natural livestock farming foundation

A MILK BRAND Nandini TRUSTED BY MILLIONS KMF

TDU THE UNIVERSITY OF TRANS-DISCIPLINARY HEALTH SCIENCES & TECHNOLOGY

# INTERNATIONAL WEBINAR

## Natural approaches to mastitis control in smallholder and large scale dairy farming

## Farmer-friendly

# ETHNO-VETERINARY FORMULATIONS

## for MASTITIS CONTROL as

## ALTERNATIVE to ANTIBIOTICS


**Prof. N.PUNNIAMURTHY** GLOHMSIWA –TDU –NLF,India

**Prof. MNB Nair & Dr. S. Kumar**

**TDU –FRLHT, Bangalore, India**


**Date:** Thursday April 15, 2021

**Duration:** 120 min

**Timings:** Netherlands 10.30 to 12.30, Ethiopia/Uganda 11.30 to 1.30 PM, India: 2 to 4 PM

**Moderator:** Katrien van't Hooft, DVM

GLOHMSIWA

YOURFARM™ Rear. Produce. Live

World Health Organization

# World Health Day, 7 April 2021

**Building a fairer, healthier world *so that everyone, everywhere, can realize the right to good health***

**According to OIE - human health and animal health are interdependent and bound to the health of the ecosystems in which they exist.**


ONE HEALTH
BY PROTECTING ANIMALS, WE PRESERVE OUR FUTURE
Animal and human sectors work together to protect health and ensure food safety and security
60%
of human pathogens are of animal origin
5
new human diseases appear each year
20%
of animal production losses are caused by diseases globally
With regards to animal health, veterinarians are key players of the 'One Health' concept

WORLD ORGANISATION FOR ANIMAL HEALTH

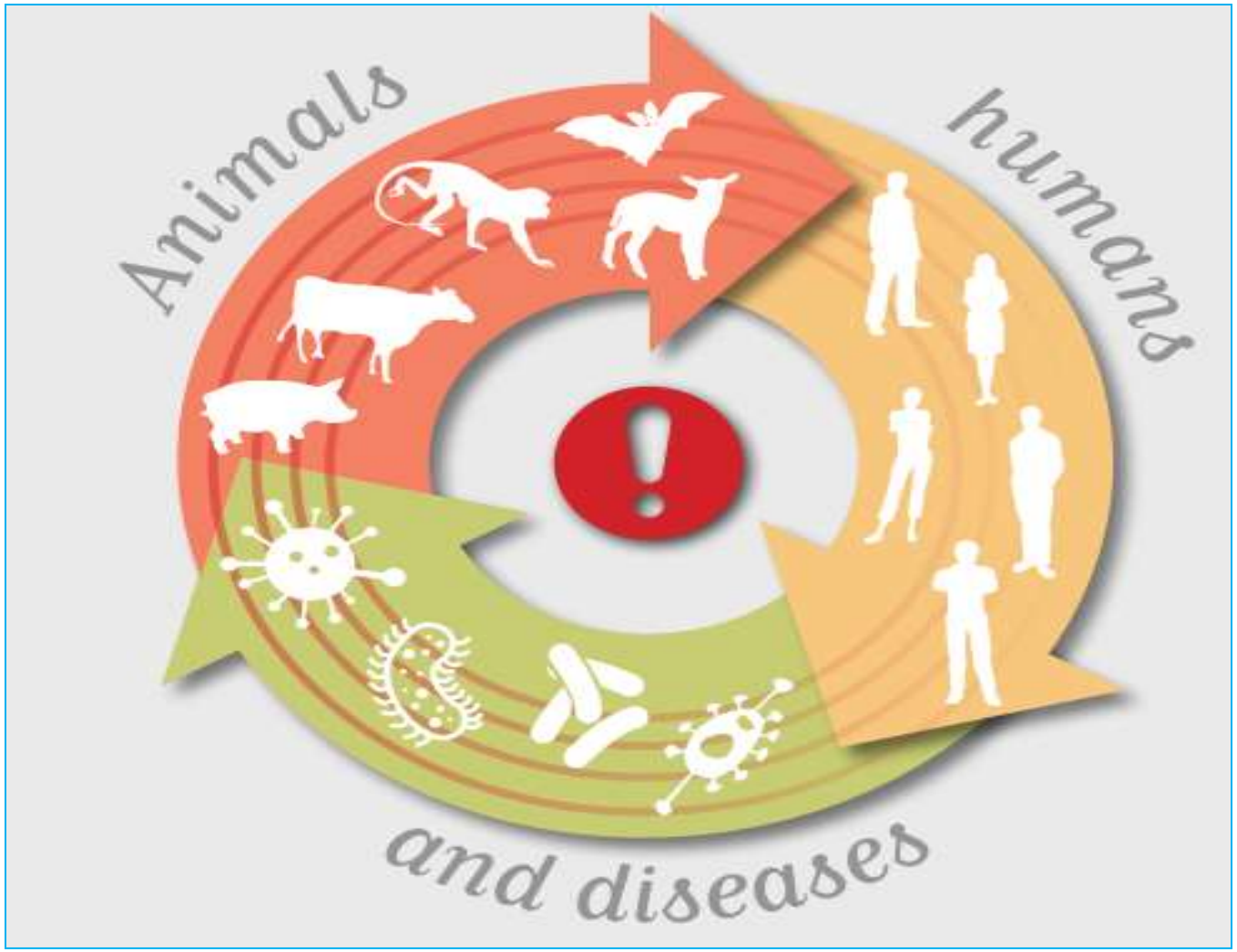
*Protecting animals, preserving our future*

# Domestic animals, wildlife and humans face similar health threats

**Zoonosis - is only one aspect- of O'Health**

Many wrongly construe it as a whole concept of

**one health**



- **Mastitis in bovines –what we know?!**
  - **Antibiotics and other synthetics in mastitis -not effective -why?**
  - **Why a herbal alternative ?**
  - **Why farmer-friendly?**
  - **Rational & successful model of *phyto-therapy* in the management of mastitis, consistently on a large scale across India !**

- **Mastitis - single largest cause of economic loss, affecting 50% of the herd**
- **M. causes 70% of all avoidable losses during milk production**
- **M. reduces milk by 21% and fat by 25%**
- **Mastitis is a multi-etiological disease - 95% -**

  **S*treptococcus, Staphylococcus* and *E. coli.***

- **20-35% of clinical cases of bovine mastitis have unknown etiology**

(Contreras, G.A., Rodríguez, J.M. Mastitis: Comparative Etiology and Epidemiology. *J Mammary Gland Biol Neoplasia* **16,** 339–356 (2011).

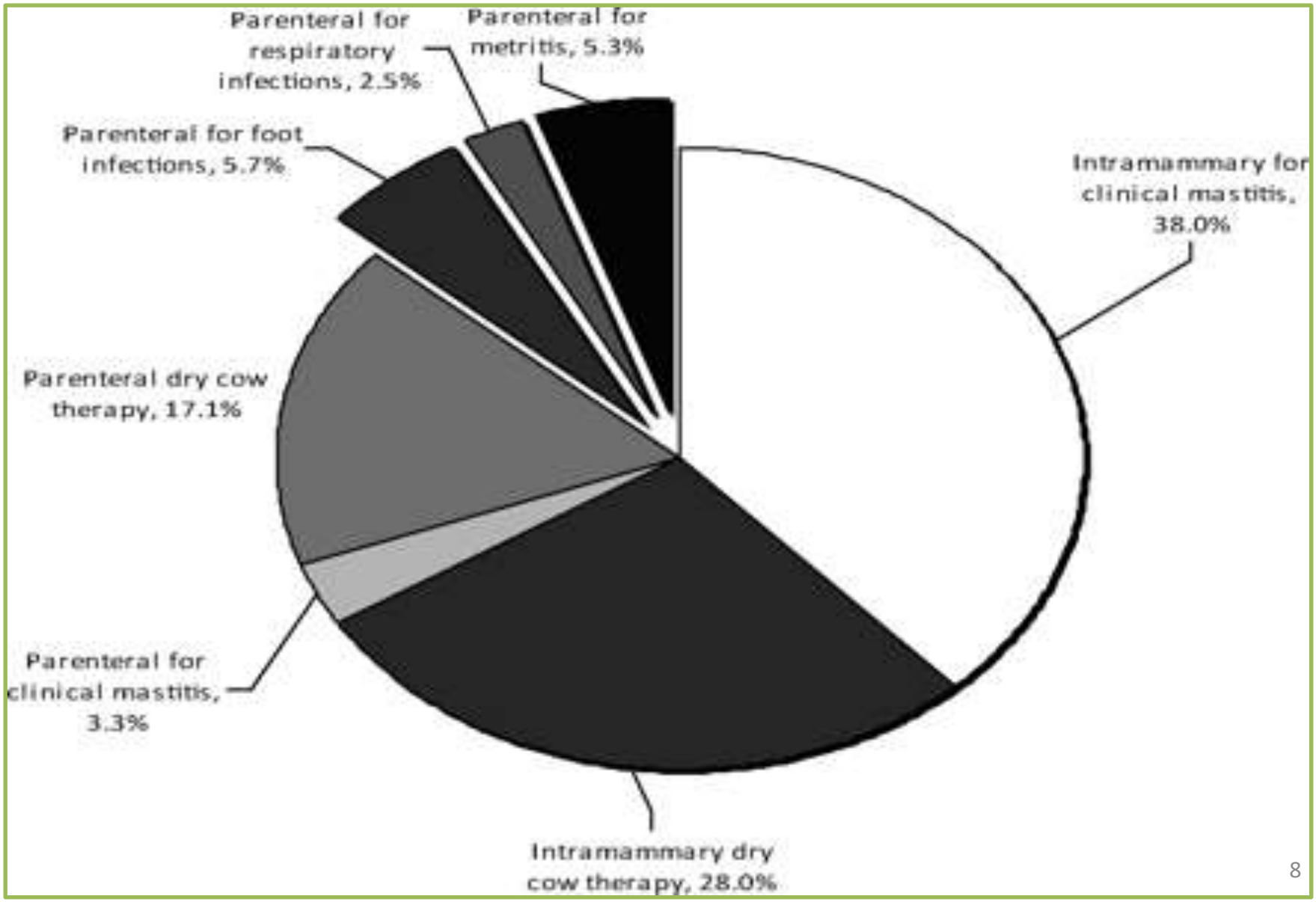
**Bovine mastitis mainly results from IMI, and is mostly derived from common udder pathogens such as Staphylococci, Streptococci, and Coliform species (Ruegg, 2017).**

**Control of *E. coli* mastitis result in a significant increase in milk production. Reducing *Staph. aureus* mastitis is the greatest challenge for the dairy sector**

Prevention and treatment of mastitis are the main reasons for antimicrobial drug use in the dairy industry (EMA-EFSA, 2017).

Approx. 90% of the residues detected in milk over a period of 5 yr in Michigan originated from antibacterial therapy for mastitis (Erskine et al., 2003).

**Proportion of defined daily doses of antimicrobial per cow per year administered on conventional dairy farms in Wisconsin (n = 20) for treatment of selected diseases by route and indication. Pol and Ruegg (2007).**



- **Bovine mastitis** - a daily loss 1.0 - 2.5kg - in a fortnight
  - a total loss of 110 -552 kg (entire lactation)

M. has a long-lasting effect on the milk yield, will not regain its peak milk yield in their remaining part of the lactation (Rajala-Schultz et al. 1999)

**Heifer mastitis SCM** (detected through an elevated quarter or composite SCC), CM, or one or more non-functional quarter(s) in animals in the first lactation, particularly in the Peripartum period.

Heifer mastitis is remarkable that these animals have never been milked (milking process is considered a risk factor for contagious mastitis in mature cows). In heifers teats have not been challenged by the milking vacuum.

A short-term prepartum antibiotic treatment is an effective measure to control heifer mastitis (?), not recommended because of the long-lasting adverse effects on udder health & milk production, thereby lowering the profit of the farmers (De Vliegher et al. 2012).

Presence of microorganisms (i.e., IMI) is associated with tissue damage.

Mammary tissue damage reduces the number and activity of epithelial cells and, consequently, milk production of the quarter is disturbed (Zhao and Lacasse, 2008).

The mechanisms causing the damage to the mammary tissue may differ (Zhao and Lacasse, 2008) but the resulting irreversible damage is the main reason for the milk loss (Oliver and Calvinho, 1995)

*Staphylococcus aureus* mastitis responds poorly to treatment and often remains persistent in the quarter

**The endogenous protection mechanism of keratin plug formation in teat canal takes about 10 -14 d during drying off of cows** (Bitman et al., 1991 ; Williamson et al., 1995).

**Ineffectiveness of current drug-therapy**
**with single-drug approaches in emerging re-emerging infectious diseases**
**(multidrug-resistant organisms, together with toxic side effects, compliance, availability and cost)**
**necessitate drugs from plant sources.**

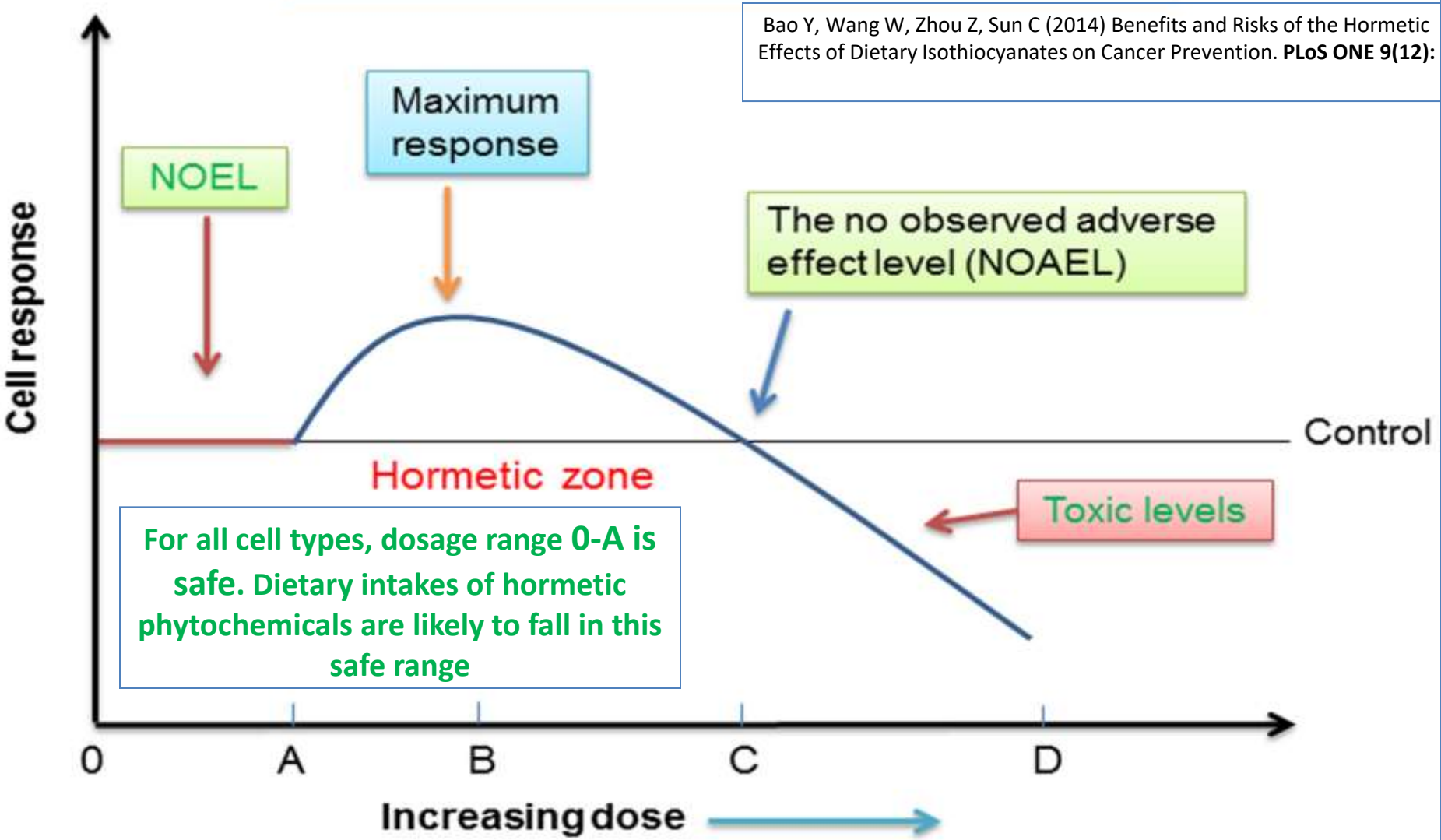
**A number of discreet MOA of commonly used herbal products have been confirmed.**

**They range from adaptogenic , immune modulation and nitric oxide synthesis modulators, to micro-nutrient and anti-inflammatory activity.**

**This increased knowledge enable healthcare practitioners to use herbal products, alone or together as part of Integrative medicine.** (American Journal of Internal Medicine 2018; 6(5): 99-107)

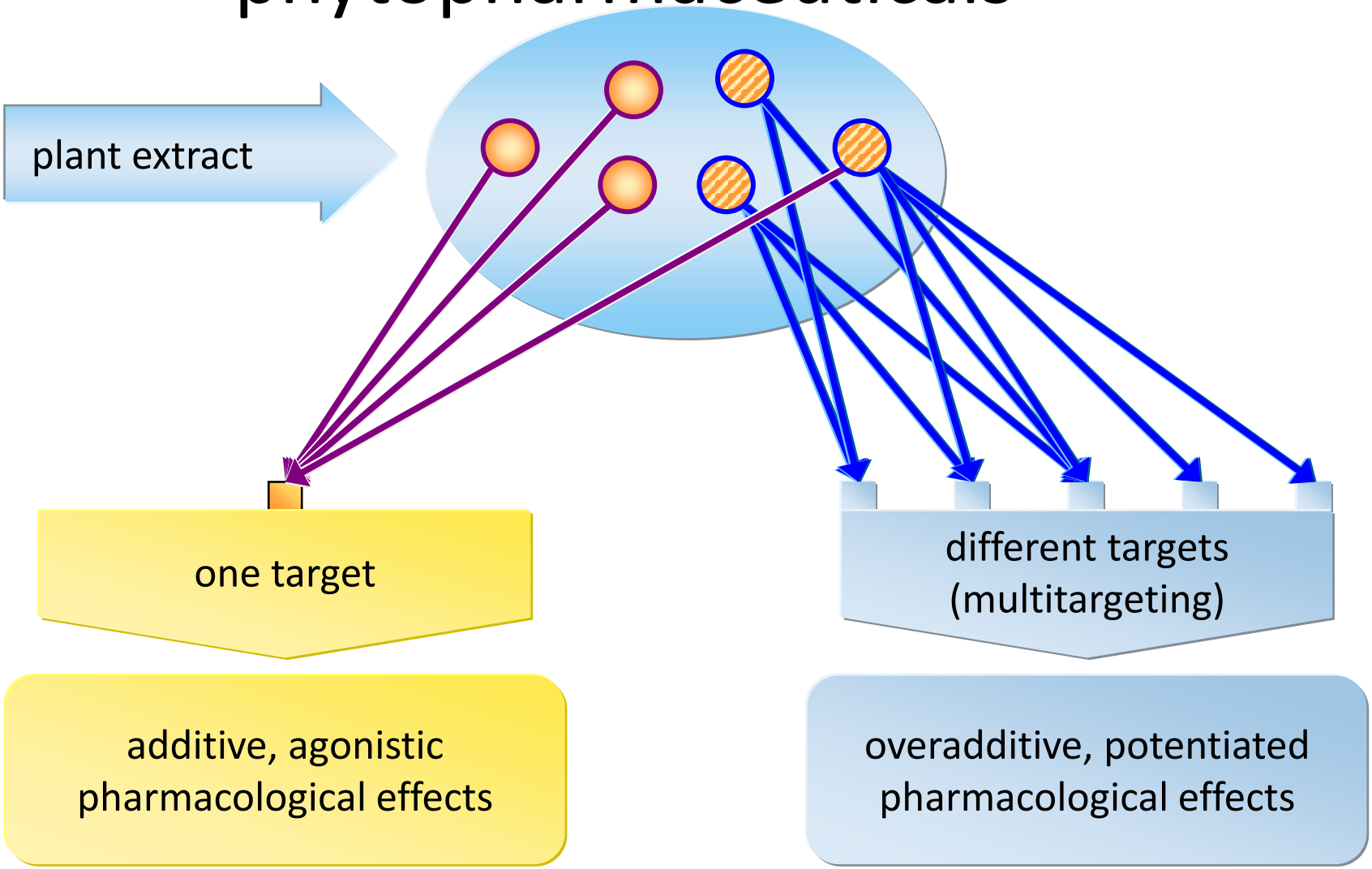
0-A: No-Observed-Effect Level (NOEL)
A-C: Hormetic zone (B-maximum response dose)
C: NOAEL, the highest dose that is without toxic effect
>C: Toxic levels

Bao Y, Wang W, Zhou Z, Sun C (2014) Benefits and Risks of the Hormetic Effects of Dietary Isothiocyanates on Cancer Prevention. **PLoS ONE 9(12):**




**Isothiocyantes -hormesis**

# Drug-synergism of phytopharmaceuticals

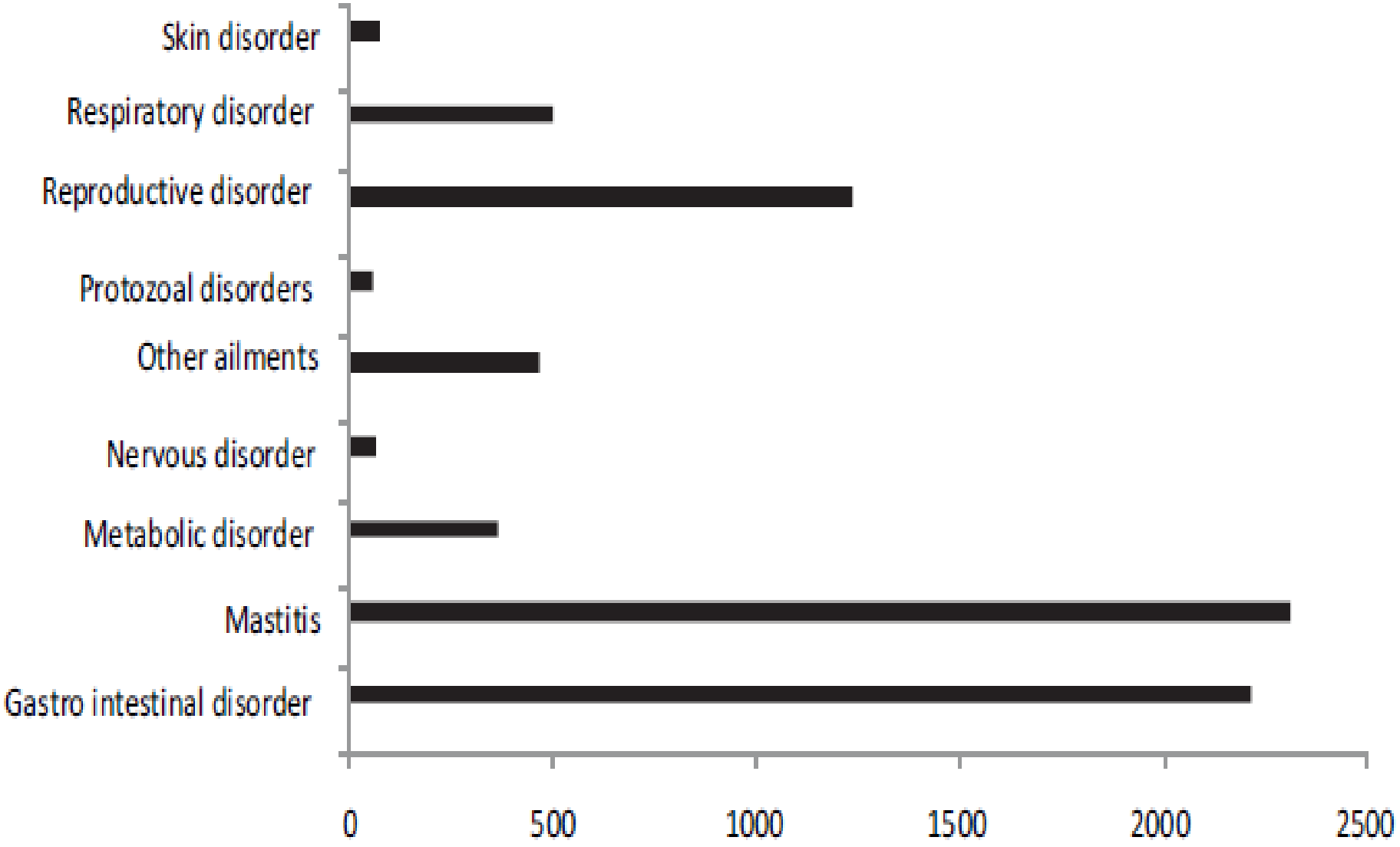


# The hand of God and the beauty of herbs

## Healthcare
## Accessable , Affordable Assessable (Predictable clinical outcome)

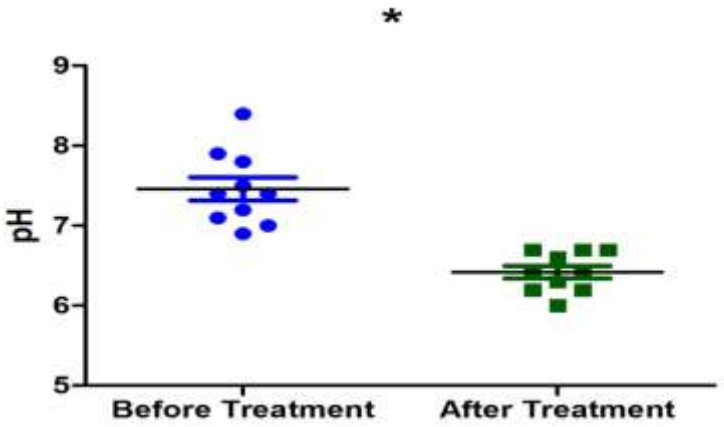
Sabarkantha co-op milk union , Himatnagar Gujarat 25th May 2016

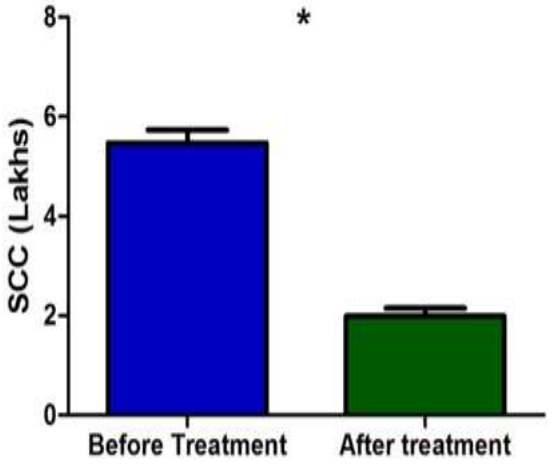
# Clinical Conditions treated using EVM though telemode at VUTRC, Thanjavur.



# Effect of herbal therapy on pH of the milk before and after treatment

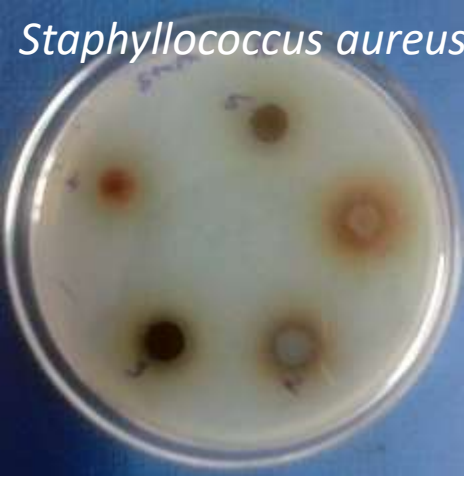
## fig1 and 2



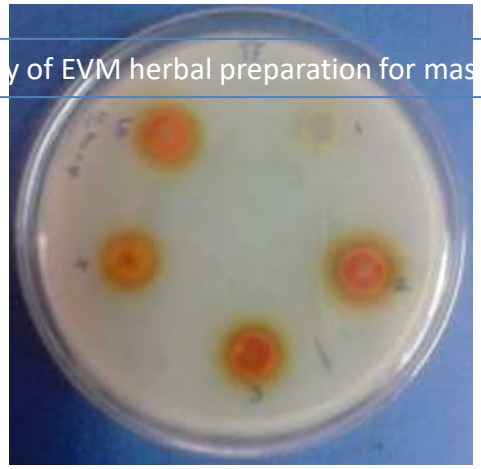

| Parameter | Before treatment | After treatment |
|---|---|---|
| pH | 7.4±0.44[a] | 6.42±0.24[b] |
| SCC | 5.47±0.78[a] | 1.99±0.48[b] |
| Organisms present | *Staphylococci*<br>*Streptococccci*<br>E.*coli* | E.*coli* |
| CMT | + | Negative |

*Staphyllococcus aureus*

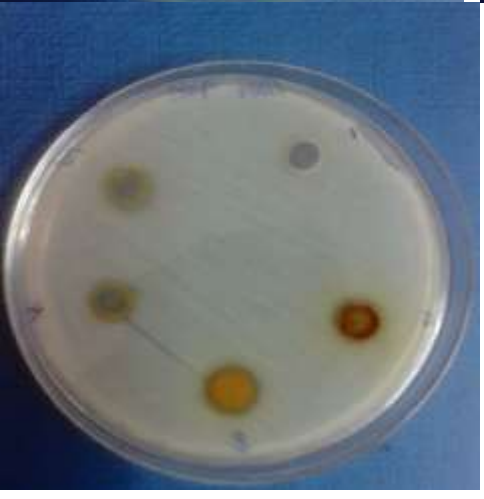
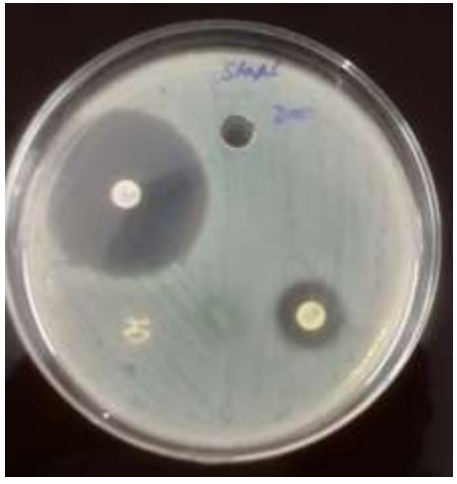


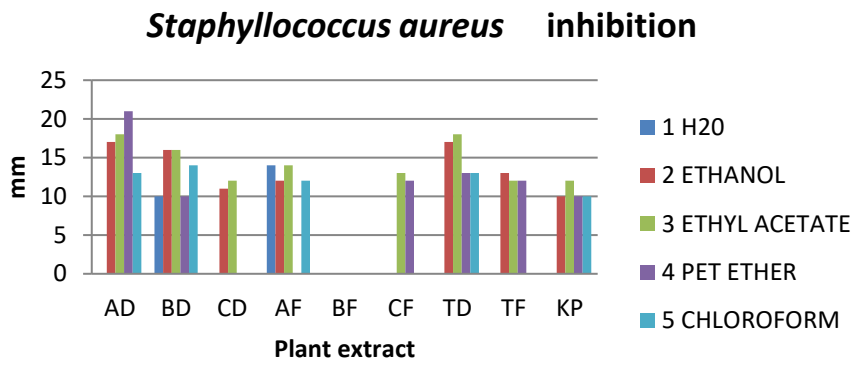






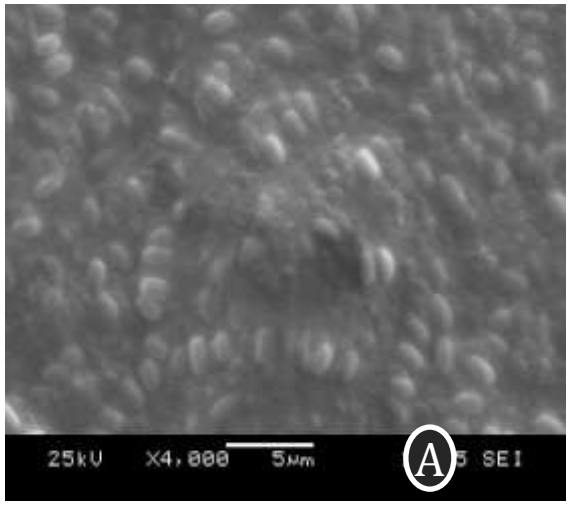

**Punniamurthy, N.** *et al* (2017) I*n-vitro* antimicrobial activity of EVM herbal preparation for mastitis. *Dairy and Vet Sci J* 3(2)

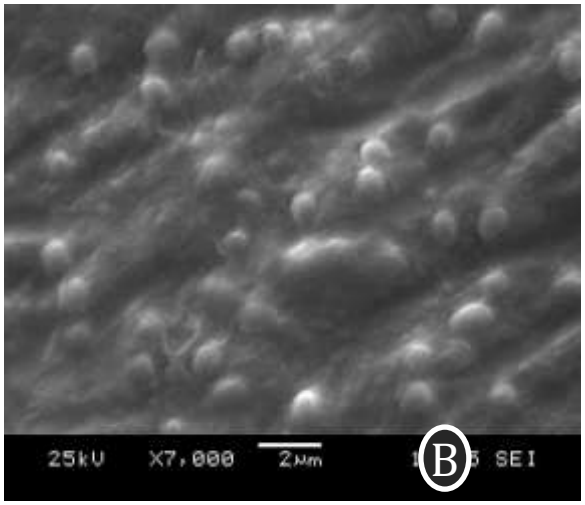



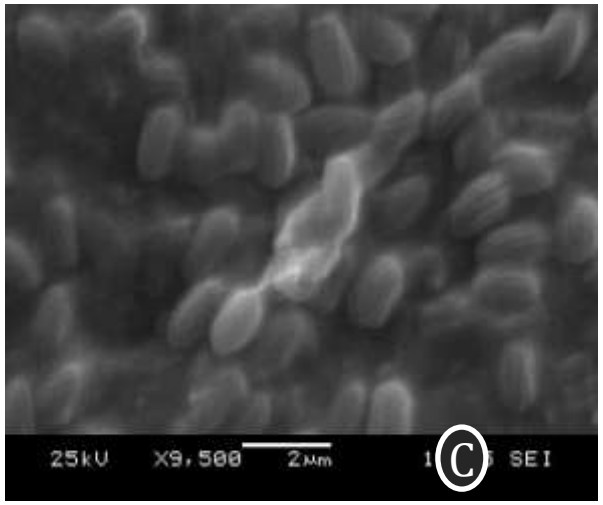


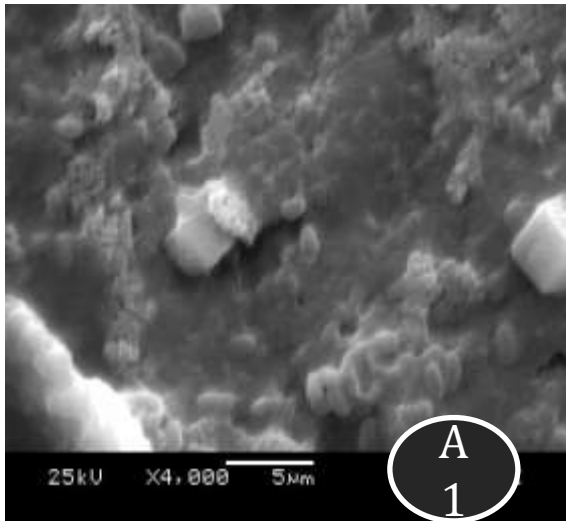
# Anti mastitis herbal - Fresh formulation

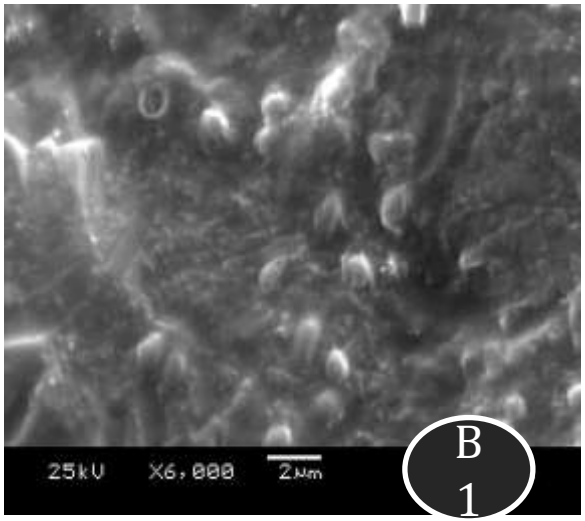
*Escherichia coli* *Staphylococcus aureus* *Pseudomonas aeruginosa*

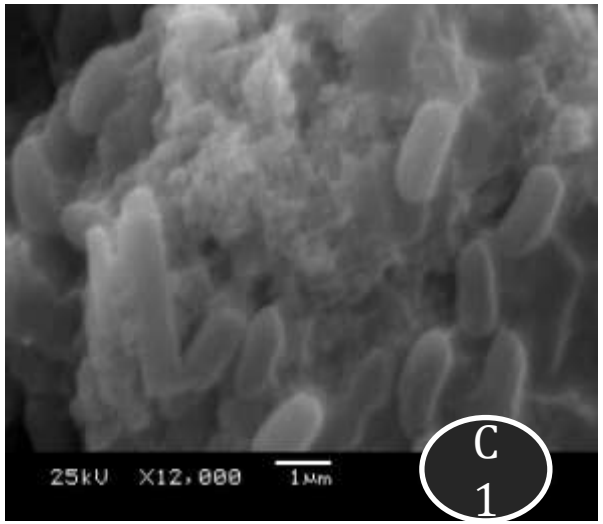


# Molecular docking

| Ingredient | Number of ligands |
|---|---|
| Aloe vera | 27 |
| Turmeric | 5 |
| Lime | 151 |

| Protein taken for the study | Role |
|---|---|
| Biotin protein ligase | Required for the activation of acetyl-CoA carboxylase |
| DNA gyrase | Catalyse changes in the topology of DNA |
| opuCB | ABC transporter |
| Penicillin binding protein | Peptidoglycan biosynthesis |
| sirA | ABC transporter |
| Sortase A | bacterial adhesion to specific organ tissues, invasion of host cells, and evasion of the host-immune responses |

Organism taken for the study – S.aureus

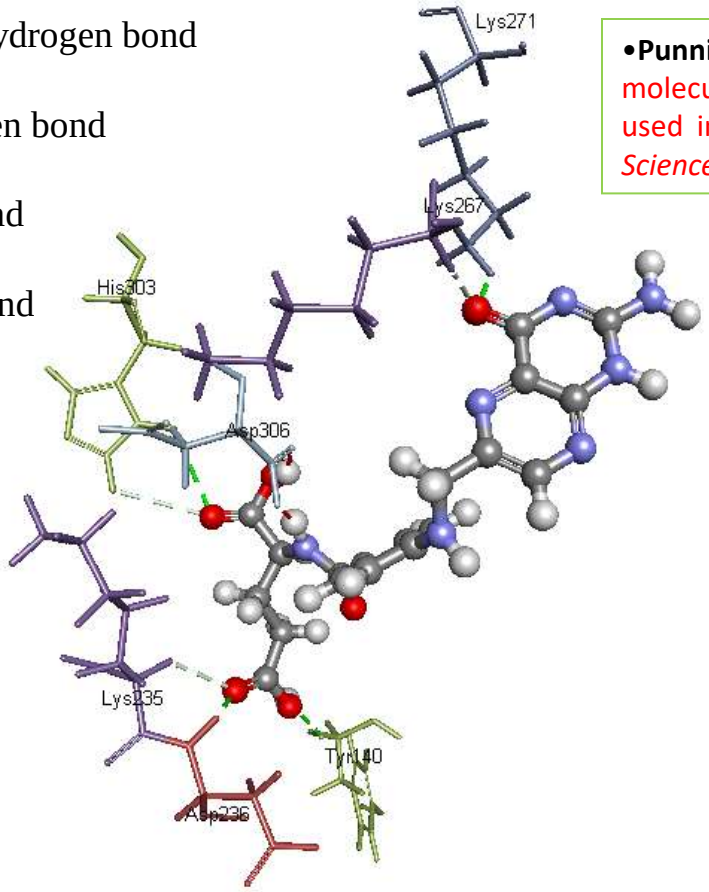
| Protein | Number of binding sites | Site | Ligand | Source | Dock score | H-bond forming amino acids | H-bond distance |
|---|---|---|---|---|---|---|---|
| opuCB | 14 | 1 | Folic acid | Aloe vera | 73.989 | LYS271, HIS303,ASP236, TYR140, LYS267, LYS235 | 1.73886, 2.95952, 1.94424, 2.56994, 2.27906, 3.06675, 2.65844 |

Conventional Hydrogen bond

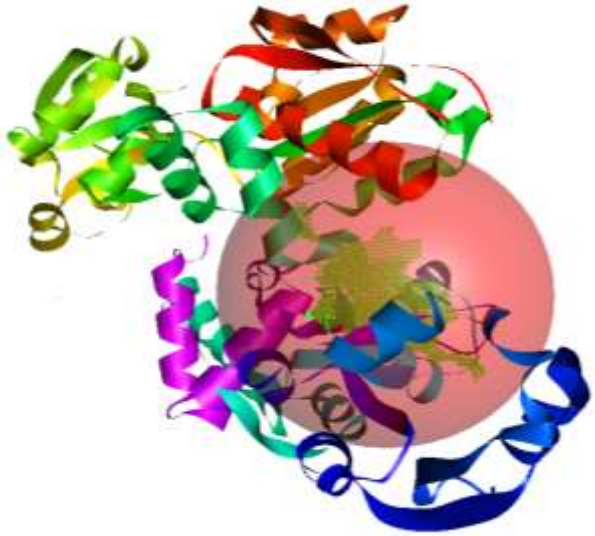
Carbon Hydrogen bond

Electrostatic bond

Hydrophobic bond




•**Punniamurthy N** ,et al (2017).**A**nalysis of the mechanism of action by molecular docking studies of one ethno-veterinary herbal preparation used in bovine mastitis. *International Journal of Applied and Natural Sciences* Vol. 6, Issue 5, Aug – Sep 2017; 23-30



# Information Flow Analysis (IFA)

•Information Flow Analysis (IFA) is an innovative strategy for “Big Data” analysis.

• More specifically, it is a Systems Pharmacology based method for studying cause-effect relationships.

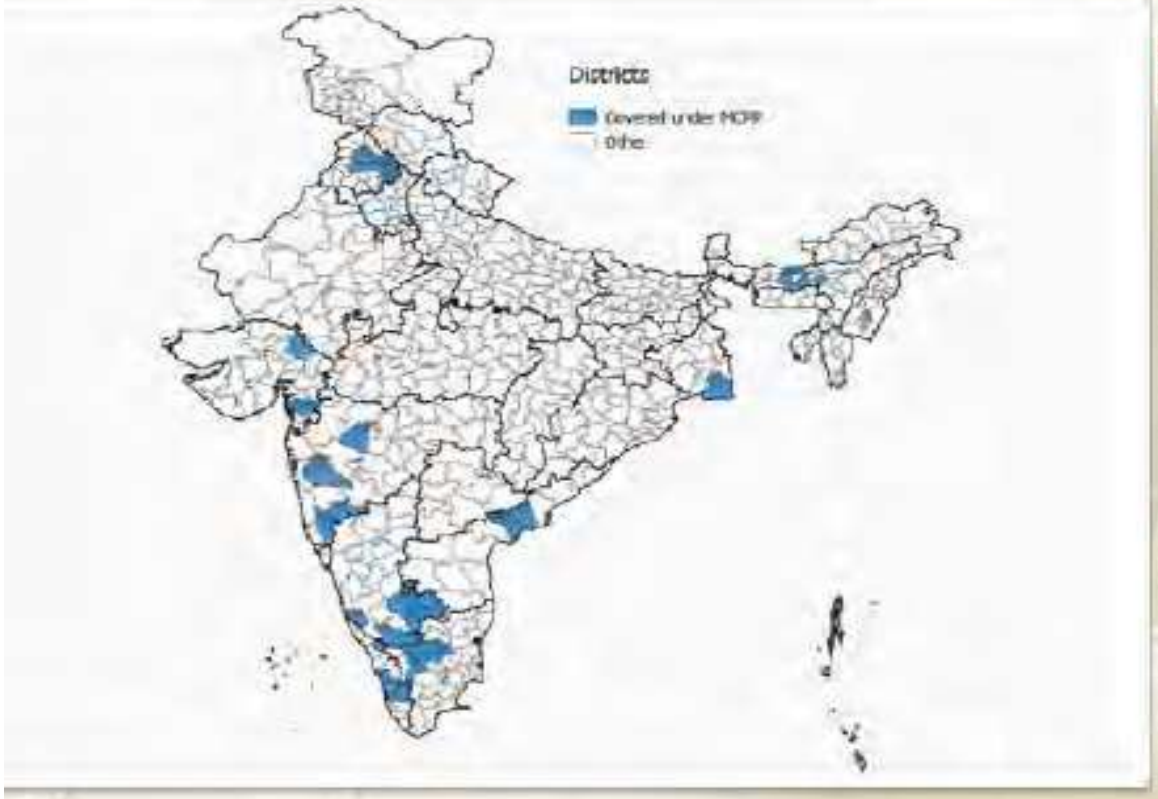
• IFA is unique and unlike statistical “Big Data” analysis methods; it determines changes in effect (function) values relative to changes in input (cause) values by measuring the overall degree of likeness (derivative values) between information spectra.

The combination of aloe , Curcuma and calcium oxide acts like a broad spectrum antibacterial against strains causing Mastitis .

**Punniamurthy, N**. et al. (2017) i*n-vitro* antimicrobial activity of EVM herbal preparation for mastitis**.** *Dairy and Vet Sci J* 3(2)

IFA result indicates that constituents of the mastitis herbal formula are capable of modulating the immune response causing Mastitis

# Expansion of mastitis control project in total 25 organisations in 9 states




**Gujarat**
- Surat MU
- Sabarkantha MU

**Andhra Pradesh**
- Krishna MU

**Maharashtra**
- Kolhapur MU
- Aurangabad MU
- Pune MU
- Rajaram Bapu MU
- Baramati MU

**Punjab**
- Jalandhar MU
- Ludhiana MU
- Mohali MU

**Karnataka**
- Bangalore
- Chamrajnagar
- Shimoga
- Kolar
- Tumkur
- DKMU

**Kerala**
- Malabar MU
- Ernakulam MU

**Tamil Nadu**
- Erode MU
- Salem MU

**West Bengal**
- Sundarban MU

**Assam**
- West Assam MU

**Recently included:** NDS managed Maahi PC, Rajkot and Shreeja PC, Tirupati

| VILLAGE | Mastitis history | Before ethnovet treatment | After ethnovet treatmen | Before ethnovet treat | After ethnovet treatment | Before EVM | After EVM | Milk recovery | Ethnovet treatment frequency | Recovery status | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ilol | Chronic | All four quarters infected,treated with higher antibiotics for three days 3 times | Soft and Reduced | Curdy | Clear and Normal | 0.25 | 2.5 | 2.25 | 6 Times / 3 Days | Complete | |
| Kanai | Acute | Soft with mild swelling | Reduced | Mild flakes | Clear and Normal | 2.5 | 3.5 | 1.0 | 4 Times / 2 Days | Complete | |
| Kanai | Acute | Hard in one quarter | Soft and Reduced | Watery | Clear and Normal | 4 | 7 | 3.0 | 5 Times / 3 Days | Complete | |
| Raigadh | Acute | Hard in one quarter | Soft and Reduced | Watery | Partialy clear | 2.5 | 3.5 | 1.0 | 2 Times / 2 Days | Poor | Not applied sincerely |
| Raigadh | Fibrosis | Hard in one quarter | Soft and Reduced | Normal with 10 m.l. milk | Normal with 100 m.l. milk | 6 | 7 | 1.0 | 4 Times / 6 Days | Partial | |
| Raigadh | Acute | Hard in one quarter | Soft and Reduced | Watery with 50 m.l. milk | Normal with mild flakes | 1 | 4 | 3.0 | 4 Times / 2 Days | Complete | |
| Raigadh | Fibrosis | Hard in one quarter | Slightly reduced | Watery | Watery | 6 | 6 | 0.0 | Delayed and stop | Poor | Not applied sincerely |

# Ethnovet practices at Sabar

| Type of mastitis | No of animals treated | Recovery status | | | | |
|---|---|---|---|---|---|---|
| | | Complete | % | Partial | % | Not recovered |
| Acute | 223 | 199 | 89 | 18 | 8 | 6 |
| Chronic | 10 | 4 | 40 | 6 | 60 | 0 |
| Sub clinical | 8 | 6 | 75 | | | 2 |
| *Incompletely treated cases were not considered | | | | | | |

# Medicines used before using VHM.

- Ceftrioxone inj.for 6 days
- Cloprostenol inj .1 day.,
- Zeet inj. for 6 days.,
- Flunixine Meglumin inj.for 6 days.
- Phyto mast tabs @10tabs for18 days.
- ,Wisprec cream externally

**Buffalo Not cured**.

Dr.Prasad Senior advisor/vet Krishna Milk Union Vijayawada AP June 2019

**Details of the Mastitis case successfully treated with EVM treatment, when all the other treatments failed.**

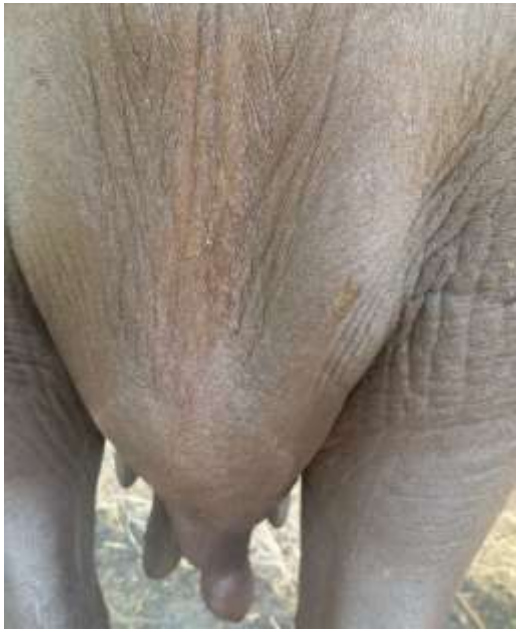
**Owner: Potluri Nani. Peda Muttevi.KMU**.

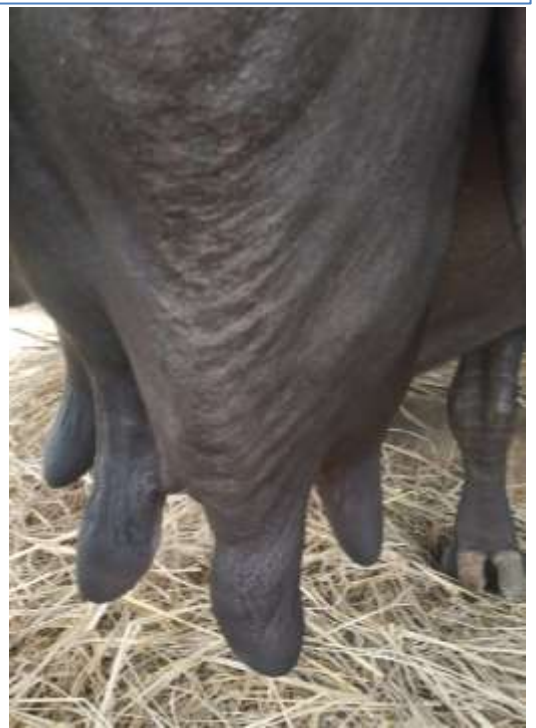
**Then they approached us.**

**Then we Started EVM treatment**

**It was successfully treated with in three days.**

**Now the milk production is normal**.





Progress in the field of high tech analysis, molecular biology, synergy research and omic technology can give phytotherapy a new legitimacy and the possibility to treat diseases which up to now were reserved for chemotherapy only

**Animal Healthcare**

**Accessable , Affordable, Assessable (Predictable clinical outcome)**