaccharide layer on the cell wall of susceptible bacteria, pH of intracellular contents will be reduced and this process consumes a great amount of energy to maintain intracellular homeostasis and causes bacterial cell death. SCFAs will improve gut health by reducing damage of intestinal cells by pathogenic bacteria and improve birds' performance in terms of body weight gain, FCR, maintain egg production, reduce egg shell contamination, and reduce litter contamination in broiler, layer and breeders.

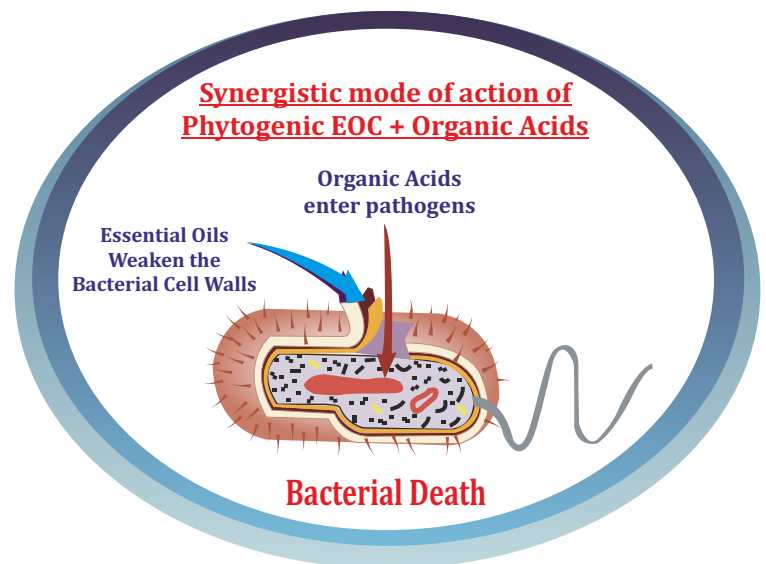


Fig. 6. Synergistic action of Essential oils and short chain fatty acids

MEDICINAL ACTIVITY OF COMMONLY USED HERBS AS EO_s

Name of the Herb	Major Active Ingredient	Medicinal Property	Reference
Oregano <i>Origanum vulgare</i>	Carvacrol & Thymol	Anti-bacterial, anti-fungal, anti-parasitic, anti-viral, anti-inflammatory, immuno-stimulant, hepatoprotectant and anti-oxidant activity	Joseph Nordqvist, 2017
Cinnamon <i>Cinnamomum verum</i>	Cinnamaldehyde	Immuno-modulatory, anti-oxidant, anti-viral, anti-microbial, lipid-lowering, anti-inflammatory, anti-tumor, gastroprotective, neuroprotective and blood purifying properties.	Steiner, 2010; Toghyani <i>et al.</i> , 2011
Clove <i>Syzygium aromaticum</i>	Eugenol	Anti-microbial, anti-fungal, anti-inflammatory, anti-carcinogenic, anti-parasitic and anti-oxidant effects	Mitsch <i>et al.</i> , 2004; Kamel, 2001
Eucalyptus <i>Eucalyptus globulus</i>	Cineole	Anti-microbial, anti-viral, expectorant, decongestant, mucolytic, immuno-modulatory and activity against heat stress	Farhadi <i>et al.</i> , 2016
Capsicum <i>Capsicum frutescens</i>	Capsaicin	Improves stimulation of pancreatic, intestinal enzymes and bile acid secretion	Abdel Salam <i>et al.</i> , 2005; Platel and Srinivasan, 2004,
Ginger <i>Zingiber officinale</i>	Gingerol	Digestion stimulation, anti-oxidant, anti-microbial and immune stimulation	Morakinyo <i>et al.</i> , 2011
Pepper <i>Piper nigrum</i>	Piperine	Anti-microbial, anti-inflammatory, digestive stimulant, anti-oxidant, immune stimulant and hypolipidemic	Khalaf <i>et al.</i> , 2008; Mittal and Gupta, 2000; Reddy <i>et al.</i> , 2004
Garlic <i>Allium sativum</i>	Allicin	Anti-bacterial, anti-fungal, anti-parasitic, anti-viral, anti-oxidant, anti-cholesteremic, anti-carcinogenic and vasodilator characteristics	Hanieh <i>et al.</i> , 2011
Turmeric <i>Curcuma longa</i>	Curcumin	Anti-oxidant, anti-protozoal, anti-microbial, anti-inflammatory, anti-carcinogenic, liver health and immuno-modulatory	Amalraj <i>et al.</i> , 2017
Cumin <i>Cuminum cyminum</i>	Cuminaldehyde & Thymoquinone	Anti-inflammatory, anti-carcinogenic, immune stimulatory, gastroprotective, digestive stimulant, hepatoprotective, nephroprotective, and neuro-protective activities.	Srinivasan, 2018
Peppermint <i>Mentha x Piperita</i>	Menthol	Anti-coccidial, anti-stress, anti-microbial, insect-repellent, analgesic and anti-oxidant	Arab Ameri <i>et al.</i> , 2016

CONCLUSION

Controlling of gut pathogens can be done by using essential oils and its main purpose is to attain good gut health and keeping the stressor agents at bay. Synergistic effect of essential oils with SCFAs will exert broad spectrum antimicrobial effect and help in reducing clinical and sub clinical infections caused by *Salmonella*, *E. coli*, *Staphylococci* and *Clostridium* in the gut as well as systemically. In broilers, it helps in improving bird performance, health status, immunity and feed conversion. In layers and breeders, it is employed for improving egg production and egg quality, health status of birds, feed efficiency, immunity and reduction in the percentage of cracked / broken eggs. Application of essential oils with SCFAs in the poultry diet could be used as antimicrobial, antioxidant, immuno-modulating and anti-inflammatory agents to produce low cholesterol meat, juicy and tender meat, fortified eggs and improved productivity with better survival rate.

Essential oils serve as an effective performance enhancer and an excellent alternative to AGPs due to their unique, traditionally used components like herbs / spices and thus play a huge role in the poultry industry development. The efficacy of any performance enhancer is partially dependent on other factors like effective rotation / shuttle programme of coccidiostats in feed, hence proper attention should be paid towards coccidiosis control programme. No agent is ideal unless proper management, feeding, brooding conditions, feed form (pelleted / mash), preventive vaccination and strict bio-security are maintained at farm level.

References are available on request.

The Chickens Take A Holiday

The sun was about to rise on Farmer Tim's farm. A hen woke up the cows with the important news.



"The chickens are taking a holiday today," the hen said.

"Is that so?" said Daisy the cow. "What is the special occasion?"



"We worked too hard this week," chicken said.

"You did?" asked Daisy.

"Yes! We laid ten eggs this week," chicken said, "and there are only five of us."

Daisy smiled and nodded her head. Ten was a lot of eggs for five chickens.

"Enjoy your day off," she said.

"But what about us?" the other cows said to Daisy.

"We gave Farmer Tim 100 pails of milk this week. There are only ten of us!"

Daisy agreed with the cows too. 100 pails of milk would make a lot of cheese.

"But we can't take a holiday on the same day as the chickens," Daisy said. "What would Farmer Tim say?"

Daisy and the cows moved over to a patch of grass to have their breakfast.

"The chickens are taking a holiday," Daisy told the trees.

"And we don't think it's fair."



The trees were not happy with this news.

"I've dropped over 1,000 apples this season," one said.

"And I've had a million cherries picked!" said another.

The wind blew and the trees put on their angry faces.

"We deserve a holiday more than the chickens!" the trees shouted together. "We worked too hard all season."

This woke up the rake that was sitting on the grass underneath the trees.

"Have you heard the news?" the apple tree asked the rake. "The chickens are taking a holiday. They think they worked too hard this week."

The rake stood up and announced its disapproval. “I raked over one million leaves this year. And there's only one of me! If anyone deserves a holiday it is a poor tired rake.”



Just then Rowdy Rooster hopped on the fence. He looked up into the sky and began to crow. It was time for the farmer to wake up.

The chickens, cows, and trees waited for Farmer Tim to come out and pick up the rake.

But a minute passed, and Farmer Tim did not appear.

Rowdy called two more times.

“Call him again,” the chickens yelled to the rooster.

“He must be having a dream.”



Rowdy made one last call and this time Farmer Tim woke up. But he didn't come out and pick up the rake, or milk the cows, or check on the eggs underneath the chickens. Instead, he opened the window and shouted loud enough for everyone to hear:

“I worked too hard this week, I say. It's time I took a holiday!”

MORAL OF THE STORY:

Some members of the organization's contributions may appear less significant or of much less value than others. Especially as it compares to those louder and likely more prominent members of the group. But the truth is everyone has their unique role and has a crucial part in the success of the organization. So, each member of the group should understand and recognize everyone's contribution in building a strong team.

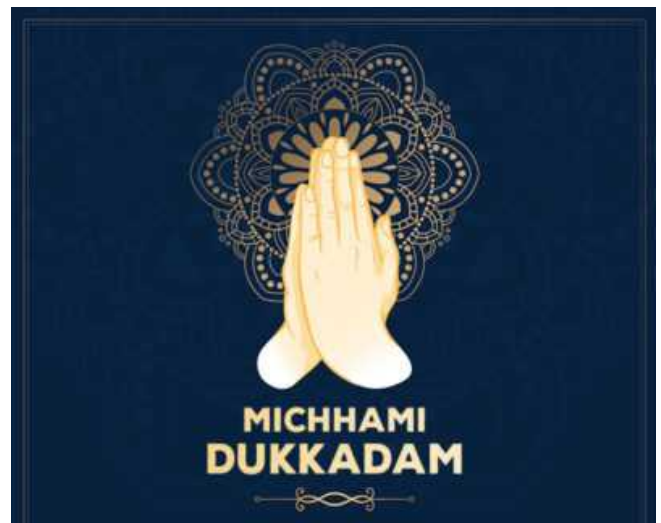
“THE STRENGTH OF THE TEAM IS EACH INDIVIDUAL MEMBER. THE STRENGTH OF EACH MEMBER IS THE TEAM” – Phil Jackson

MICHCHAMI DUKKADAM

Also written as michchha mi dukkadam, is an ancient Indian Prakrit language phrase, found in historic Jain texts. Its Sanskrit equivalent is “Mithya me duskrtam” and both literally mean “may all the evil that has been done be in vain” **SEEK FORGIVENESS FROM OTHERS:** “If I have caused you offence in any way, knowingly or unknowingly, in thought, word or deed, then I seek your forgiveness.

“MICHHAMI DUKKADAM: WHY I MUST FORGIVE TO BE HAPPY?”

There is an important prerequisite to happiness - forgiveness. To be happy and in peace with ourselves and the entire world, we've got to forgive EACH and EVERY person in the world. Until we forgive people who've pained us, we continue to give them a lot of undue importance and they continue to dwell in our minds. Thus, contrary to our liking, we end up closely holding those people who we supposedly dislike.



Major Fish Diseases of Economic Importance

Fish diseases are very common and the most difficult health problems to deal. They are generally saprophytic in nature but can become pathogenic when fishes are physiologically unbalanced, deficient in nutrition, overstocking, and have poor water quality. Microorganisms are essentially opportunistic pathogens that invade the tissues of a fish host and become susceptible to infection by stress factors. Farmers are now in the practice of using various probiotic formulations, aqua drugs and chemicals, various antimicrobials, sanitizers, anti-parasitic drugs, and even antibiotics in the fish culture system, as preventive and control measures to protect the crops. Aquaculture in India is a progressively growing food production system that fulfils adequate requirements of protein sources to society globally. India is the second largest country in fish production. This aqua sector has bench-marked from a domestic activity to an enterprise in the state, Andhra Pradesh.

Indian Major Carps

In Andhra Pradesh, fish and shrimp culture is the predominant income generating profession. Further, this state leads first in position in aquaculture production of the nation. In the state, it is estimated that more than 80% of the fish production arises from the fishbowl area i.e., Krishna, East Godavari and West Godavari districts. Of these districts, West Godavari plays a lead role, especially in freshwater fish production. Production of IMC i.e., Catla, Rohu and Mrigala contribute 80- 85% of total fish production. Despite the unprecedented development of semi-intensive culture of Indian major carps, many economically important problems have been identified, that are threatening the sustainability of the cultural system. The expansion and intensification of aqua farming practices lead to health problems in culturing fishes, thereby reducing the production rate. The degraded environmental parameters also influenced the occurrence of infectious diseases. The disease is one of the major constraints to aquaculture and limiting

factor for economic and socio-economic development in India and as in many other countries of the world. Some diseases have caused serious damage, not only the livelihood of fish farmers, but also to the future development of the industry. Many diseases affecting present day aquaculture is resultant of intensification of culture practices without the basic perception of intricate balance between host, pathogen, and environment.

Major diseases

The increase in aqua production particularly in expansion into intensive and semi-intensive methods of production has been coupled by an increase in fish and shellfish resulting from high stocking densities and stress condition that favours the occurrence and spread of infectious diseases. The vertical expansion of fish culture with diversified species and high stocking density has resulted in more frequent occurrence of bacterial, parasitic, and viral pathogens, often leading to higher morbidity or mass mortalities and lowered production. Some of the major freshwater fish diseases that cause huge economic loss for fish culture are:

Argulosis Disease

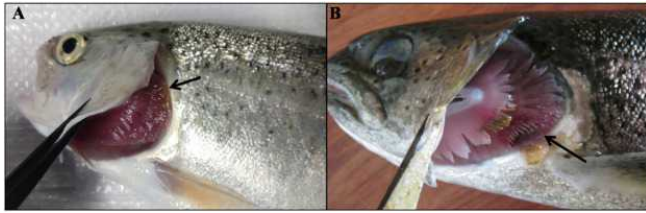
Argulus or Fish Lice is a common copepode parasite in fishes. It is a large ectoparasite and can move over the body surface of the fish. Argulus puncture the skin and inject cytolytic toxin through the oral stinging to feed on the blood.



The feeding site becomes a wound and haemorrhagic, providing ready access to secondary infection of other parasites, bacteria, virus and fungi. Argulus transmits dropsy in fishes. In advanced stages, fish swim erratically, show growth loss and loss of equilibrium. To control Argulus, remove the submerged vegetation, wooden lattices placed in the pond will serve as an artificial substrate to deposit its eggs, which can be removed at intervals to kill the eggs.

Columnaris Disease

Columnaris disease is caused by *Chondroccus columnaris* and *Cytophaga columnaris*. It is a long, thin, flexible, gram-negative slime bacterium.



This disease is often associated with low oxygen level. Initially it is marked by appearance of grayish-white or yellowish-white patches on the body. The skin lesions change to ulcerations and fins may become frayed. Gill filaments are destroyed and eventually lead to the death of the fish.

Vibriosis Disease

Vibrio bacteria are the causative agents of vibriosis disease. Diseased fishes show large, bright coloured, bloody lesions in the skin and muscles, haemorrhages in eyes, gills may bleed with slight pressure, and inflammation of the intestinal tract.

Dropsy Disease

Pseudomonas punctata is the causative agent of this disease. It is characterized by accumulation of yellow coloured fluid inside the body cavity, protruding scales and pronounced exophthalmic conditions. This is known as “Intestinal Dropsy”. In case of ulcerative dropsy, ulcers appear on the skin, deformation of back bone takes place and show abnormal jumping. This is a fatal disease in culture systems. Removal and destruction of fishes, followed by draining, drying and disinfecting the pond with lime are preventive measures to control the disease.



Disease	Causative agent	Symptoms
Argulosis - (Fish Lice)	<i>Argulus</i> sps.	Parasite on skin surface, causing lesions with secondary bacterial infections, haemorrhagic spots and ulcers.
Red Disease	<i>Aeromonas</i> sps	High mortality, Deep skin lesions on fins with haemorrhage and necrosis. Red areas on the body, Skin ulcers,
Gill Fluke	<i>Dactylogyrus</i> sps.	Gill filaments were disrupted. Gills with clumps of white masses.
Dropsy	<i>Pseudomonas punctata</i>	Accumulation of body fluid in the body cavity and cause abnormal bulge at base of body
Columnaris	<i>Flexibacter columnaris</i>	White spots on mouth, edges of scales, and fins Cottony growth that eats away at the mouth Fins disintegrate beginning at the edges Fungus often invades the affected skin

Treatment

Parasitic and bacterial diseases are often the problem in the grow out farms. The parasitic infections cause primarily to the fish tanks later fish will be susceptible to the secondary bacterial infections in the fish tanks. Treatment for these diseases is salt, lime and antibiotics may save the fish temporarily, but fish farms often face these problems, sometimes result in heavy mortalities. Some of the antibiotics which are mainly used to control fish diseases are:

Disease	Treatment
Argulosis - (Fish Lice)	Water application: Deltametrin - 1.25% - 100 ml / acre Feed application: Ivermectin - 1 g / tonne biomass
Red Disease	Feed Application: Furazolidone - 10 g + Sulphadiazine and Trimethoprim - 10 g per tonne of biomass
Gill Fluke	Feed Application: Fenbendazole + Livabendazole - 10 - 15 g per 1 tonne biomass
Dropsy	Feed Application: Doxycycline - 10 - 15 g per tonne biomass or Neomycin - 10 - 15 g per tonne biomass
Columnaris	Water application: Sanitizer - Formaldehyde + Gluteraldehyde + BKC : 1liter per Acre Feed application: Enrofloxacin - 10 - 15 g per 1 tonne biomass

Nutritional Disease In Fishes

- Nutritional fish diseases can be attributed to deficiency, excess or improper balance of components present in the food available.
- Symptoms appear gradually when one or more components in the diet drop below the critical level of the body reserves.

Nutritional components	Symptoms
Protein	Reduce growth rate and body deformities
Carbohydrate	Depress the digestion; symptoms are similar to that of diabetes mellitus in warm blooded animals. Enlarge livers. Sikoki disease in carp similar to diabetic symptoms
Lipids	Thyroid Hyperlasia or Goiter caused by iodine deficiency. Dicalcium phosphate deficiency cause scoliosis in carps
Vitamins (water soluble)	<ul style="list-style-type: none"> • Thiamine (vit-B1) deficiency resulted in poor appetite, muscle atrophy, loss of equilibrium similar to that of whirling disease symptoms in trout, odema and poor growth. • Riboflavin (vit-B2) corneal vascularisation, cloudy lens, haemorrhagic eye, photophobia, dim vision, incardination, discolouration, poor growth and anemia. • Pyridoxine (vit-B6) Nervous disorders hyper irritability, aemia serous fluid, rapid gasping and breathing. • Panthothenic acid. Loss of appetite, necrosis and scarring, cellular atrophy, exudates on gills, sluggishness, cubbed gills, poor growth • Inositol. Fin necrosis anaemia, distended stomach, skin lesions and poor growth. • Biotin. Blue slime patch on body, loss of appetite, muscle atrophy, fragmentation of erythrocytes, skin lesion and poor growth.

	<ul style="list-style-type: none"> • Folic acid. Poor growth, lethargy, fragility of caudal fin, dark colouration, macrocytic anaemia, decreased appetite. • Choline. Anaemia, hemorrhagic kidney and intestine, poor growth. • Nicotinic acid. Loss of appetite, photophobia, swollen gills, reduced coordination, lethargy • Vitamin (B12) cobalamin derivative. Erratic haemoglobin level, erythrocyte counts and cell fragmentation. • Ascorbic acid. Lordosis and scoliosis eroded caudal fin, deformed gill operculum, impaired collagen formation.
Fat soluble vitamins	<ul style="list-style-type: none"> • Vit-A - Causes exophthalmos, ascite, odema, hemorrhagic kidney. Hypervitaminosis (A) cause necrotic caudal fin • Vit-D - Necrotic appearance in the kidney • Vit-K - Mild cutaneous hemorrhages due to ineffectiveness of blood clotting • Vit-E - Exophthalmia, distended abdomen, anemia with reduced RBC numbers and haemoglobin content. Accumulation of ceroid in fish liver.

Conclusion

Another significant observation in IMC culture is the seasonal variation in the occurrence and severity of fish diseases in carp culture. The incidence of red disease or aeromoniasis is common during all seasons, among parasitic disease, occurrence of Argulosis and gill flukes disease are comparatively more during winter and post-rainy seasons. The mortality rate is also higher in the winter season. The transformation of Aquaculture activity from traditional to commercial scale, has led to a drastic increase of production levels, simultaneously earning crores of rupees through export. Due to lucrativeness, the farmers are proceeding from semi-intensive to intensive culture practices along with heavy inputs. The heavy inputs of feed, fertilizers, chemicals, and probiotics bring in a lot of changes in water quality parameters, resulting in negative effects, which lead to stress and finally the occurrence of diseases.

The development of suitable preventive and control measures and specific therapy for fish diseases assumes paramount significance, for the farmers to protect their crops against pathogens. The implementation of Better Management Practices (BMP) is most important to prevent frequent occurrences of disease and production loss in aquaculture. Further enhancement in knowledge about the disease process, host-pathogen, and the environment interaction leading to disease occurrence, is very much essential for the development of scientific methods of disease control. This needs due attention from the farmers for attaining higher yields.

Tongue Twister

Give papa a cup of proper coffee in
a copper coffee cup.





BENZATEC[®] 80

Alkyl Dimethyl Benzyl Ammonium Chloride - 80%
with suitable stabilizers & activators

*Powerful and Proven
Biocide and Deodorant*

Is It Better to Be a Night Owl or an Early Bird?

The question of whether to be a night owl or an early bird has been debated for centuries. The answer to that question is complex and depends on a lot of factors. In general, though, it's safe to say that getting enough sleep can help you feel more rested and energized throughout the day. It also helps regulate your body clock so that your circadian rhythm is set properly for what time of day it is, which could have an impact on your metabolism.

But some feel that they function efficiently in the night than they do in the day. It's not that they have changed their biological clock or something and sleep during the day; but it's just that they feel more productive not only while studying but otherwise. It feels invigorated for some in the night.

Here is the response from a knowledgeable spiritual guru

There are three types of people who do not sleep at night.

A Rogi (sick person) will not sleep at night because he is unable to sleep due to his physical condition. A Bhogi (pleasure seeker) will not sleep in the night because night is conducive for him for his kind



of business. A Yogi (practitioner of Yoga) also will not sleep in the night because for him too, the night is very conducive.

We value light because our visual apparatus is made in a certain way. Everything becomes more distinct when we are exposed to light. Now as because it is lit, we can see everyone around us. If the lights went out and it got dark, all we'd see is a swarm of people. As a result, there is a sense of lack of boundaries in the night. So, for yoga, for sexuality, for friendship, for being together, for studying, for focusing, for all these things, the night seems to be conducive because the difference between you and the other comes down in the night, simply because our visual apparatus functions like this: where there is no light, everything merges in our experience. So, a Yogi, a Bhogi, and a Rogi all three of them make use of the night. We can also make use of it.

We have to bring some sensitivity into the body system, as we are a product of this planet. Whatever nonsense people believe about themselves; we are all just popups on this planet. We will be gone too. Countless people who awoke this planet before you and me are no longer alive; there is no sign of them; they have all become topsoil. We may think we have a great life, but as far as the earth is concerned, it's just recycling its soil. Just throws you up and draws you back. So, the important thing is to create sensitivity within us so that every dimension of life comes into our experience. Isn't it important that we live this life to the fullest before we die?

Experience means people think we must party every day. There is much more for human life to explore. Being sensitive to life and being ego-sensitive are two different things.

Being sensitive to life means that if we walk into this hall, we experience everything that's here. We don't miss a thing. If we walk outside, we don't miss a thing. If we simply close our eyes, we must know what phase of the moon it is right now. Because all this is playing out in our body. It is constantly playing on our system. If it's a full moon or a new moon, the entire ocean is coming up, and there are tides. The whole ocean is trying to rise. 72% of our body is water, and do we think nothing is rising? It is! Every position of the sun, moon, and many other things that happen to the planet also happen to us.

Hence, we must become life-sensitive. Then we will know how to manage every aspect of our lives. Don't become ego-sensitive. Don't become society-sensitive. You will notice that you have your GPS on if you become life-sensitive, if you know what's going on in this life, if you know this one thing all the time, you will never be lost, no matter what situations life throws at you.

Right now, we have developed a psychological structure that has nothing to do with life but with the social scene.

How waking up at a certain time benefits us

Something really fundamental, changes as a result of the way the globe is spinning and what is taking place; somewhere between 3.20 am - 3.40 am. This is called Brahma Muhurtam. Our system functions in a certain way. Our life is a product of many things we call as the universe and existence. So, we are a consequence of a certain phenomenal happening that we call as cosmos. We are not an individual existence. So, when we get in sync, certain things will happen.



Do you know that the cicadas wake up once in seventeen years? They come awake and they breed, and they go back to sleep. They are keeping time once in 17 years without an alarm bell. Because they are in sync with nature. We have



lost sync with nature, and we think that is our nature. All the many ailments that human beings are suffering is simply because we have lost that awareness as to how to be in sync with the many forces, which are making us who we are. Yoga is to bring that sync so that we are in rhythm with life. You will also be able to wake up at 3 am if you are conscious; suddenly a certain spark of aliveness will happen within you. Even if you are in deep sleep, you will come awake.

Because initiation means you are not just taught a practice, it was introduced and implanted into your system. If there is a life seed with in you and if you are awake at Brahma Muhurtam and sit for the practice, it bears maximum fruit because the planet is behaving in relation to your system. The seed will get the necessary support at that time for it to sprout.



Sandhya Kalas

Some believe that the times around sunrise, sunset and noon are the best times to meditate because the flow of energy through the sushumna nadi (the body's primary energy channel) is upward during sandhya kala. There are, therefore, greater benefits from meditation, pranayama and other yogic practices during that time period. Brahma Muhurtam Sandhya (sunrise) is traditionally considered by many to be the best time to meditate because mind is still calm and the day's distractions have not yet intervened.

We have gotten off track of these very simple and basic concepts. It is never too late to start the process. It's up to each of us to make a choice whether staying awake late at night is worth missing out on all the things around us!



**CGM at Shyamnagar, West Bengal,
Kolkata H.Q - 10th Dec, 2022**

Customer Group Meeting was held to educate the dairy farmers about the benefits and to make the best utilization of the nutritional products.



**Animal Health Camp Activity, Krishna Ram Pur -
Chanditala-2, West Bengal, Hooghly H.Q -
14th Dec, 2022**

Provet sponsored for a free health camp that was organised by Block Livestock development Officer. Free medicines were distributed at the Health Camp.



**CGM at Nagaon, Assam, Nagaon H.Q -
19th Dec, 2022**

Product Information shared with Artificial Insemination Workers and Para Veterinary Practitioners.



**CGM at Bokaro, Jharkhand,
Ranchi H.Q - 23rd Dec, 2022**

Meeting of the Customer Group was conducted to update the dairy producers on the advantages and best practises on utilising nutritional products.



**CGM at Moktar Par, Burdwan, West Bengal,
Burdwan HQ - 28th Dec, 2022**

It was discussed with the Para vets, how this product can be beneficial. The meeting provides information in specific detail so that people know what they are doing wrong and how to fix it. The team also discussed about the utilisation of the right product for the specific treatment.

PROVET Calender 2023 Painting Marvels of India

Incredible India 



2023 JANUARY

MON	TUE	WED	THU	FRI	SAT	SUN
30	31	01 - English New Year	02 - Republic Day / 14 - Maharashtra	03	04	05
06	07	08	09	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

Painting Marvels of India - Rajput Painting
The Rajput paintings are known as Rajasthani paintings. originated and flourished in the Rajasthan region in the state of Rajasthan around 1400 AD. The main illustrations are the Hindu epics, Mahabharata and Ramayana, and scenes from Hindu mythology. The paintings are done with very vibrant colors and rich patterns. The Rajput paintings are of two styles: the Rajasthani style and Pahari style.

AMBERCIN PLUS TYLVATEC BACITOX PLUS HATCHPRO KALSEZ MINTROPLEX

Incredible India 



2023 FEBRUARY

MON	TUE	WED	THU	FRI	SAT	SUN
06	07	08	09	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28					

Painting Marvels of India - Madhubani Painting
The Madhubani paintings or Mithila paintings originated in the Madhubani village of Bihar and are mostly created by women. These brightly colored Madhubani paintings are characterized by their geometric patterns. The origin of this form dates back to the Ramayana period. It is one of the most celebrated and popular styles of folk painting in India.

LARVISTAT SUPER NAGRONEX ESF SOLUMIN MINBLEND HEPAPRIME COMBIFERT

Incredible India 





2023 MARCH

MON	TUE	WED	THU	FRI	SAT	SUN
06	07	08	09	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

Painting Marvels of India - Warli Painting
The form of folk art belongs to one of the major tribes, the Warlis, in Maharashtra. It has been practiced for over 2000 years. These paintings have an etching quality and depict life. They are closely connected to nature and show various mythological characters and scenes. Warli paintings are traditionally done on the mud walls of their huts with red ochre.

IMMULATOR NAGRONEX SNB NAGROWALL BACITOX PLUS MASTILOK BIOBUFF

Incredible India 




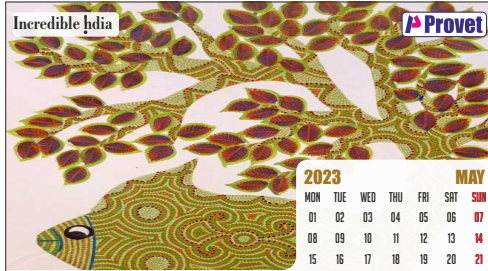
2023 APRIL

MON	TUE	WED	THU	FRI	SAT	SUN
03	04	05	06	07	08	09
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

Painting Marvels of India - Kalamkari Painting
Originated from the ancient Indian painting style, Kalamkari painting is an art form that has been practiced for over 2000 years. It is generally done on cotton fabric and is known for its intricate designs.

LEBROCIN BH LIPIGEST FORTE MIPRAMAX VIBROCID MAXIGRO RUMENECO

Incredible India 



2023 MAY

MON	TUE	WED	THU	FRI	SAT	SUN
08	09	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

Painting Marvels of India - Bhil Painting
The Bhil art form is a traditional folk art form that has been practiced in India. The Bhils, who live in the Western Ghats region of India, are known for their intricate designs. These Bhil paintings are done on the walls of their huts and are known for their vibrant colors and intricate patterns.

AMBERCIN PLUS NAGRONEX ESF PROTECT AQUATIC ZEOMIN FORTE YEAFORTE UTEBOLIC

Incredible India 





2023 JUNE

MON	TUE	WED	THU	FRI	SAT	SUN
05	06	07	08	09	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

Painting Marvels of India - Tanjore Painting
The Tanjore art form is a traditional folk art form that has been practiced in the state of Tamil Nadu, India and dates back to 1000 AD. These paintings are done on the walls of their huts and are known for their vibrant colors and intricate patterns.

NAGRONEX SNB IMMULATOR MINTROPLEX GOLD SOLUMIN KALSEZ PROGEL FENSIMEC

Incredible India 



2023 JULY

MON	TUE	WED	THU	FRI	SAT	SUN
31	01	02	03	04	05	06
07	08	09	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

Painting Marvels of India - Mysore Painting
Mysore painting is a traditional folk art form that has been practiced in the state of Karnataka, India. It is known for its intricate designs and vibrant colors. The paintings are done on the walls of their huts and are known for their vibrant colors and intricate patterns.

LARVISTAT SUPER TYLVATEC VIBROCID ENVIPO GOLD MECTIMAX ECTOCTP

Incredible India 



2023 AUGUST

MON	TUE	WED	THU	FRI	SAT	SUN
07	08	09	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

Painting Marvels of India - Mandana Painting
Mandana painting is a traditional folk art form that has been practiced in the state of Madhya Pradesh, India. It is known for its intricate designs and vibrant colors. The paintings are done on the walls of their huts and are known for their vibrant colors and intricate patterns.

NAGRONEX ESF PEPTONIC GOLD HATCHPRO BACITOX PLUS CEFTIJECT LINCQVET

Incredible India 




2023 SEPTEMBER

MON	TUE	WED	THU	FRI	SAT	SUN
04	05	06	07	08	09	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

Painting Marvels of India - Chittara Painting
Chittara painting is a traditional folk art form that has been practiced in the state of Chhattisgarh, India. It is known for its intricate designs and vibrant colors. The paintings are done on the walls of their huts and are known for their vibrant colors and intricate patterns.

LEBROCIN BH LARVISTAT SUPER ENVIPO GOLD NAGROWALL PENJECT LA PATHOJECT CS/GT

Incredible India 



2023 OCTOBER

MON	TUE	WED	THU	FRI	SAT	SUN
02	03	04	05	06	07	08
09	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

Painting Marvels of India - Patachitra Painting
Patachitra is a traditional folk art form that has been practiced in the state of Odisha, India. It is known for its intricate designs and vibrant colors. The paintings are done on the walls of their huts and are known for their vibrant colors and intricate patterns.

AMBERCIN PLUS TYLVATEC ZEOMIN MIPRAMAX GENTAJECT AVZOLE

Incredible India 





2023 NOVEMBER

MON	TUE	WED	THU	FRI	SAT	SUN
06	07	08	09	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

Painting Marvels of India - Kalamazhuthu Painting
Kalamazhuthu is a traditional folk art form that has been practiced in the state of Kerala, India. It is known for its intricate designs and vibrant colors. The paintings are done on the walls of their huts and are known for their vibrant colors and intricate patterns.

PEPTONIC GOLD NAGRONEX SNB BENZATEC 80 ORBIGEL HP PROVEFLOX 10 SYNERJECT AT

Incredible India 



2023 DECEMBER

MON	TUE	WED	THU	FRI	SAT	SUN
04	05	06	07	08	09	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Painting Marvels of India - Gond Painting
Gond painting is a traditional folk art form that has been practiced in the state of Madhya Pradesh, India. It is known for its intricate designs and vibrant colors. The paintings are done on the walls of their huts and are known for their vibrant colors and intricate patterns.

LIPIGEST FORTE IMMULATOR YEAFORTE PLUS PROTECT AQUATIC PROYEAST SYNTOBIND

Mastilok[®]

A Balanced Combination to Prevention & Control of Mastitis



Multi-pronged approach to manage & control Mastitis

INDICATIONS:

- Subclinical Mastitis
- Adjunct to Antibiotic therapy in Clinical Mastitis

DOSAGE & ADMINISTRATION:

To be given orally by mixing in jaggery or as an Electuary.
Prevention: 30 gm/day one week before Calving & one week after Calving
Treatment: 60 gm first day, 30 gm twice a day for two days.



Udder Rejuvenation with Provet's Innovation



Excellence through Innovation



www.provet.in

[f](#) provetppl [t](#) provetppl [in](#) provetppl

For further information, please write to:

Provet Pharma Private Limited

ISO 9001:2015 & ISO 22000:2005 Certified Company

No. 9, 1st Floor, Chakrapani Street, 2nd Lane,

Narasingapuram Extension, Maduvankarai, Guindy,

CHENNAI - 600 032. INDIA

Telefax: +91 44 2244 2124 / 27 e-mail: info@provet.in