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From Traditional Wisdom to Scientific Wound Care: The Role of Ethnoveterinary Practices in Animal Wound Management

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Abstract:

Wounds are among the commonest clinical problems in livestock, working animals and companion animals, and their cost runs well beyond the break in the skin. Long before veterinary clinics existed, farming communities treated animal wounds with the plants and materials around them, and much of that practice survives today. This article examines that knowledge, known as ethnoveterinary medicine, against modern wound science. It outlines the four stages of repair, explains why some wounds stall, and assesses four widely used materials, namely neem, turmeric, Aloe vera and honey, by separating traditional claims from laboratory findings and controlled clinical evidence. Honey alone carries substantial randomised trial data, and even that evidence is mixed. The article then sets out the pathway that turns a folk remedy into a standardised veterinary product and why standardisation of plant material is so difficult. The argument is not that tradition should replace veterinary medicine, but that it remains a legitimate and underused source of testable hypotheses.

Keywords: Ethnoveterinary medicine, wound healing, medicinal plants, antimicrobial resistance, veterinary wound management

When a Wound Is More Than a Wound?

A crossbred cow catches her flank on a projecting nail. A draught bullock develops a raw gall under the yoke midway through the ploughing season. A farm dog comes back from the fields with a torn ear. Such injuries are common, and are often managed at home for days before anyone with training sees them. What makes a wound important is rarely the tear itself. Pain suppresses feed intake and rumination, contaminated tissue invites infection that can track into fascial planes, joints or the bloodstream, and healing those stalls costs weeks of production. Then come the direct costs of drugs, dressings, repeat visits and discarded milk. In welfare terms an untreated wound is a long and avoidable source of suffering, and

in fly season an open invitation to myiasis.

Where veterinary services are far away or unaffordable, communities have never simply waited. Across South Asia, Africa and Latin America, herders built their own repertoire of wound treatments from whatever grew close by: crushed leaves, seed oils, resins, honey, wood ash and bark decoctions. The systematic study of these practices is called ethnoveterinary medicine. It deserves scientific attention because plants have historically been productive starting points for drug discovery, and because rising antimicrobial resistance has pushed the profession to look harder at adjuncts that reduce unnecessary antibiotic use. Interest, though, is not endorsement. The sequence that matters runs one way only: tradition generates a hypothesis, science tests it, and only what survives testing earns a place in practice.

How a Wound Heals?

Repair is an overlapping sequence in which each stage sets up the next (Gurtner et al., 2008). In haemostasis, damaged vessels constrict and platelets adhere, aggregate and degranulate; fibrin forms a clot that stops bleeding, provides a provisional scaffold and releases growth factors that recruit the cells needed later. In inflammation, neutrophils arrive within hours to kill bacteria and clear debris, and macrophages take over from the second or third day, phagocytosing dead tissue while releasing the cytokines that drive repair. In proliferation, fibroblasts synthesise collagen, new capillaries sprout into the bed, granulation tissue forms, epithelial cells migrate across the surface and myofibroblasts draw the edges inward. In remodelling, type III collagen is replaced by type I and fibres reorganise along lines of stress, though healed skin plateaus at roughly seventy to eighty per cent of the strength of intact skin.

Cutting across all four stages are a few requirements: controlled rather than runaway inflammation, adequate perfusion and oxygenation, a bed that is moist but not macerated, and protection from further contamination and repeated trauma.

Why Some Wounds Refuse to Close?

Most acute wounds in healthy animals heal without much help. The ones that do not usually have an identifiable reason, often several at once. Heavy contamination and infection prolong the inflammatory phase, while necrotic tissue and foreign material sustain that inflammation indefinitely. Poor blood supply starves the bed of oxygen. Repeated trauma from movement, rubbing harness or the animal's own licking tears out fragile granulation tissue as fast as it forms. Nutrient deficiencies slow matrix synthesis, and concurrent disease takes its toll. So does inappropriate treatment, including harsh antiseptics poured into a wound bed.

Bacteria in chronic wounds frequently grow not as free-floating cells but as biofilms, structured communities embedded in a self-produced matrix on the wound surface. Within a biofilm they tolerate antibiotic concentrations far above those that would kill the same species in suspension, and they are shielded from immune cells. This is why a chronic wound can look clean, swab as sensitive and still refuse

to progress, and why physical disruption through lavage and debridement matters so much. It is also why unnecessary antibiotic courses add selection pressure for little clinical return, and why interest in non-antibiotic adjuncts is legitimate.

Tradition on Trial: Four Familiar Materials

Repeated use over generations shows that a practice was acceptable, available and not obviously catastrophic. It does not show that the material worked, because there were no control group and no way to separate a treatment effect from the natural tendency of most wounds to heal anyway. Traditional use is a hypothesis of high interest and low proof. Four materials recur in ethnoveterinary surveys and have attracted enough laboratory attention to discuss honestly (Table 1, Figure 1).

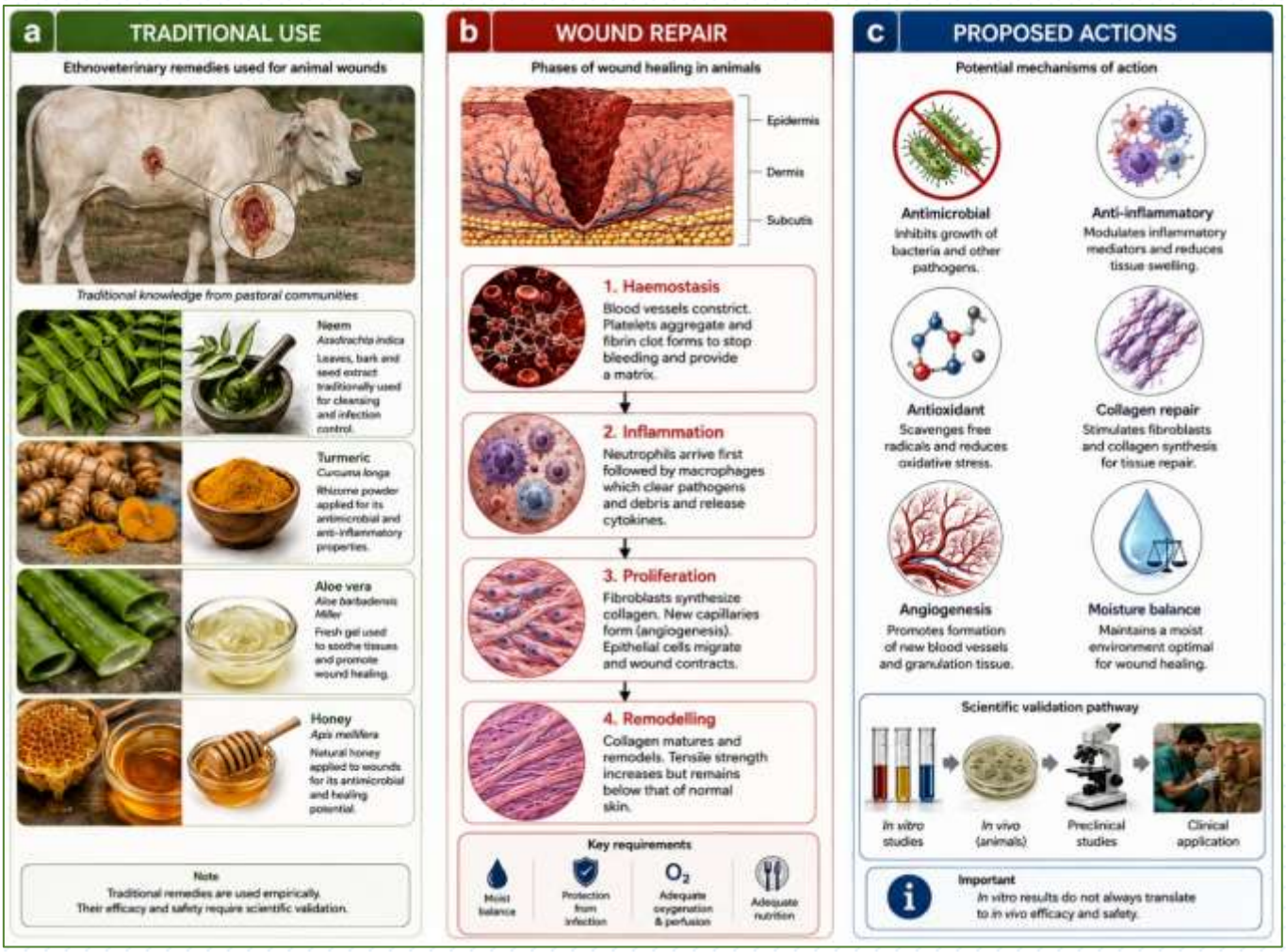

Figure 1. The path from traditional materials, through wound biology, proposed mechanisms to veterinary application.

Neem and turmeric sit at the preclinical end. Neem extracts show antibacterial, anti-inflammatory and antioxidant activity in laboratory systems (Alzohairy, 2016), and curcumin has well-documented anti-inflammatory and antioxidant activity with preclinical reports of effects on fibroblasts and re-epithelialisation (Akbik et al., 2014). Neither has been tested in adequately controlled wound trials in livestock. Aloe vera performs well in experimental models, but human reviews remain inconclusive because preparations differ so much between studies (Biswas and Mukherjee, 2003).

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Material	Traditionally reported use	Major bioactive components	Potential activity, evidence and limitations
Neem *(Azadirachta indica)*	Leaf paste, leaf decoction or seed oil applied to cuts, abrasions and fly-struck wounds in cattle, buffalo, small ruminants and dogs.	Limonoids and triterpenoids (azadirachtin, nimbin, nimbidin), flavonoids, tannins, seed-oil fatty acids.	Antibacterial, antifungal, anti-inflammatory and antioxidant activity reported in laboratory systems (Alzohairy, 2016). Evidence is largely in vitro and rodent-based, composition varies widely with plant part, season and solvent, and controlled wound trials in target species are scarce. Concentrated neem oil can be irritant.
Turmeric *(Curcuma longa)*	Rhizome powder or fresh paste, often mixed with oil, applied to cuts, swellings and castration wounds.	Curcuminoids (chiefly curcumin), volatile oil rich in turmerones, polysaccharides.	Anti-inflammatory and antioxidant activity, with preclinical reports of effects on fibroblast proliferation, collagen deposition and re-epithelialisation (Akbik et al., 2014). Curcumin is poorly water-soluble and chemically unstable, which complicates topical delivery. Standardised veterinary wound trials have not been published; skin and coat staining is a practical limitation.
Aloe vera *(Aloe barbadensis)*	Fresh inner leaf gel smeared on burns, sunburn, superficial abrasions and teat lesions.	Polysaccharides (acemannan, glucomannan), glycoproteins, sterols; anthraquinones in the latex layer.	Retains moisture at the wound surface, with reported anti-inflammatory activity and stimulation of fibroblasts and collagen synthesis in experimental models (Biswas and Mukherjee, 2003). Human systematic reviews remain inconclusive because preparations and trial quality vary. The yellow latex is a purgative and must be separated from the inner gel.
Honey	Direct application to open wounds, burns, ulcers and post-surgical sites; among the oldest recorded wound treatments.	High sugar content giving low water activity, low pH, glucose oxidase generating hydrogen peroxide, phenolics; methylglyoxal in manuka honeys.	Antibacterial activity, osmotic drawing of fluid that assists autolytic debridement, and maintenance of a moist wound bed. Cochrane analysis found honey may shorten healing of partial-thickness burns and infected post-operative wounds, while evidence for other wound types is uncertain (Jull et al., 2015). Raw honey may carry bacterial spores; sterilised medical-grade product is preferred.

Table 1. Selected ethnoveterinary materials and their potential relevance to wound healing

Honey is the exception, and it is instructive. Its activity is mostly physical and chemical rather than exotic: very high sugar content gives low water activity, the pH is acidic, and glucose oxidase generates hydrogen peroxide slowly at the wound surface. The Cochrane review by Jull et al. (2015) concluded that honey may shorten healing in partial-thickness burns and in already infected post-operative wounds, while evidence for other wound types remains uncertain. Two practical points follow: raw farm honey may carry bacterial spores, so sterilised medical-grade product is preferred, and honey is a dressing rather than a substitute

for cleaning a contaminated wound.

Where These Products Fit, and When to Call a veterinarian?

Modern wound management is a sequence of decisions, not a product: assessment of animal and wound, control of bleeding, copious lavage, debridement when indicated, assessment rather than assumption of infection, a dressing chosen for what the wound needs at that stage, then protection and monitoring. Ethnoveterinary preparations, where evidence supports them, fit into that sequence at the dressing stage; they do not replace it. Applying honey or a leaf paste over embedded soil and dead tissue is not wound care. Standardised medical-grade honey shows the correct relationship: traditional in origin, characterised and sterilised in manufacture, used as one option within a full plan.

Some situations need a veterinarian without delay: uncontrolled bleeding; deep or penetrating wounds; extensive tissue loss; bite and puncture wounds, which are far more damaging below the surface than they appear; any wound involving or near a joint, tendon sheath, body cavity or the eye; suspected fracture; spreading swelling, heat or foul discharge; extensive burns; maggot infestation; and any wound accompanied by fever, dullness or loss of appetite. Tetanus prophylaxis deserves consideration in horses.

From Folk Remedy to Standardised Product:

The distance between a leaf paste and a licensed veterinary product is measured in steps, each of which can end the journey: correct botanical identification with a voucher specimen, extraction and standardisation, phytochemical characterisation, antimicrobial testing against organisms isolated from animal wounds, antioxidant and anti-inflammatory assays, cytotoxicity and safety assessment, controlled animal studies, clinical trials in the target species, and finally a standardised formulation with defined composition, stability and shelf life.

Standardisation is where most herbal wound products fail. Plant chemistry varies with species, plant part, harvest stage and geography, so the same species from two districts is not the same material. Extraction method and solvent determine the final profile, storage matters because phenolics oxidise and volatile oils are lost, and contamination is a real risk in material dried in the open. Above all sits batch-to-batch variation. A preparation that cannot be measured cannot be reproduced, studied meaningfully in a trial, or regulated. It is also worth saying plainly that natural does not mean safe: plants make their secondary metabolites as chemical defences, and some are irritant, cytotoxic or organ-toxic.

Conclusion:

Ethnoveterinary medicine should not be viewed simply as an alternative to modern veterinary medicine. It is better regarded as a source of hypotheses and bioactive leads that can be investigated through modern science and potentially transformed into safe, standardised and evidence-based wound-management solutions. The farmer who has treated wounds with neem leaf for forty years has made an observation worth taking seriously, but an observation is not yet a conclusion. Traditional knowledge

provides the clues; scientific validation determines what works.

Note: Reported activity refers to effects observed in laboratory or experimental settings and does not indicate proven clinical efficacy in veterinary patients. Most supporting data are in vitro or from rodent models.

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