

# Determination of the Nutritional Requirements of the Calf's Gut

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Treatment of diarrheic calves mainly relies on electrolyte solutions to replace the fluid lost in the scours. Antibiotics are also used, but they only work against a few of the many causes of scours. These treatments do not promote healing of the gut. Instead, they keep the calf alive so that the body can slowly heal itself. We have shown that scouring calves have damage to the lining of the gut and reduced absorption of nutrients. We know that holding animals off feed results in atrophy of the gut. If we knew which nutrients the gut uses, we could speed healing by adding the required nutrients to an electrolyte mix. The purpose of our study was to determine the intravenous nutritional requirements of the calf's gut by infusion of several potential nutrient and energy sources.

Five healthy male Holstein calves were acquired from local dairy. All calves were obtained within a week of age. They had been fed colostrum (5% of the body weight at birth). The calves were then fed twice daily fresh cow's milk (10% of the body weight). The femoral artery, jugular vein and the portal vein were cannulated to measure nutritional gut uptake. Calves were allowed at least five days to recover from surgery. Blood flow was measured using an ultrasonic probe placed around the portal vein. Experiments consisting of infusion three nutrients and a control were carried out both at rest (fasting) and in the working state. To mimic work, the calves were fed an electrolyte solution mix without an energy source. No milk was fed for 16 h before each infusion. There was at least one day of rest between each experiment. In each experiment, four different infusions of glucose, acetate, glutamine, and saline (con-

trol) were administered intravenously at a rate of 200 mmol/L/h over 1 h. The order of these infusions were randomized. Blood samples were collected in the last 15 min of an infusion. There was a period of at least 30 min between each infusions to allow the calf to adapt to the new nutrient. At the end of the experiments, the calves were euthanized and the proper placement of the catheters were confirmed on necropsy.

Plasma glutamine, all the essential amino acids, -hydroxybutyrate, acetate and pyruvate concentrations were quantitatively determined by reverse-phase high performance liquid chromatography. Plasma ammonia and glucose concentrations were determined by spectrophotometry.

Our study shows that glucose and glutamine are important sources of energy for the gut in the fasted state prior to any infusions. No significant intestinal uptake of acetate, -hydroxybutyrate, or any essential amino acids were found in all the infusion studies. However, when glutamine was infused there was an increased intestinal glutamine uptake which was associated with ammonia production. This is important because glutamine infusion stimulates use of glutamine by the gut (as shown by additional production of ammonia a breakdown product of glutamine). Infusing glucose was not associated with increased glucose uptake in both groups. Glutamine has been categorized as a nonessential amino acid. Recently, glutamine has been suggested to be beneficial in the regeneration of the damaged gut. This work has been performed in healthy calves, but may have implications in the development of treatment to promote gut healing in diarrheic calves.

## Dectomax Discovery: A Review of the Scientific Approach to Long Duration Endectocide Activity

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### Abstract

Approximately 10 years ago, Pfizer Animal Health resolved to discover and develop a novel parasiticide

active against internal and external parasites that was superior to currently marketed parasiticides in spectrum of activity and time of protection from reinfection. Several scientific teams of researchers were assembled