The project will investigate the properties of post-production waste from the brewing industry, such as spent grain and spent brewery yeast. The research results will allow for their secondary management. So far, they are most often used in feeding farm animals. However, they have a high content of bioactive compounds with beneficial effects on the human body and could be used as components of food. The scientific objective of the project is to analyse the bioactive compounds in the waste raw material from the brewing industry and research their nutritional and biotechnological potential.

Research on spent grains will include the evaluation of the possibility of using them to stimulate the development of probiotic microflora typical of the human intestinal microbiota. The relationship between the presence of spent grains in the *in vitro* environment of the large intestine and the ability of probiotic bacteria to form an intestinal biofilm, i.e. bacterial colonies adjacent to the intestinal epithelium, will be analyzed. The intestinal biofilm of probiotic bacteria is one of the elements of the immune system and one of the first barriers that protect the organism against the penetration of pathogenic bacteria, toxins and antigens. Spent grains contain polysaccharides with prebiotic properties, it was hypothesized that they can stimulate the formation of intestinal biofilm of probiotic bacteria and displace pathogenic bacteria from it. Prebiotics are nothing more than dietary fibre fractions, which are naturally present, among others, in cereals and are used only by probiotic bacteria. There are scientific data on the prebiotic effects of single isolated fibre fractions from spent grains. However, there are still gaps in the scientific literature on the direct effect of spent grains without extracting the prebiotic fraction on probiotic and pathogenic bacteria. In addition to dietary fibre, the brewed grain contains proteins, fats and simple carbohydrates that can stimulate the growth of not only probiotics but also pathogenic bacteria. Therefore, tests are necessary to confirm the nutritional effect of this raw material and the possibility of reusing it in food production. The result of this research will be the understanding of the influence of spent grains on the formation of bacterial biofilms by bacteria typical of the intestinal microflora *in vitro* and the indication of the direct prebiotic effect.

Research on the use of spent brewery yeast will concern the use of this raw material for the synthesis of vitamin B12 by propionic bacteria. *Propionibacterium freudenreichii* synthesize vitamin B12 as a result of their metabolism. Spent brewery yeast is a product consisting mainly of dead yeast cells, substances assimilated by them and their metabolites. The substances included in the spent brewery yeast are substrates for the synthesis of vitamin B12 by Propionibacterium freudenreichii, i.e. it is the source of the necessary substances for this bacterium to produce this vitamin. Based on the above data, a research hypothesis was formulated regarding the use of this secondary raw material. The hypothesis is that the spent brewer's yeast can be a substrate for the synthesis of vitamin B12 by *Propionibacterium freudenreichii*. 5,6-Dimethylbenzimidazole is necessary for the synthesis of vitamin B12, the natural precursors of which are vitamins B2 and B6, which are found in the spent brewery yeast. There are also scientific data that for the synthesis of this vitamin, aspartic acid is necessary, which is an amino acid found in this post-production waste. In addition, cobalt is present in the waste yeast, which is necessary for the formation of the active form of vitamin B12. Due to the increasing popularity of the vegan diet and the fact that vitamin B12 is the only vitamin that is not found in plant products, it must be supplied to this group of consumers. The result of these studies will be the indication that the waste yeast can be an inexpensive and easily available substrate for the synthesis of vitamin B12, and that it can be used as a growth medium for *Propionibacterium freudenreichii* culture.