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Potential Health Benefits of Aloe vera in Livestock: A Review

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ABSTRACT

Aloe vera is one of numerous feed supplements that can be used to increase productivity and disease resistance in domesticated animals. To reap these advantages, there are various indications, which include the proper dosage for better efficacy. As stated earlier, the rising demand for animal source protein in practice is largely met by the strengthening of the livestock sector; this demand goes along with higher demand for animal feeds and animal feed additives. For many years, livestock keepers have been using chemical derivatives and antibiotics to treat their animals against many animal diseases. But the misuse of antibiotics and poor handling of chemical derivatives in different fields has led to tremendous effects, which include adverse effects on animals, plants, the environment, and the final consumer. Herbs are plant sources of safer and inexpensive compounds, so many herbal products have been reported worldwide to enhance several actions such as anti-stress, tonic, antimicrobial, growth stimulant, and immune stimulant in livestock rearing. So many medicinal plant extracts have been tested recently for animal growth performance, immune stimulation, anti-inflammatory, antioxidant, and disease resistance, which have offered good results and have the potential to reduce the use of antibiotics. Aloe vera is one of the herbs that is rapidly utilized as a feed additive in the livestock sector. The physico-chemical composition of Aloe vera and its health characteristics, such as antioxidant properties, healing, immune responses, antimicrobial properties, and many more benefits in domesticated animals, are briefly well discussed in this review article.

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INTRODUCTION

Aloe vera is a naturally occurring plant that has been proven to have beneficial advantages for livestock as well as wild animals. Aloe vera produces carbohydrates that have a variety of biological actions in domesticated animals **(Mnisi *et al.*, 2022).** A treatment, such as heating, dehydration, or grinding, is frequently included in the preparation process of aloe products **(Chakale *et al.*, 2022; Martínez-Burgos *et al.*, 2022).** Unfortunately, due to improper processing during gel preparation and stabilization, bioactive components like polysaccharides and antioxidant compounds are permanently altered, affecting their original structure and leading to significant changes in biochemical properties, resulting in many of the products having very little or almost no active ingredient **(Bokelmann, 2022).**

More studies are now looking for alternatives to antibiotics in order to reduce their impact on animals as a result of the recent ban on the use of antibiotic growth promoters in animal feeds. This is because there are worries about the presence of these substances in animal products and possible bacterial resistance in both animals and humans **(Seidavi *et al.*, 2021).** Given the importance of healthy animal food and human health, more research is being done to find alternatives to industrial chemicals, including probiotics, prebiotics, enzymes, organic acids, and herbs **(Dey *et al.*, 2022).** *Aloe barbadensis* (Miller), sometimes known as Aloe vera, has a long history of usage as an oral and topical route of administration. With a dilution mixture ratio of 10:1 (water: aloe vera juice) **(Movaffagh *et al.*, 2022).** Aloe vera juice should either be added daily to the fresh water, sprinkled over the animal feed, or gently syringed directly down the animals' throats **(Babar *et al.*, 2012).** Broiler chickens overall performance was improved by adding a polyherbal supplement in the form of Aloe vera as a feed additive at levels of 0.5%

Aloe vera powder **(Riswanda *et al.*, 2021; Tanwar *et al.*, 2021).** Rats are protected from the oxidative stress that arsenic exposure (0.2 mg/kg) causes when Aloe vera (1, 2, or 5% w/v in drinking water) is given orally during exposure **(Gupta and Flora, 2005).**

A significant source of bioactive chemicals is the Aloe vera plant; its physiological and metabolic features may be significantly impacted by the environment throughout growth **(González-Delgado *et al.*, 2023).** Aloe vera is widely used due to a variety of health benefits linked to its many bioactive chemicals **(Mota-Ituarte *et al.*, 2023).** In Aloe in, an anthraquinone C-glycoside, is present in the bitter, yellowish-brownish sap-like substance that is localised between the rind of the leaf and the inner parenchymatous tissue (the inner leaf gel) **(Delatorre-Castillo *et al.*, 2022).** This substance is also identified as aloe latex and is highly valued by the pharmaceutical industry due to a diversity of biological activities **(Khajeeyan *et al.*, 2021; Kumar *et al.*, 2022).** The worldwide status of domesticated animals, as reported by the Food and Agriculture Organization (FAO), continues to show the remarkable vitality and growing importance of domesticated animals in providing various potentials such as food, nutrition, culture, and employment opportunities (FAO, 2020).

Scientific classification and growth habit of Aloe vera

Aloe plant was once thought to belong to the Liliaceae family, but it has since been given its own family, the Aloaceae family **(Maan *et al.*, 2018; Manokari *et al.*, 2021).** Table 1 shows the botanical classification of Aloe vera. Aloe vera, a kind of succulent plant in the genus Aloe, is widespread and is regarded as an invasive species in many parts of the world **(Bokelmann, 2022).** Although Aloe vera is native to the Arabian Peninsula, it grows wild in tropical regions all over the world and is also cultivated for medicinal purposes **(Cristiano *et al.*, 2016).** Aloe vera is a fundamentally stemless or extremely short-stemmed plant (Fig. 1) that reaches heights of 60 to 100 cm **(Jakhar *et al.*, 2020).** Aloe vera has fleshy, thick leaves that range in colour from green to grey-green **(Jakhar *et al.*, 2020).** The leaf's edge is serrated and features tiny white teeth. The blooms are produced in the summer on a spike that can reach a height of 90 cm, each flower being pendulous and having a 2-3 cm-long yellow tubular corolla. Aloe vera's ability to succulence allows it to flourish in areas with low rainfall, which makes it suitable for rockeries and other low-water-use gardens **(Hernández *et al.*, 2022).**

Table 1: Taxonomical classification of Aloe vera **(Singh *et al.*, 2019).**

Rank	Scientific Name and Common Name
Kingdom	Plantae
Subkingdom	Tracheobionta
Superdivision	Spermatophyta
Division	Magnoliophyta
Class	Liliopsida
Sub Class	Liliidae
Order	Liliales
Family	Aloaceae
Genus	Aloe L.
Species	*Aloe Barbadenis* Mill, or *Aloe vera* (L.) Burm.F

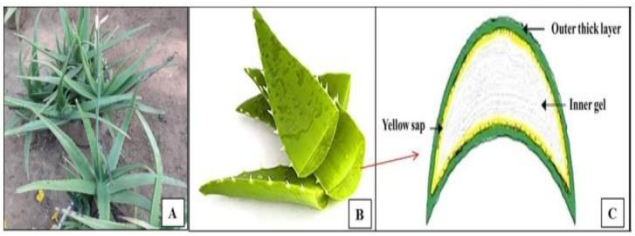

Fig. 1: Aloe vera (*Aloe barbadensis* Miller). A: Aloe plant. B: Aloe vera leave. C: Cross section of Aloe vera leaves **(Talukdar *et al.*, 2023).**

Physico-chemical composition of Aloe vera

The physico-chemical composition of Aloe vera and the physical parameters of fresh Aloe vera leaf are shown in Table 2. Aloe vera, one of several kinds of aloe, is regarded as the most effective, commercially significant, and widely used plant in scientific study. Table 3 shows the chemical composition of Aloe vera gel. Around 75 nutrients are present in the plant's various portions, along with 200 active substances like lignin, salicylic acid, saponins, anthraquinones, carbohydrates, enzymes, vitamins, and minerals **(Vasani and Saple, 2008; Ebrahim *et al.*, 2020 ; Saleem *et al.*, 2022).**

Table 2: Physical parameters of fresh Aloe vera leaf **(Sabat *et al.*, 2018; Talukdar *et al.*, 2023).**

Parameters	Value	Range
Length (mm)	562.72±6.32	62.72±6.32
Width (mm)	83.55±4.46	66-100
Thickness (mm)	25.33±4.05	18-29
Apparent volume	298.44±7.32	217-353
Leaf weight (g)	340.28±6.32	295-417
Gel weight (g)	180.23±9.39	151-215

Table 3: Chemical composition of Aloe vera (g/100g on dry basis) **(Zhang *et al.*, 2018)**

Sample	LOD[a]	Ash	Fiber	Protein	Lipids	Organic acids	Free sugars	Polysaccharides	Sum[b]
1	5.7	14.9	23.8	7.7	2.2	19.9	11.3	8.8	86.9
2	5.2	16.0	18.8	4.7	2.7	22.8	18.1	8.1	88.4
3	6.0	14.1	27.5	8.3	2.2	19.8	6.9	9.3	86.6
4	5.1	28.6	1.2	4.5	4.3	29.6	21.8	8.1	88.1
5a	6.4	28.8	4.5	3.8	4.2	25.6	22.5	11	92.5
5b	6.8	12.9	45.8	3.8	3.8	8.7	6.6	6.9	88.7
6	5.3	16.8	21.8	5.0	3.9	22.9	7.1	10.4	84.6
7	6.2	16.2	tr[c]	1.2	0.45	24.7	37.7	8.3	85.7
8	3.3	16.5	tr	1.2	0.32	27.0	34.8	12.5	87.5
9	7.0	15.3	tr	0.9	0.28	27.0	37.7	7.1	87.2
10	5.9	18.1	tr	1.1	0.34	31.4	34.5	7.5	89.4
11	2.6	14.8	tr	0.7	0.50	22.4	37.7	15.4	86.8
12	2.9	20.8	tr	1.8	0.55	27.1	29.6	16.1	88.0
13	5.2	27.7	tr	2.0	0.43	22.6	30.7	11.8	86.1
14	2.6	24.1	tr	2.8	0.21	28.0	31.2	12.2	89.0
15	8.0	21.6	7.3	4.6	2.9	26.4	0.1	33.6	90.4
16	5.3	6.7	22.6	8.8	2.4	5.9	0.2	45.4	94.4
17	5.2	14.6	36.7	9.8	3.7	14.9	0.1	14.2	90.9
18	5.7	16.8	29.8	7.4	2.0	18.9	0.1	21.7	95.1

[a] LOD = Loss on dry.
[b] Sum of LOD, fibers, proteins, lipids, organic acids, free sugars, and polysaccharides, plus five major minerals. Ash contents are not included. [c] tr = Trace.

The plant bears yellow tubular flowers, fruits that are filled with seeds, and triangular, fleshy leaves with serrated edges **(Kassama and Misir, 2017).** Basically, there are three layers to an Aloe vera leaf: there is an inner gel containing 99% water, and the middle layer is made of latex, which is a yellow sap containing glycosides and anthraquinones **(Sabat *et al.*, 2018).** The thick outer layer (Fig. 1)**,** known as the rind, is made up of 15 to 20 cells that produce proteins and carbohydrates. Vascular bundles, such as the xylem and phloem, can be found inside the rind **(Saleem *et al.*, 2022).**

Additionally, Aloe vera offers vital vitamins A, B1, B2, B3, B5, B6, B12, C, and E. Vitamins are used by the animal body in a number of metabolic activities. They are necessary for the healthy operation of tissues, cells, and organs **(Wahua and Ukomadu, 2021).** Minerals such as calcium, chromium, copper, selenium, magnesium, manganese, potassium, sodium, and zinc are present in Aloe vera **(Sánchez *et al.*, 2020; Saleem *et al.*, 2022; Kamble *et al.*, 2022).**

Anthraquinone

Aloe vera contains 12 secondary metabolites (anthraquinones) (Singh *et al.*, 2019).
Antracin
Aloe Emodin
Aloetic Acid
Aloin
Antranol
Chrysophanic Acid
Barbaloin
Emodin
Ethereal Oil
Isobarbaloin
Resistannol
Cinnamonic Acid Ester

Extraction of Aloe vera

The inner leaf material is processed after the outer leaf rind and latex have been removed, rinsed, or washed, and then the Aloe vera leaf juice is collected. Aloe vera can be extracted using a variety of solvents, including water, ethanol, methanol, chloroform, petroleum ether, and others **(AnŜ ibarro-Ortega *et al.*, 2021).** Additionally, three separate plant parts, including the entire leaf, the inner gel, and the latex, can be used to derive Aloe vera extract **(Saha *et al.*, 2023).** According to **Saha *et al.* (2023)** explanation of Aloe vera extraction techniques, Aloe vera leaves are cleaned with distilled water. The gel from the Aloe vera plant is then removed from the leaves and dried in a 60^{o}C oven. A ceramic mortar and pestle are used to grind the dried Aloe vera gel. The powder is then steeped in methanol for seven days. After that, the bottles are placed in a dark area and covered with aluminum foil. During this time,

Whitman filter paper is used to filter the solutions. The methanol is then evaporated using a rotary evaporator **(Das and Srivastav, 2014; Ghayempour *et al.*, 2016).** Aloe vera farming has grown in commercial significance for the production of pharmaceuticals and cosmetics, but little is known about how this crop is extracted.

Healing properties of Aloe vera

In treating a number of animal ailments, traditional herbal medicine shows highly encouraging outcomes. The use of different plants is becoming commonplace in veterinary medicine. One such herb that is frequently utilized in treating numerous clinical diseases in animals is Aloe vera **(Ferrer *et al.*, 2022; Ramin Raji *et al.*, 2023).** According to **Paul *et al.* (2021)**, a concentration of 1000 g/ml of gel was tested *in vivo* on rats and managed to prevent tissue damage in the rats. Additionally, it has been demonstrated that Aloe vera is effective in treating a number of other inflammatory conditions, including burn injuries and ocular inflammation **(Yavari and Ghorbani, 2021; Simanjuntak, 2022).** *Aloe barbadensis* (Miller) supplementation resulted in lower plasma concentrations of nonesterified fatty acid (NEFA), β-hydroxybutyrate (as markers of reduced lipid mobilisation), myeloperoxidase, and ceruloplasmin, and higher concentrations of cholesterol, retinol, tocopherol, and paraoxonase as markers of a mitigated inflammatory response at cow calving **(Bucktrout *et al.*, 2021; Cattaneo *et al.*, 2023).**

Aloe vera has been used for a very long time to treat chronic constipation as a potent laxative, and it is still classified as such in many pharmacopoeias. Aloe vera gel has been consumed as a general tonic in addition to being applied topically for its anti-inflammatory and wound-healing capabilities **(Perveen *et al.*, 2023).** Aloe vera gel (juice) is given topically to promote healing to all open wounds, cuts, abrasions, and burns on the general skin of all animals in veterinary medicine **(Gupta *et al.*, 2023).** Aloe gel changed the collagen composition (more type III) and the degree of collagen crosslinking, in addition to increasing the wound's collagen content. As a result, it hastened wound healing and improved the breaking strength of the ensuing scar tissue **(Mohammed *et al.*, 2022).** Aloe vera is a wonderful natural choice that is readily available and has many recognized nutrients. Animals need Aloe vera to be healthy and live a long time.

Antioxidant activity of Aloe vera

Antioxidants, which can be either natural or manufactured, are substances that prevent or delay the initiation of oxidation **(Liang *et al.*, 2022).** Aloe vera is abundant in a variety of biologically active compounds, with Aloe vera polysaccharide serving as the gel's primary biologically active component. A vast class of macromolecules called aloe polysaccharides has a variety of physiological uses **(Zhou *et al.*, 2021).** According to **Abo El-Azayem *et al.*, (2023),** who conducted a study in rabbits fed on diets supplemented with Aloe vera powder at levels of 0.5, 1.0, and 2.0 g/kg diet, respectively, the antioxidant status was overall higher in Total Antioxidant Capacity (T-AOC) levels with lower levels of malondialdehyde (MDA) in supplemented groups with Aloe vera than in the control group. When there is an excessive increase in free radicals, it causes excessive production of MDA in the animal cell **(Majd *et al.*, 2022).** Some of the main oxidative stress and antioxidant enzymes in this defence mechanism comprise Catalase (CAT), Superoxide Dismutase (SOD), T-AOC, and MDA, so it is considered necessary for the survival and health of the organism to ensure equilibrium between the actions and intracellular levels of these antioxidants **(Majd *et al.*, 2022).** One of the most commonly used biomarkers to assess lipid peroxidation status is MDA, which is one of the various by-products released after lipid peroxidation **(Zhao *et al.*, 2022).** Aloe vera extract enhances lipid metabolism and antioxidant activities in livestock by scavenging free radicals **(Navathej *et al.*, 2016; Banakar *et al.*, 2022).**

Effects of Aloe vera on animal production

Domesticated animals are valuable resources that require constant management. Many factors, including feeds, latitude, breed, climate, and many others, have an impact on the production and productivity of livestock. According to **Ashar *et al.* (2022)** research, broilers fed with Aloe vera at a rate of 1.0 g/kg of feed significantly increased their average feed consumption compared to feeding them a basal diet. Aloe vera consumption by broilers may have enhanced feed intake because it altered feed flavour, stimulated appetite, and raised endogenous secretions **(Zayed *et al.*, 2020; Ashar *et al.*, 2022).** Lyophilized *Aloe arborescens* (10 g/d) added to dairy feed has an advantageous effect on liver function and may modulate rumen fermentation. Furthermore, more milk was produced during the first few weeks of lactation **(Singh *et al.*, 2021; Cattaneo *et al.*, 2023).** A 40 g/kg feed supplement of Aloe vera increases milk production in dairy goats (Banakar *et al.*, 2021). The chicken batter and semi-cooked nugget were mixed with Aloe vera gel powder (AGP) in amounts of 0, 1.5, 2.5, and 3.5%. By adding 2.5% and 3.5% AGP, the shelf life of the chicken nugget was extended to two weeks **(Shahrezaee *et al.*, 2018).** AGP also softened the chicken nugget and decreased its textural parameters **(Rajkumar *et al.*, 2016).**

Effects of Aloe vera on reproductive performance

The ability of livestock to reproduce is crucial for the producers' financial well-being, and it also has an impact on how much meat and other animal products cost consumers. Poor fertility is a significant problem limiting output in many systems of animal production **(Bryant, 2022).** The main factor in an efficient and reliable animal production system is reproductive abnormalities, one of the most serious issues affecting farmed animals' productivity and output **(Chandran *et al.*, 2022).** As a result, improving reproductive efficiency without sacrificing animal welfare must be a crucial component of sustainable livestock management **(Hufana-Duran and Duran, 2020; Tolosa *et al.*, 2021).** Using phytogenic compounds with antioxidant effects at the right dosage can significantly increase male reproductive performance in animals.

Antibiotics added to the diet during the reproductive period increase the health and reproductive efficiency of animals. The contentious consequence, though, is when it's probable that leftover antibiotics will end up in animal products like milk, meat, and dung, endangering human and environmental health. This worry prompted many researchers to search for a better natural substitute **(Dey *et al.*, 2022).** Aloe vera demonstrated significant spermatogenic activity by improving sperm parameters and increasing spermatogenesis and it might therefore be considered a possible herb for the production of reproductive medications **(Shai *et al.*, 2022).** Aloe vera gel may be able to reduce the steroidogenic activity in animals that have polycystic ovarian syndrome brought on by letrozole **(Dey *et al.*, 2022).** Heat cycle irregularities and reproductive issues are serious female reproductive illnesses that can be treated with Aloe vera **(Ghagane *et al.*, 2022).**

Immuno-stimulation effects of Aloe vera

Growing consumer demand for meat, dairy products, and eggs suggests a greater reliance on domesticated animals to supply those needs. In order to meet this need, national and international food security is significantly dependent on animal health. Understanding immune development and management techniques, which must be followed to maintain and enhance the animals' immune systems, is essential for maintaining the health of livestock **(Asif *et al.*, 2022).** The gut region contains the majority of the body's immune cells, and it promotes the growth of innate and adaptive immunity, which has a significant impact on how the host develops **(Saini, 2021).** In research, Aloe vera has been found to reduce the amount of intestinal bacteria, which can boost livestock's immunity. The ability of Aloe vera gel to boost the immune system is due to the polysaccharides in the gel **(Alvarado-Morales *et al.*, 2019).** Aloe vera was discovered to boost the body's immune system by triggering the immune response to an infection. This resulted from T4 helper cells being activated **(Paul *et al.*, 2021).** Aloe-based carbohydrates' ability to boost immunity is due to their ability to activate macrophage cells, which in turn influences lowered antigen processing **(Shokraneh *et al.*, 2016).**

Use of Aloe vera as an antimicrobial agent

The antibacterial properties of Aloe vera come from the anthraquinones that can be extracted from the gel extracts. These compounds have the potential to keep animals from getting sick **(Soltani *et al.*, 2022).** Aloe vera contains six antiseptic substances, including salicylic acid, lupeol, sulphur, urea nitrogen, cinnamomic acid, and phenols, which have an inhibitory effect on viruses, bacteria, and fungi **(Soltani *et al.*, 2022).** Aloe vera supplementation reduced microbial activity and liver load in lactating cows **(Cattaneo *et al.*, 2022).**

1. Antibacterial effects of Aloe vera

Antibiotics were frequently utilized in the past to treat a variety of bacterial infections in animals. However, because of its detrimental effects on animal health, its use was banned **(Bacanli and Başaran, 2019; Butzin-Dozier *et al.*, 2020).** Bacterial resistance developed as a result of widespread antibiotic use, posing a serious hazard to animal health **(Prakash *et al.*, 2021b; Song *et al.*, 2022).** This worry motivated researchers to look for better, less harmful ways to treat and cure animal ailments. According to studies, aloe extracts are effective at fighting bacteria like *Escherichia coli*, *Pseudomonas aeruginosa*, and *Bacillus cereus* **(Nsofor *et al.*, 2023).** Many methods have been employed to show that Aloe vera has antibacterial characteristics that are effective against both gram-positive and gram-negative bacteria **(Iqbal and Ahmed, 2021).**

Potential uses in medical devices are suggested by an electrospunnano-bers composite formed of Aloe vera and zinc oxide nanoparticles that demonstrates antibacterial action against gram-positive (*S. aureus*) and gram-negative (*E.coli*) bacteria **(Munir *et al.*, 2022).** Gram-positive and Gram-negative bacteria are both susceptible to the antibacterial properties of aloe liquid **(Khan *et al.*, 2022).** According to studies, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Streptococcus pyogenes*, *Pseudomonas aeruginosa*, *Escherichia coli*, *Propionibacterium acne*, *Helicobacter pylori*, and *Salmonella typhi* can all be killed, significantly

reduced, or completely prevented from growing **(Ghasemi *et al.*, 2021).** Anthraquinones and saponin are two leaf components that are thought to have direct antibacterial effects **(Mondal *et al.*, 2020).** While the activation of phagocytic leucocytes to kill bacteria by polysaccharides has been linked to direct bacterial action **(Bokelmann, 2022).**

2. Anti-viral effects of Aloe vera

Sources of chemical compounds found in plants can be used to treat viral infections. The mucopolysaccharide acemannan, which is a part of Aloe vera, is thought to be responsible for the plant's nutritional value **(Wang *et al.*, 2022).** A number of studies on the antiviral properties of Aloe vera and other Aloe species' extracts appeared to show antiviral activities. Newcastle disease in chickens has been shown to have a decreased mortality rate and severity when exudate from Aloe secundiflora leaves is used **(Shahid, 2020).** Alcoholic extracts from the leaves and flowers of *Aloe hijanzensis* were found to lower the infectivity of several hemagglutinating viruses. These viruses included the Newcastle disease virus (NDV), an especially dangerous strain of avian influenza (H5N1 subtype), the egg drop syndrome virus, and avian paramyxovirus type 1 **(Abdirahman *et al.*, 2023).** In numerous *in vivo* experiments, it has also been proven to confer anti-viral effects. Periodic injection of acemannan enhanced the feline immunodeficiency virus-infected cats' survival rates **(Wang *et al.*, 2022).**

The inhibitory effect of the viral glycoprotein's glycosylation provided the anti-viral mechanism **(Banakar *et al.*, 2022).** A complex carbohydrate that has been proven to increase the synthesis of interleukin-1, tumor necrosis factor alpha, and prostaglandin E2 by macrophages has also shown antiviral activity *in vitro* against influenza, Newcastle disease, and human immunodeficiency viruses **(Wang *et al.*, 2022).** Another anthraquinone molecule with antiviral effects is aloe emodin, which works by preventing the formation of nucleic acids and proteins **(Gamil Zeedan and Abdalhamed, 2021; Prakash *et al.*, 2021a).**

3. Antifungal effects of Aloe vera

When applied, Aloe vera can enhance comfort and ease itching related to foot and jock itch. It also offers a natural solution to treat tenacious and chronic fungal infections. The body can easily absorb the plant's numerous minerals and vitamins, and the gel prevents fungal growth **(Danish *et al.*, 2020).** Developing appropriate and efficient diagnosis and treatment procedures is the first step in controlling fungal illnesses. Fungal infections on cattle hides reduce their marketability and result in numerous financial losses. Bovine dermatophytosis and ringworm brought on by keratinophilic fungus are two such illnesses that require control **(Lee *et al.*, 2023)** Aloe vera has the ability to improve T-lymphocyte cells, which will increase internal immunity and treat ringworm illness **(Banakar *et al.*, 2021; Prakash *et al.*, 2021a).** The aloe extract was successful in reducing the rate of growth of the aflatoxins and fungi strains found in animal feed while it was being stored **(Ullah *et al.*, 2023).**

4. Anti-parasitic effects of Aloe vera

One of the biggest challenges in raising livestock is thought to be the financial losses brought on by parasitic illnesses. Significant infestations reduce output and jeopardise animal welfare. Research conducted by **Saini, (2021)** concluded that inclusion of Aloe vera at 4g per kg body weight in the diet of buffalo calves had a substantial effect on the control of gut parasites, along with a lower cost of feeding per kg weight gain as compared to the control. Animals that are parasitized experience stress because they require more resources to grow at the same rate as they did before becoming infected **(Ebrahim *et al.*, 2020).** Both endoparasites and ectoparasites worsen the animals' health conditions and cause direct or indirect harm to them. There are chemicals that eliminate or kill worms from the digestive tract but are not safer for animal health **(Ebrahim *et al.*, 2020).** To get rid of these infestations, a routine deworming procedure is accepted. However, it was evident from numerous studies that the chemical deworming treatments ultimately damaged the health of animals and had adverse ecological repercussions as a result of their lingering effects **(Chandran, 2022).** Because the medications were administered repeatedly in certain cases, parasites developed resistance, which further endangered the animal's life **(Sasi *et al.*, 2021).** After the skin was wiped with a concentration of 4 ml-1 of Aloe vera gel, the results demonstrated that Aloe vera gel had significant effects on the haematological and biochemical parameters and an inhibitory effect against lice parasites in the laying hens **(Shlash, 2020).**

CONCLUSION

Aloe vera can be used to maintain the health and wellbeing of domesticated animals as well as to avoid animal diseases due to the qualities of the plant and its chemicals. It appears that using Aloe vera as a supplemental treatment to existing practices can speed up the healing of wounds and improve livestock health. It will have a wider range of applications in the future as a superior antibiotic substitute because the polysaccharides generated

from it can boost the immune system and enhance animal development and reproductive performance. Aloe vera, however, has the potential to change animal medicine through the prevention of the spread of several animal diseases, the reduction of side effects, and the maintenance of environmental sustainability and animal health. For best use in a livestock production system, more *in vitro*, *in vivo*, and clinical research is needed to fully grasp the therapeutic potential of this natural feed additive prior to its widespread application in clinical practice.

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Conflicts of interest

The authors declare that there is no conflict of interest regarding the research data and tools used in this study.

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