

Using and Side-effects of Propylene Glycol in Animals

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Abstract

Propylene glycol is a substance widely used in the cattle industry for a long time, especially to healing negative energy balance. However, large amounts of propylene glycol may have some side-effects. The objective of this review was to describe to using of propylene glycol and possible side effects in the adult calf.

Keywords

Propylene glycol; Animal use; Side-effects

Introduction

Propylene glycol (PG) has been used in the treatment of ketosis since the 1950s [1] and is still used today [2,3]. In cows after calving very often there is a shortage of energy, a decrease in blood glucose levels and the activation of fatty reserves, which leads to the initiation of the synthesis of harmful ketones. This implies the risk of ketosis in dairy cows in the first stage of lactation [4,5]. It has been reported that orally given PG reduces the propionate ratio of acetate to acetaminophen, while increasing conversion of ruminal PG to propionate, and aid in the closure of energy deficit in cattle [6]. On the other hand, it has been scientifically proven that PG provides substrates for both gluconeogenesis and induces insulin resistance in peripheral tissues to conserve glucose for milk synthesis [7]. After its ingestion, PPG escapes the ruminal fermentation and is metabolized by the liver into glucose through the lactaldehyde pathway and subsequent oxidation to lactate [8]. Some researchers [9,10] that reported a non-significant effect of PG supplementation on milk yield, Generally, but for cows in early lactation PG tends to increase milk yield and reduce milk fat percentage, while milk protein percentage is unchanged [11]. Mc Art et al. [12] claim that intensive detection of subclinical ketosis, followed by treatment of positive cows with oral PG decreased the risk of developing a DA.

Recently, PG has been the most carefully studied glucogenic supplements, and some researchers [13] mention that antibacterial and antifungal effects may be present. Thorgeirdottir et al. [14] reported that PG increased antiviral efficacy in combination with antiviral drugs at different concentrations. Nalawade et al. [15] claimed that PG had bacteriocidal effects on many bacteria, especially *E. coli*. The same investigators have shown that there is no effect on *Staphylococcus aureus*. Khaw and Panosian et al. [16] reported that an increase in the activity of antiprotozoal drugs used in combination with PG.

Although PG is generally recognized as safe at regulated concentrations, when propylene glycol ingested at toxic doses can cause central nervous system depression, neuro degeneration and lactic acidosis [17]. PG is an approved food additive for dog and sugar glider food under the category of animal feed and is generally recognized as safe for dogs, with an LD50 of 9 mL/kg. The LD50 is higher for most laboratory animals (20 mL/kg). However, it is prohibited for use in food for cats due to links to Heinz body anemia [18].

The side effects of PG when allocated to cows are poorly described in the literature [11]. Although propylene glycol can prevent and treat ketosis in dairy cows, large doses (>500 g/day) can harm cattle like other herbivores. Symptoms when such doses are fed include depression, ataxia, and excessive salivation, as well as abnormal, malodorous, and foul breath and feces [19]. Moreover, it has also been reported that high doses of these carbohydrate precursors may lead to diarrhea in cattle [3,20,21].

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