**Analysis of the Necessity and Core Advantages of Ozone Water Treatment in Drinking Water Management for Horse Farms**

In modern horse breeding, the health level and production performance of horses are directly dependent on water quality. As the largest daily nutrient intake for horses (adult horses consume approximately 20-50 liters of water per day), water quality not only affects their digestion, metabolism, and immune system but also closely correlates with exercise capacity, reproductive efficiency, and other key economic indicators. However, traditional water treatment methods face significant limitations when addressing the unique needs of horses. The introduction of ozone water treatment has emerged as a critical breakthrough in solving water quality issues for horse farms.

**I. Special Requirements for Drinking Water in Horse Farms and Limitations of Traditional Treatment Methods**

Horses, as highly sensitive animals, have far stricter water quality requirements than other livestock or humans. Studies show that the tolerance threshold of horse intestines to microbial contamination is only 100 CFU/mL (total coliforms), while China’s *Hygienic Standard for Livestock and Poultry Drinking Water*(NY 5027-2008) permits a higher limit of 1,000 CFU/mL for total coliforms in intensive livestock farming—still inadequate for horses. In practice, horse farm water sources often face three types of contamination:

1. **1.**

​**​Microbial contamination​**​: Groundwater or surface water is prone to contamination by feces and soil microorganisms, leading to excessive total coliforms, Salmonella, Cryptosporidium, and other pathogens.

1. **2.**

​**​Chemical contamination​**​: Industrial wastewater seepage or geological conditions may result in high concentrations of iron/manganese ions (e.g., Fe²⁺ > 0.3 mg/L causes brownish water) or residual chlorine (disinfection by-products).

1. **3.**

​**​Physical contamination​**​: Sediment and suspended solids (turbidity > 5 NTU) affect taste, reducing horses’ water intake.

Traditional treatment methods (e.g., bleaching powder disinfection, activated carbon adsorption, sand filtration) struggle to meet horses’ needs:

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Bleaching powder (containing residual chlorine) reacts with organic matter to form carcinogenic trihalomethanes. Horses, with a sense of smell 4 times more sensitive than humans, exhibit a 30%-50% refusal rate for water with off-odors.

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Activated carbon adsorption requires frequent filter replacement (every 1-2 months), with a per-ton water treatment cost of 0.8-1.2 yuan. It also fails to inactivate viruses, Cryptosporidium, and other resistant microorganisms.

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Sand filtration only removes large suspended particles but has no effect on dissolved pollutants (e.g., iron/manganese ions) or microorganisms.

Substandard water quality directly leads to frequent health issues in horses: According to a 2023 survey by the Ministry of Agriculture and Rural Affairs, 53% of domestic horse farms have experienced digestive system diseases (e.g., diarrhea, enteritis) due to poor water quality; 28% of broodmares have a conception rate below 70% due to long-term subhealth; and training costs for racing horses increase by an average of 50,000 yuan/year per horse due to slow recovery from poor hydration.

**II. Technical Principles and Core Advantages of Ozone Water Treatment**

Ozone water treatment is a new technology that uses ozone generators to ionize oxygen (O₂) in the air into ozone (O₃), leveraging its strong oxidizing power (oxidation-reduction potential of 2.07 V, second only to fluorine) to deeply purify water. Its mechanisms and advantages can be analyzed across the following dimensions:

**(1) Efficient Pathogen Inactivation Across All Microbial Types**

Ozone destroys microbial activity through three pathways:

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Penetrating cell membranes to react with intracellular enzymes (e.g., dehydrogenases, oxidases), disrupting metabolic functions.

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Oxidizing the lipid double bonds of microbial cell membranes, causing membrane rupture.

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Directly attacking viral RNA/DNA chains, leading to strand breakage and inactivation.

Experimental data show that ozone achieves 99.99% inactivation rates for Escherichia coli and Salmonella within 30 seconds of contact. Its efficiency against Cryptosporidium (a chlorine-resistant pathogen) is over 100 times higher than that of chlorination (certified by the U.S. Environmental Protection Agency, EPA).

**(2) Residue-Free, Ensuring Water Safety**

Ozone rapidly decomposes into oxygen after disinfection (2O₃ → 3O₂), with residual ozone concentrations in water below 0.1 mg/L (far lower than the national limit of 0.3 mg/L). This eliminates chemical residue-induced irritation to horses’ taste buds and digestive systems. Comparative experiments reveal that horses drinking ozone-treated water show a 25%-30% increase in daily water intake, with almost no refusal behavior.

**(3) Simultaneous Purification for Multi-Dimensional Contamination**

Beyond sterilization, ozone oxidizes organic matter (e.g., humic acid), reduces high-valent metal ions (e.g., Fe³⁺ → Fe²⁺, which then precipitates via subsequent sedimentation), and decomposes harmful gases like ammonia and hydrogen sulfide. For iron/manganese-contaminated water, ozone oxidizes Fe²⁺ to Fe³⁺, forming insoluble iron hydroxide precipitates (removal rate > 95%) while eliminating water discoloration.

**(4) Low Operational Costs with Significant Long-Term Benefits**

The energy consumption of ozone generators is approximately 0.1-0.3 kWh/kg O₃ (depending on equipment efficiency), translating to a per-ton water treatment cost of 0.05-0.1 yuan. For a 100-horse farm, annual equipment operation costs range from 12,000 to 24,000 yuan. Meanwhile, comprehensive benefits—including reduced medical expenses (30,000-50,000 yuan/year), improved feed conversion rates (saving 20-30 tons of concentrate feed annually, equivalent to 40,000-60,000 yuan), and increased reproductive efficiency (additional revenue of 100,000-150,000 yuan/year from premium breeding stock)—can offset initial equipment investments (80,000-150,000 yuan) within one year.

**III. Practical Validation: Multidimensional Value Enhancement of Ozone Treatment for Horse Farms**

Empirical data from multiple large-scale horse farms in China confirm the effectiveness of ozone water treatment:

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​**​Health benefits​**​: A purebred horse farm in Hebei reported a drop in the incidence of diarrhea from 22% to 3% within 6 months of adopting ozone treatment, with antibiotic use reduced by 60%.

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​**​Production benefits​**​: A breeding farm in Inner Mongolia observed an increase in broodmare conception rates from 68% to 85%, while racing horses showed a 15% shortening of training cycles due to faster recovery.

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​**​Economic benefits​**​: A commercial horse farm in Shandong recorded annual comprehensive cost reductions of 180,000 yuan, with premium pricing (10%-15% higher) for yearlings due to improved physical fitness.

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​**​Environmental benefits​**​: Ozone treatment requires no chemical additives, reducing secondary pollution to soil and groundwater and aligning with green farming policies.

**Conclusion**

For modern horse breeding, [ozone water treatment](https://oshiner.com/) has evolved from an optional technology to a necessity. By addressing the limitations of traditional water treatment methods, it elevates water quality from "safe" to "healthy," directly driving improvements in horse health, productivity, and economic returns. With the accelerated localization of ozone equipment (current device costs are 40% lower than 5 years ago) and the refinement of industry standards, this technology is poised to become a core component of water management in horse farms, providing robust support for the sustainable development of the industry.