

Acemannan and Aloe Vera in Animal Applications

Acemannan, a β -(1-4)-acetylated polymannose extracted from Aloe vera gel, has been extensively studied for its diverse applications in animal health and welfare. This report synthesizes findings from peer-reviewed literature on acemannan and Aloe vera uses across various animal species, highlighting their therapeutic potential and biological mechanisms.

Immunomodulatory Effects and Disease Management

Acemannan demonstrates significant immunomodulatory properties across multiple animal species. A pivotal study on 49 feline immunodeficiency virus (FIV) infected cats with clinical signs of disease revealed that acemannan administered intravenously, subcutaneously, or orally led to significant increases in lymphocyte counts ($P < 0.001$) and decreased neutrophil counts and sepsis incidence. The study demonstrated a 75% survival rate, with 36 of 49 animals still alive 5-19 months post-treatment, suggesting substantial benefit for FIV-infected cats exhibiting clinical symptoms.

For feline leukemia virus (FeLV), another study involving 50 FeLV-positive cats showed that acemannan treatment significantly extended survival time and improved quality of life. The mechanism appears linked to acemannan's ability to stimulate macrophages, which initiate immune responses resulting in necrosis and regression of cancerous cells

In poultry, research demonstrates acemannan's efficacy as a vaccine adjuvant. When evaluated with Newcastle disease virus (NDV) and infectious bronchitis disease virus (IBVD) vaccines, acemannan improved antibody titers and vaccine efficacy, with 95% of acemannan-treated birds showing protection compared to 90% of birds vaccinated with traditional oil-based adjuvants. Additional studies confirmed that broiler chickens supplemented with Aloe vera in drinking water exhibited significantly increased antibody titers to vaccines compared to control groups.

Another study evaluated the radioprotective potential of Acemannan against a lethal dose of radiation. Treatment of mice with 50 mg/kg body weight of acemannan by oral gavage for 7 days was able to protect against radiation-induced mortality. Seven-day pretreatment or posttreatment of mice with acemannan resulted in the increase in median survival by 60 and 20%, respectively. The decrease in mortality can be attributed to the induction of hematopoiesis (peripheral lymphocytes counts, spleen cellularity, spleen index) and the upregulation of cytokines like TNF- α and IL-1 by acemannan in irradiated mice. Data indicate that acemannan has the ability to protect mice against radiation-induced mortality by immunomodulation and can be developed as a radiation damage mitigation agent.

Wound Healing and Bone Regeneration

Acemannan has received FDA approval in veterinary products for wound treatment. CarraVet Acemannan hydrogel is licensed for treating wounds, cuts, abrasions, post-surgical incisions, and burns in companion animals (dogs, cats, horses). The hydrogel maintains optimal wound moisture levels while stimulating fibroblast and connective tissue formation, epithelial cell growth, and repair processes.

In bone regeneration studies, acemannan has shown remarkable efficacy. A controlled study on calvarial defects in Sprague-Dawley rats demonstrated that acemannan significantly increased bone surface and bone volume in low-dose groups (1-2 mg) and tissue mineral density in higher-dose groups (4-8 mg). Microcomputed tomography and histological analysis confirmed denser bone matrix in acemannan-treated groups compared to controls, establishing acemannan as an effective bioactive agent for bone regeneration.

Notably, acemannan is also licensed by the USDA for treating sarcomas (malignant tumors) in dogs and cats. Studies show that injection of acemannan pre- and post-surgery, combined with radiation therapy, increased mean survival time and tumor-free intervals compared to animals receiving the same therapy without acemannan.

Growth Promotion and Livestock Performance

Multiple studies demonstrate acemannan and Aloe vera's benefits for livestock productivity. Research on broiler chickens supplemented with 1% Aloe vera in their diet showed greater body weight gain, improved feed intake, and enhanced feed conversion rates compared to controls[3]. Another study found that broilers receiving 2 oz of liquid Aloe vera per gallon of drinking water had significant increases in antibody titers while showing less gastrointestinal irritation and lower coccidia oocyst shedding.

In swine, weaned pigs fed 0.05% Aloe vera polysaccharide exhibited increased average daily gain and reduced incidence of diarrhea and weaning stress. For dairy cattle, lyophilized Aloe arborescens (10 g/day) supplementation improved liver function, potentially modulated rumen fermentation, and increased milk production during early lactation[6]. Similarly, a New Zealand commercial dairy herd study showed that cows receiving an Aloe vera and manuka honey supplement had a 5.5% increase in milk yield at peak lactation compared to controls.

Gut Health and Microbiome Effects

Acemannan demonstrates significant benefits for gut health across various species. In-vivo studies on broilers found that those fed Aloe vera gel showed a significant reduction in E. coli colonies and increased lactobacillus populations compared to those receiving virginiamycin (an antibiotic)[2]. This suggests acemannan's potential as an alternative to antibiotic growth promoters (AGPs), which have faced increasing regulatory restrictions globally.

The Acemannan in Aloe vera appears to reduce pathogenic bacteria colonization in the gastrointestinal tract while beneficially affecting intestinal structure and function. Meta-analyses have confirmed Acemannan benefits across various species including swine, poultry, turkeys, cattle, and fish, with improvements in productivity, feed conversion ratio, body weight, and overall health.

Safety and Toxicology

Extensive toxicology testing has established acemannan's safety profile. The Cosmetic Ingredient Review Expert Panel found no significant toxicity in mice, rats, or dogs at maximum dose levels of 200, 50, and 50 mg/kg, respectively, administered intraperitoneally and intravenously at 4-day intervals over 30 days. Additionally, dietary administration at 1500 mg/kg daily in dogs and up to 2000 mg/kg daily in mice demonstrated no observable toxic effects.

A 14-day study established a no observable effect level (NOEL) in Sprague-Dawley rats at 4.1-4.6 g/kg/day, while a 180-day study confirmed no observable effects at doses up to 2000 mg/kg/day in mice. These findings suggest acemannan is remarkably safe even at high doses and with prolonged administration.

Practical Applications and Dosage Considerations

For practical applications, research indicates various effective administration methods. In poultry, a dilution ratio of 10:1 (water:Aloe vera juice) has shown efficacy. Administration options include daily addition to fresh water, sprinkling over animal feed, or direct oral administration[6]. For broilers, 0.5% Aloe vera powder as a feed additive has demonstrated performance improvements[6].

In smaller animals, dosing guidelines suggest 1 ml per 10 pounds of body weight for dogs and proportionally smaller amounts for cats. For dairy goats, a 40 g/kg feed supplement of Aloe vera was shown to increase milk production.

Conclusion

Peer-reviewed research substantiates acemannan and Aloe vera's diverse applications in animal health. From immunomodulation and disease management to wound healing, bone regeneration, growth promotion, and gut health, these compounds offer scientifically validated benefits across multiple species.

The established safety profile and growing body of efficacy data suggest that acemannan and Aloe vera represent valuable natural alternatives to conventional pharmaceuticals for various veterinary applications. As regulatory restrictions on antibiotic usage in livestock continue to increase, these natural compounds may play an increasingly important role in sustainable animal husbandry and veterinary medicine.

Future research should focus on standardizing preparation methods, optimizing dosages for specific conditions and species, and conducting larger-scale controlled trials to further validate the promising findings observed in current studies.

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