

## **Use of Waste from Beer Fermentation Broth (WBFB) from regional brewers (RS, Brazil) for bioethanol production.**

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### **Summary:**

The search for alternative sources of renewable biomass for ethanol production is mandatory for the economical and environmental sustainability of biofuels industry for the next decades. Agroindustrial refuges represent rich sources of lignocellulosic biomass that use to be incorrectly discharged or incinerated, leading to environmental impacts. Among these, the so-called "Waste from Beer Fermentation Broth" (WBFB), the brewer fermentation residue, is rich in organic matter from cereals, hydrolytic enzymes and fermentative microorganisms. It is described as able to perform "Simultaneous Saccharification and Fermentation" (SSF), without exogenous carbon sources, enzymes or microbes. This study tested WBFB from two artisanal brewers, Anner Cervejas Especiais and Sagrada Cervejas Artesanais, both from Rio Grande do Sul (Brazil), to assess their SSF potential for bioethanol production. Samples of WBFB were processed to generate two different culture media: Broth WBFB (brWBFB), which contained only the liquid phase of WBFB; and complete WBFB (coWBFB), which consisted of both liquid phase and sediments from WBFB, mixed. Experiments were prepared from exponential phase 5 ml pre-cultures, incubated at 28°C for 24h. A volume of 500 µl from these inocula was used to prepare 50 ml final cultures for incubation at 28°C. The microbes growth was measured by absorbance (600 nm) at each 4 hours, in 48 hours experiments. The initial and final density of the different media was measured with a densimeter, to calculate the concentration of inferred ethanol production. The results indicated that brWBFB media from WBFB samples of both brewers presented relevant microbiological growth, with absorbance values that ranged from 0,55 to 0,85 in 48 hours. The predicted concentration of ethanol produced varied from 0,4 to 0,9 % among the different experiments. However, the coWBFB from samples of both brewers were not successful for verifiable microbiological enrichment. Nevertheless, some decay of media density was observed, with estimated ethanol production from 0,2 to 0,5%. These data indicates that mainly brWBFB from both brewers may present the potential to perform SSF and thus produce ethanol, which will be further confirmed by liquid chromatography. If this interesting potential is confirmed, the partner brewers will be able to elaborate adequate plans for future use of their WBFB to produce bioethanol and thus to increase their annual profits applying a sustainable strategy.

**Keywords:** Bioethanol; Brewer fermentation residue; Industrial refuge; Lignocellulosic biomass.

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