Use of Biochar as a slurry floating cover: limitation and perspective

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**Abstract.**

During manure storage, gaseous emissions, especially ammonia (NH3), play an important role in the environmental impact related to the livestock farm. In this context, the most implemented mitigation strategy is to cover the surface of the manure storage tank with different materials, such as straw, saw-dust, clay, oil. Generally, the permeable floating covers limit the gas transfer into the atmosphere acting as a barrier. A common issue related to the covers is the cost and the maintenance of their action as time goes by. Quite recently, there has been a growing interest in biochar cover application on storage tanks, because of its hydrophobicity and adsorption capacity. This paper explores the possibility of biochar use as a floating cover to reduce the NH3 emission from manure storage, focusing on the mechanism leading the adsorption and the operative aspects as well as the costs related to the biochar utilization. To this purpose, three different trials were carried out in a climate-controlled room, measuring the NH3 emissions and manure pH and varying biochar application methods and biochar characteristics. After all the tests, a desorption test of the ammoniacal N adsorbed during the manure storage tests by the biochar, was performed. Results show that biochar is a promising floating cover for manure storage, which reduces emissions acting as a physical barrier. Unfortunately, its cost expressed as € m-2 is still important. A possible way to make biochar interesting also from the investment point of view is reducing the application cost, mainly cutting the cost related to the feedstocks. When the biochar layer is floating and compact, it also helps to reduce 78% NH3 released into the atmosphere with 2 cm layer thickness, since it introduces an additional resistance to the gas transfer. This aspect is even more impacting than the NH3 adsorption in the NH3 emissions reduction. Moreover, biochar physical and chemical characteristics could be affected by the pyrolysis conditions, such as temperature. Biochar obtained at a lower temperature (<300°C) proved to be more hydrophobic and so more durable applied as floating cover.