

## WASTES UTILIZATION FROM BREWING INDUSTRY

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Beer is the most popular low-alcohol beverage consumed in large amounts worldwide. Yearly in the world it produces around 200 billion liters of beer. Each 1000 tons of produced beer generate around from 137 to 173 tons of solid wastes which represents spent grain, residual yeast, kieselguhr (diatomite). Diatomite is used during beer filtration and the generated quantity is around 12 thousand tones of sludge. The obtained quantity of spent grain represents approx. 5 Mio. tones.

Taking into consideration the high number of generated wastes, the reutilization of them becomes crucial nowadays for ecology. Another type of waste generated by the brewing industry is the sludge obtained after treatment of wastewater.

The main directions of spent grain using are forages and food products. The spent grain has a high assimilation of protein substances 71-76%, fat 80-82%, extractive substances without nitrogen 60-65%, fibers 40-45%. By using of wet spent grain appears problems a stability to the storage conditions and transportation. Therefore, in the summer times the wet spent grain should be used for 24-72 hours. There are different methods of spent grain treatment to prolong the shelf live and one of them is drying process.

The spent grain can be used also for preparation of protein concentrates. In the last times the spent grain is added to the dietetic food products, bakery, pasta, confectionery products, meat and milk systems. In the food industry seldom is used the wet spent grain, in the most of cases, basically this is dried and then transformed in a powder by using different technologies. Using the spent grain powder in the bakery and confectionery permits to reduce the production costs of finished products. It is elaborated the technology of xylite production from spent grain as well as ethylic alcohol. A new direction of using the spent grain is the energy production.

The residual yeasts are used dried in the production of animal food. The yeast is reached in vitamins and can be used also in the production of medicines prophylaxis of different illness.

Residual yeasts can be used as an additive to media for cultivation of microorganisms producing relevant value-added compounds used in the food industry. For this purpose, mainly hydrolysates and autolysates obtained from BSY are used. BSY is a potential supplement to media utilized for the growth of lactic acid bacteria and production of lactic acid, for production of ethanol by genetically modified *E. coli* strain, and for synthesis of succinic acid.

The kieselguhr sludge can be used in the industry as absorbent or as addition in cement production as well in the agriculture for soil fertilization and Ph regulation.

During treatment of wastewater in the brewery is obtained sludge. The sludge can be used as fertilizer.

**Keywords:** *brewery wastes, spent grain, residual yeast, kieselguhr, sludge.*

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