

# Application of Atropine Injection in the Treatment of Ruminant Diseases

Haosheng Huang<sup>1,\*</sup>, Qiong Yang<sup>2</sup>, Cuili Liu<sup>3</sup>, Canshan Huang<sup>1</sup>, Lini Yang<sup>4</sup>, Yuanxing Lei<sup>5</sup>, Guochun Tang<sup>5</sup>

<sup>1</sup>Animal Husbandry Management Station of Mengshan County, Wuzhou City, China

<sup>2</sup>Animal Epidemic Disease Prevention and Control Center of Pingle County, Guilin City, China

<sup>3</sup>Agricultural and Rural Comprehensive Service Center of Chentang Town, Mengshan County, Wuzhou City, China

<sup>4</sup>Animal Husbandry Management Station, Guigang City, China

<sup>5</sup>Animal Disease Prevention and Control Center of Mengshan County, Wuzhou City, China

## Email address:

175057105@qq.com (Haosheng Huang)

\*Corresponding author

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**Abstract:** Atropine is one of the commonly used drugs for clinical treatment of livestock and poultry, as well as one of the commonly used drugs for animal emergency treatment. Its main components are d-hyoscyamine and L-hyoscyamine. Atropine is a toxic colorless, odorless or white crystalline alkaloid extracted from belladonna and other solanaceous plants. It is neutral or weakly acidic when dissolved in water. Atropine is mainly an m-receptor blocker, belonging to anticholinergic drugs. It can compete with acetylcholine for M-choline receptor, thus blocking the M-like effect of acetylcholine. Atropine has a very high selectivity in blocking M receptor, and large doses can also block ganglion N1 receptor. It mainly acts on smooth muscle, relieves small vessel spasm, improves microcirculation, inhibits gland secretion, relieves vagus nerve inhibition on heart, accelerates heart beat, dilates pupils, increases intraocular pressure, excites respiratory center, and relieves respiratory inhibition. It is applied to cases of ruminant diseases such as diarrhea in calves and lambs, toxic diseases in organic phosphorus, abdominal pain caused by parasitic diseases, gastrointestinal volvulus, administration before anesthesia, improvement of microcirculation, eye diseases, etc. through oral, subcutaneous, intramuscular and intravenous injection. However, the amount of treatment has no significant effect on blood vessels and blood pressure. A large dose of treatment can cause skin blood vessels to expand. A large dose of treatment can relieve small vessel spasm when microcirculation is impaired, and expand peripheral blood vessels to improve microcirculation.

**Keywords:** Atropine, Ruminants, Cattle, Sheep, Microcirculation

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## 1. Introduction

Atropine is one of the commonly used drugs for clinical treatment of livestock and poultry, as well as one of the commonly used drugs for animal emergency treatment. Its main components are d-hyoscyamine and L-hyoscyamine. Atropine is a toxic colorless, odorless or white crystalline alkaloid extracted from belladonna and other solanaceous plants. It is neutral or weakly acidic when dissolved in water.

## 2. Effect of Atropine

Atropine is an M-cholinergic receptor blocker. Its main functions are: to rescue organic phosphate poisoning; Antispasmodic drugs for intestinal spasm pain have relaxing effect on visceral smooth muscle; It can inhibit gland secretion, and is often used for administration before anesthesia to prevent the secretion of bronchial mucus, so as to reduce the occurrence of postoperative pneumonia; It is used to dilate pupils during ophthalmic treatment; It relieves

the inhibition of vagus nerve on heart, and is used to treat slow arrhythmia caused by excessive excitation of vagus nerve; Large dosage can relieve small vessel spasm, improve microcirculation, and be used for toxic shock. The use of atropine in large quantities can cause atropine poisoning in animals, which should be used under the guidance of veterinarians [1].

### 3. Usage and Dosage of Atropine

Atropine usage: oral, subcutaneous, intramuscular, intravenous, etc. The common dose of cattle and sheep is 0.1mg/kg, and the maximum dose is 0.5g/d. Before anesthesia, the dosage was 0.06~0.12mg/kg for cattle and 0.15~0.3mg/kg for sheep; Auxiliary treatment of allergic reaction disease: organic phosphorus poisoning 0.5mg/kg, im, 0.2mg/kg, intravenous injection [7, 8].

### 4. Treatment of Calf and Lamb Diarrhea

Within 7 days of birth, cattle and sheep are prone to intestinal flora imbalance, infection with *E. coli* and other diseases and diarrhea symptoms due to weak resistance, poor environmental sanitation and other factors. The intramuscular injection of Shijunjing antibacterial drug, combined with atropine injection (intramuscular injection or oral administration), can reduce gastrointestinal peristalsis, relax gastrointestinal smooth muscle, reduce gland secretion and defecation frequency, and prevent dehydration of animals due to diarrhea [9, 10, 12].

### 5. Treatment of Toxic Diseases Caused by Organic Phosphorus

Organophosphorus drugs mainly include phorate, parathion, dimethoate, trichlorfon, etc [11]. These pesticides have high fat solubility and can be quickly absorbed by the digestive tract and respiratory tract of livestock and poultry. Cattle and sheep often eat grass, corn, sugarcane and other crops that distribute organophosphorus pesticides by mistake, or eat seeds mixed with agricultural drugs; Misingestion of surface water adjacent to the application area; A vehicle (ship) that has been loaded with organophosphorus pesticides and has not been completely cleaned, and is used to transport cattle and sheep; Poisoning occurs when containers used to prepare pesticides, tools and vessels contaminated with organophosphorus pesticides are misused as feed tanks or buckets. As a result, cattle and sheep ingested a large amount of acetylcholine, showing M receptor symptoms. Atropine can quickly block the M-choline receptor and relieve the symptoms of organic phosphorus poisoning [2]. For cattle and sheep with organic phosphorus poisoning, atropine combined with iodophordine injection and glucose infusion as an auxiliary treatment, the effect is more obvious.

### 6. Treatment of Abdominal Pain Caused by Parasitic Diseases

Cattle and sheep infected with parasitic diseases, such as a large number of ascaris parasites on the intestinal tract, which may cause mechanical damage to the intestinal tract or blockage of the gastrointestinal tract and biliary tract, resulting in sudden listlessness, abdominal pain and cramps in cattle and sheep, frequent kicking of the back legs of cattle and sheep, falling to the ground, limbs straightening and other clinical symptoms. In case of such symptoms, the diagnosis can be made in combination with the long-term management error of non deinfestation in daily feeding management and laboratory inspection. At this time, the above symptoms can be alleviated by intramuscular injection of atropine. After the symptoms are alleviated, the whole group of insecticide and epidemic prevention work should be done in a timely manner [13].

### 7. Treatment of Gastrointestinal Volvulus

When pregnant cattle and sheep have a long time of delivery, in addition to the lack of exercise in captivity for a long time, the appetite after delivery increases greatly and hurts the intestines and stomach, or because of a long time of transportation, they immediately drink water or feed forage concentrate after unloading. The above inducements can lead to abnormal movement of the intestines and stomach function of cattle and sheep, which can lead to intestinal and stomach twisting and lying on the ground, anal anger but no feces excretion, abdominal late expansion and other symptoms. At this time, atropine and paraffin oil are injected intramuscularly. It can relieve convulsion, relieve abdominal pain, release cattle and sheep to outdoor activities in time, eliminate feces and urine, and relieve the symptoms of intestinal volvulus of cattle and sheep [14].

### 8. Administration Before Anesthesia and Improve Microcirculation

Atropine is administered before anesthesia in cattle and sheep. Its main role is to reduce the secretion of respiratory gland and prevent animals from entering the lower respiratory tract with anti ruminant fodder [4]. During anesthesia, the respiratory gland secretes too much secretion or the contents of the stomach enter the lungs of cattle and sheep inversely, which can lead to pulmonary infection of cattle and sheep, causing foreign body pneumonia, atelectasis and other related complications, which is not conducive to the recovery of cattle and sheep after surgery [6]. Microcirculation refers to the blood circulation between arterioles and venules, and is the material exchange channel between blood and tissue cells. The disturbance of microcirculation will lead to cell ischemia and hypoxia, reduce cell function, and cause severe cell and tissue deformation and necrosis [5]. Atropine can dilate microvessels and increase blood flow. In cattle and sheep,

under the shock of microcirculatory disorder caused by organic phosphorus poisoning, sunstroke, severe calcium and phosphorus deficiency, arrhythmia, intermittent shock, atropine can expand capillaries, accelerate blood flow speed, increase tissue blood perfusion, restore the blood supply of important organs, alleviate the hypoxia of tissues, raise blood pressure, improve symptoms, and improve the overall microcirculation of cattle and sheep.

## 9. Treatment of Eye Diseases

The eye smooth muscle of animals, such as pupil sphincter and ciliary muscle, is dominated by cholinergic parasympathetic nerve. After nerve excitation, nerve endings release acetylcholine ester and combine with M-choline receptor to produce effects, making smooth muscle contract, causing miosis and ciliary muscle paralysis [3]. Atropine blocks the binding of acetylcholine to the M-choline receptor after binding with the receptor, without producing receptor effect. Cattle and sheep often suffer from keratitis, iridocyclitis and other eye inflammation caused by fighting. Atropine can relax the pupillary constrictor, sphincter and ciliary muscle, reduce the stimulation of inflammatory toxins on the eyes, facilitate the regression of eye disease inflammation, and can be used as an auxiliary treatment for eye diseases.

## 10. Precautions

Prohibition applies to the following cases: An animal in which the iris adheres to the lens. Atropine allergy is prohibited [15]. Animals with cardiac insufficiency, intestinal infarction, severe ulcerative colitis, urethral infarction, myasthenia gravis, esophageal reflux, etc. are prohibited. Ruminant animals with liver or kidney disease, old and weak animals or young animals should be used with caution. Horses should be cautious when using atropine systematically. Large doses can induce colic and flatulence in animals. Large dosage of atropine in ruminants can cause gastrointestinal flatulence, stomach food accumulation and forestomach retardation. Atropine can cause fetal tachycardia when used in animal pregnancy. High dose atropine can cause xerostomia, dysphagia, constipation and vomiting in animals.

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