

## Neem in Animal Health

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The use of Neem in veterinary medicine in India dates back to the times of the epic *Mahabharata* (300 B.C). According to scholars, two of the five Pandava brothers *Nakul* and *Sahadev*, who practiced veterinary medicine, used Neem to treat ailing and wounded horses and elephants by applying poultices prepared from Neem leaves and Neem oil for healing the wounds etc., during the battle of *Mahabharata*. Ancient Sanskrit literature indicates Neem applications as feed and in a large number of prescriptions and formulations to provide health cover to livestock in various forms. Various Neem preparations were standardised in the form of oils, liniments, powders and liquids. Ayurvedic scholars recommend the use of Neem oil as antipyretic, sedative, anti-inflammatory, analgesic, antihistaminic, anthelmintic and as an acaricide.

'Notes on the Bazaar and Indigenous Drugs Useful in the Treatment of Animals' published in 1929, lists the Veterinary applications of Neem in detail. It notes that "leaves, bark and oil expressed from the seeds are generally used. Internally the preparations of the Neem tree are a good bitter tonic, antiperiodic and astringent and are used in combination with other drugs having similar properties. They are best administered in the form of a decoction. They are most useful in fever and debility. Externally, the leaves are used in varied forms, such as raw crushed mass, poultice and wash. The bruised leaves, mixed with charcoal or lime, form a good application to wounds, ulcers, pustular eruptions, such as epizootic aphtha, etc. The decoction of the leaves forms a valuable antiseptic and healing lotion to foul sores and ulcers. The leaves boiled with tamarind leaves are applied as a poultice to inflammatory swellings. The oil is applied to wounds as an antiseptic dressing. It is highly efficacious in parasitic diseases, cutaneous affections of all kinds and erysipelas, etc., as it contains sulphur in organic combination. It is also useful in removing maggots from the wounds. The oil is obtained from most of the bazaars". The approx. dosages are also mentioned :

### Doses - Bark -

Horse	...	...	1-2 oz
Cattle	...	...	2-3 oz
Sheep	...	...	1/4 - 1/2 oz
Dog	...	...	1/4 - 1 dr.

### Doses - Oil -

Horse	...	...	2-4 dr.
Cattle	...	...	4-6 dr.
Sheep	...	...	1-2 dr.

Further the Notes contain details on usage, which indicate the widespread acceptance of Neem in Animal Health in India during the early twentieth century.

Neem bark (Margosa), bruised ... 1 oz ... 87 (Drug No.)

Water ... .. 1 pint.

**Boil for 20 minutes and strain (DECOCTION). To be given twice daily. A bitter tonic, antiperiodic, and astringent. Doses - Horse and cattle 1/2 - 1 pint; Dog 1-2 oz.**

Neem bark (Margosa), bruised ... 1 oz. ... 87 (Drug No.)

Cinnamon (Dalchinni), bruised ... 4 dr. ... 37 (Drug No.)

Cloves (Laung), bruised ... 2 dr. ... 38 (Drug No.)

Water ... .. 1 pint.

**Boil for 20 minutes and strain. Given when cold twice daily. A good tonic in debility after an attack of fever. Dose - Horse and Cattle 1/2 - 1 pint; Dog - 1 oz.**

Neem or Margosa Oil ... .. 8 oz. ... 87 (Drug No.)

Turpentine (Gandhi-tel) ... .. 4 oz. ... 104 (Drug No.)

**Valuable antiseptic application to wounds and ulcers.**

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Neem or Margosa Oil ... 1 pint. ... 87 (Drug No.)  
 Sulphur (Gundak) ... 1 oz. ... 99 (Drug No.)

**Mix well. A good liniment for chronic rheumatism. To be well rubbed into the affected part.**

In the past few years researchers have been studying ancient prescriptions like Neem with tools of modern biochemistry. In a recent trial at an University in Bangalore, (1) it has been observed that alcohol based Neem leaf extract showed promising results in vitro trials as compared to other herbs.

**TABLE 1** (Here minimum inhibitory concentration (mg/ml) against selected five organisms was noted)

Name of Plants	Names of Micro Organisms selected for study				
	M.luteus	S. reus	EPEC	Paeruginosa	Calbicans
<i>Ocimum sanctum</i>	-	8	16	16	32
<i>Azadirachta indica</i>	1.48	2.95	5.9	2.95	1.48
<i>Cama longa</i>	0.94	3.78	1.89	3.79	3.78

Neem leaves and its extracts are being used as immunostimulants in poultry flocks. In the poultry industry, use of neem leaves is also made to prevent aflatoxicosis caused by *Aspergillus flavus*, which originates from oil cakes or maize, which are not dried properly and used as an ingredient of the feed. Use of neem cake as a protein substitute has an economical advantage in those countries where it is abundant.

**Neem oil to treat repeat breeder cows:** In the Indian countryside, neem oil has been used to clean the uterine tract in metritis & endometritis for a long time. Due to bad husbandry practices and poor sanitation in stables, subclinical mastitis is prevalent. While conducting AI (artificial insemination) it is noticed that inspite of repeated AI done at regular oestrus cycles, cows or buffaloes do not conceive due to subclinical metritis, which goes unnoticed or remains undetected. Regular intrauterine use of neem oil @ 30ml for 3 days has proved very useful in a study done in Mumbai, India.(2).

**Antihepatotoxic effect of Neem:** In developing countries, getting clean, toxin free water is a problem. This leads to calf mortality and morbidity in large animals as well as poultry, resulting into huge economic losses. Researchers in India used neem leaf powder in case of cow calves @ 20g / day for anorexia, fatigue, anaemia & poor weight gain in animals suffering from hepatotoxicity. It was observed that feeding neem leaf powder improved appetite, liver function and general health of the calves. (3)

**Neem as immunomodulator:** A study conducted by vet doctors in India observed that in infectious bursal disease (IBD), a viral infection of poultry, causing damage to the bursa, which is the seat of production of B-cells responsible for developing humoral immunity. Simultaneously Thymus is also damaged which is the seat of production of T cells, responsible for developing cell-mediated immunity. Neem leaf powder fed @ 2g / Kg of feed enhanced both immune responses in immune suppressed birds. (4). This is significant in view of preventing losses due to mortality and morbidity caused by viral infection. Similar results were also observed by feeding Neem leaf powder to Aqua species to get higher survival rate and extra profit. (5)

**Neem and Animal Nutrition:** Fresh neem leaves are regularly fed to camel and goats in India without any untoward effect. In an experiment to evaluate growth and nutrient efficacy of broiler chicks from day 3 – day 42, chicks were fed on diets containing alkali treated neem kernel cake as protein supplement, in place of peanut meal. The trial did not show any qualitative and quantitative difference in the meat between treated and untreated birds and weight gain was similar in both groups. The use of alkali treated neem cake to spare the peanut meal in broiler diets was recommended. (6)

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In another study, water-washed neem cake was added @ 40% in the ration of 32 cows for a full lactation period. It was observed that digestibility of nutrients, blood parameters, fertility and milk production were not affected. Even performance of breeding bulls remained unaffected. (7)

**Neem oil as an Acaricide:** It is estimated that the global losses due to ticks and tick borne disease would be to the tune of US\$ 7 billion annually. 80% of the world's cattle population (1.2 billion) is at risk from ticks and tick borne diseases (8). Azadirachtin is the prominent acaricide active ingredient in the seeds, leaves and other parts of the neem tree. Azadirachtin and other 34 other compounds in Neem exhibit various modes of action against external parasites such as antifeedancy, growth regulation, fecundity, suppression, oviposition repellency, changes in biological fitness and blocking development of vector borne pathogens. Action of neem-based products, mainly neem seed oil studied by several scientists against ticks, mites, fleas, lice and flies has been reviewed below.

**Effects of Neem Oil on Ticks & Flies in Dogs:** 1) A study was conducted by using emulsified neem oil on *Rhipicephalus sanguineous* (tick) & *Stomoxuys calitrans* (fly) (9)

TABLE 2

Subjects	Lethal Concentration	No. of Days Required for Mortality
<b>TICKS</b>		
Engorged females	16%	th Day
Males	8%	3rd Day
Larvae	1%	24 hours
<b>FLIES</b>		
	2%	24 hours
	4%	18 hours
	8%	6 hours

2) All major species of African ticks, i.e., *R.appendiculatus*, *A.variangatum* and *B.decoloratus* are affected by neem. Exposure to neem oil inhibited larval and nymphal attachment and feeding (90 – 100%), reduced fecundity (30 – 40%) and hatchability of eggs (47 – 55%), reduced molting (98%) and sterilized eggs (80 – 90%). (10)

3) A study in Africa tested the in vitro toxicity of neem seed oil against the larvae of a three host tick, *Amblyoma varieagatum* (hard tick) commonly found in Nigeria. Pure, undiluted neem oil was found to kill all the larvae after 48 hrs. (11)

As compared to cypermenthrin or ivermectin, neem oil is safe being non-toxic and biodegradable. Moreover, due to synergistic action of several active ingredients present in Neem oil. However, the user has to have patience to get the desired results, which would have tremendous economic effect.

**Neem for Flea Control in Dogs:** In a recent trial the action of neem on *Ctenocephalidus felis* in dogs and cats was studied. Groups of greyhounds and cats infested with *C.felis* were sprayed once with neem seed extract with or without diethyltoluomide and / or citronella. Methanolic extract with 200, 1000 or 2400 ppm Azadirachtin fleas in a dose dependant manner. Compared with fleas counted on treated dogs, just before treatment and untreated infested dogs, 1000 to 2400 ppm Aza reduced fleas 93 – 53% for 19 days. However, combined with 500 ppm deet and 33% v/w citronella only 500ppm Aza reduced fleas 95 – 62% for 19 days on cats inoculated with 50 fleas 2 days before treatment. The combination reduced fleas and eggs 100% up to day 6 and 83 – 51% from days 7 to 9. The results show that Azadirachtin reduced fleas in a dose dependant manner. In cats, the combination killed most fleas within 24 hours, providing effective flea control for 7 days. (12)

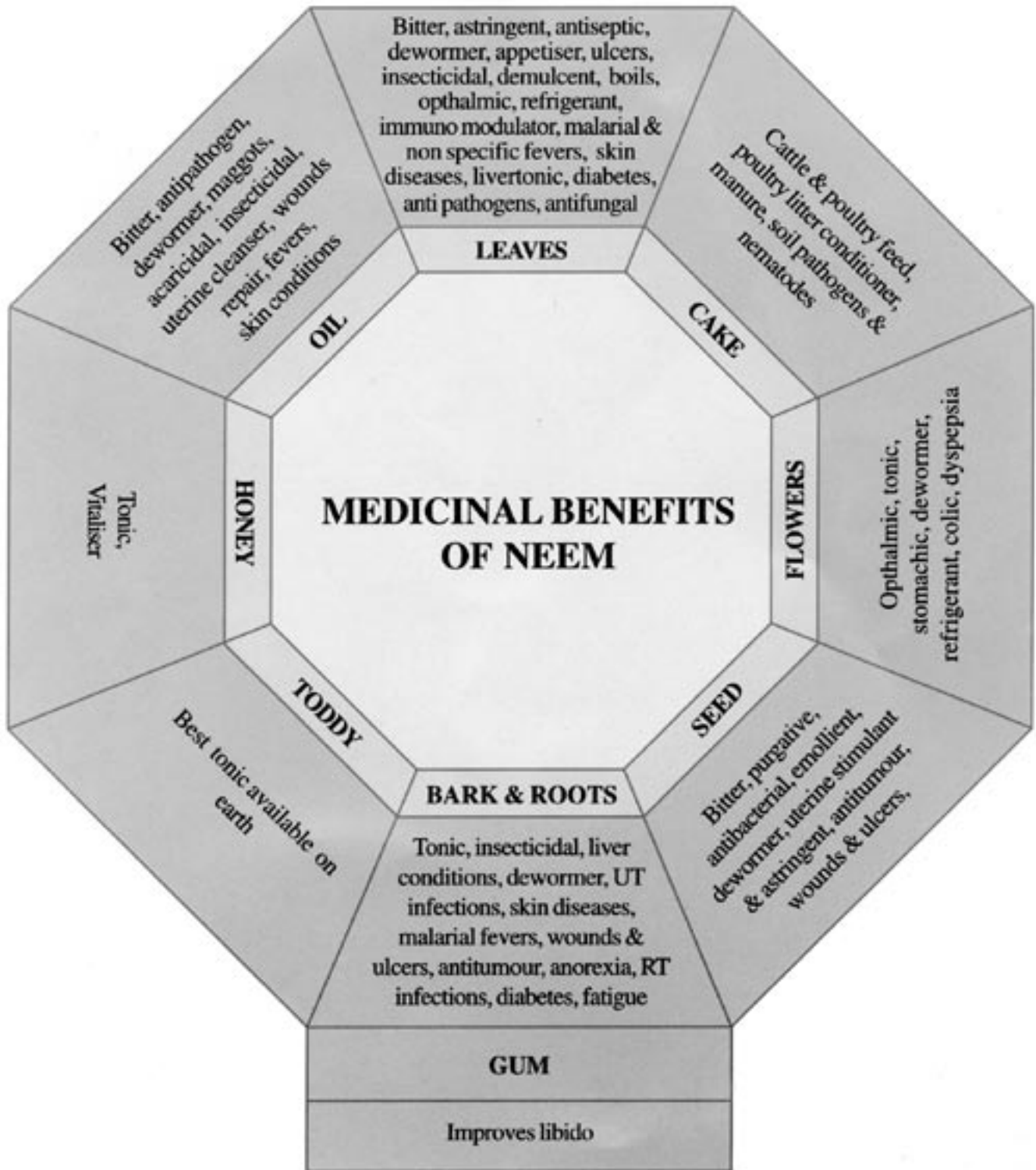
**Neem in Lice Control:** In Australia trials were conducted on sheep to know the effects of normal and UV protected Azadirachtin on *Damalenia ovis* on lousy sheep in a lice contaminated environment for 6 months. Sheep infested by lice were sprayed once with methanolic neem seed extract with 40, 60, 160, 320, 640 and 1280 ppm Azadirachtin and tween wool wax formulation with 2000 ppm Azadirachtin. The retention of Azadirachtin on wool, lice control and repellency was periodically assessed by reinfesting treated sheep with untreated lousy sheep. Up to 6 days after treatment increased Azadirachtin concentrations correlated with reductions in lice. After day 6, water – methanolic extract of neem seed with Azadirachtin concentration ranging from 80 – 1280 ppm prevented reinfestations and reduced lice 98 – 100% from day 2 to 95 and 94 – 96% from day 96 to day 170. It was concluded that low concentrations of Azadirachtin inhibit lice on sheep for relatively longer periods. (13)

**Azadirachtin as a larvicide against hornfly, stable fly and housefly:** Azadirachtin as larvicide was tried against *Hematobia irritans* (horn fly), *Stomoxys calcitrans* (stable fly) and *Musca domestica* (housefly). Azadirachtin ethanolic extract was administered orally to cattle @ >0.03mg Azadirachtin / kg body weight per day or ground neem seed was given @ 10 mg / kg body weight. Horn fly development in manure was inhibited for other flies when dose of seed powder was 10 times higher. (14)

**Conclusion:** The neem tree offers tremendous scope as a non-toxic alternative in animal health concerns. The areas of economic importance are neem as immunomodulator in poultry and livestock, as an aflatoxin inhibitor, as a feed ingredient, as an acaricide, antibacterial and other widespread clinical uses like skin infestations and wound healing. Some further research can yield a large number of drugs and formulations based on the extracts of this medicinal tree.

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