Estimated reading time: 7 minute(s)

The use of biochar as feed additive may have positive effect in animal health.

Biochar *(Activated Charcoal)* has been **used to treat digestive disorder in animals** for several thousand years. Cato the Elder (234–149 BC) mentioned in his classic **On Agriculture**: *"If you have reason to fear sickness, give the oxen before they get sick "3 pieces of charcoal"*.

History of biochar use in livestock farming

At the end of 19th to beginning of the 20th century, charcoal was increasingly used on a regular base to **increase animal performance and health.** Later during the last century, veterinarian research focused on activated charcoal trials mostly in the form of time-restricted medications against intoxication and bacteriological as well as viral diseases.

Current use of biochar in animal feeding

Only **since about 2010 has biochar increasingly been used as regular feed additive in animal farming**, usually mixed with standard feed at **approximately 1% of the daily feed intake**. Feeding biochar to various animal groups showed positive (but not always significant) effects on parameters such as *toxin adsorption, digestion, blood values, feed-use efficiency, cell numbers in milk* and *livestock weight gain*. The latter may result from the pH-increasing effect of various Biochars since these are mostly alkaline in nature.

Preventing greenhouse gasses (GHGs) emissions in livestock farming

While **chicken, pigs, fish and other omnivore animals provoke GHG emissions** (mainly CH4, N2O; and NH3) when their liquid and solid excretions decompose anaerobically, ruminants cause direct methane emissions through flatulence and burps (eructation). In-vitro studies revealed significant methane reductions of 10 to 12.7% when biochar was fed at rates between 0.5 and 1%. **When biochar was blended with nitrate, methane emissions were reduced by up to 49%** and thus replacing a function of methane producing microorganisms. In-vivo trials of Leng *et al.* (2012b) revealed a reduction of enteric methane of cattle by 20% with feeding 0.6% biochar and by 40% with feeding 0.6% biochar blended to 6% potassium nitrate, leading to a highly significant animal weight increase of 25% over 98 days. This is by far the most **spectacular results in reducing enteric cattle methane**, but it has unfortunately not yet been supported by other in-vivo or in-vitro trials.

Biochar property matters!

Methane adsorption capacity by biochar is typically the most investigated pathway for explaining effects when fed to animals, but adsorption cannot explain all observations. Biochars that are produced at temperatures above 700 °C are not only good electrical conductors, but can take part in biotic and abiotic redox-reactions as an electron mediator. The latter could **explain why several studies found a strong increase of Lactobacilli or a decrease of *gram-negative bacteria*** (Naka *et al.* 2001; Choi *et al.* 2009) **which seems to improve animal health.**

When animals receive charcoal feed additives combined with Lactobacilli spraying (*i.e. microbial milieu management*), **it is interesting to note that antibiotic use may be reduced and in some cases down to zero**. The reduction of antibiotics may also decrease CH4 emissions from ruminant husbandry. As Choi *et al*. (2009) and Islam *et al.* (2014) showed that, feeding biochar plus administering Lactobacilli have an indirect effect on GHG emissions as it is able to replace regular antibiotic "feeding". Furthermore, Joseph *et al.* (2015b) demonstrated that **feeding biochar to grazing cows had positive secondary effects on soil fertility and fertilizer efficiency, reducing mineral N-fertilizing requirements which could be taken as another indirect biochar GHG mitigation effect**.

Using biochar feeding to reduce ruminant methane emissions is presently only an interesting viewpoint that needs more efficient research.