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Extraction of Protein From Soybean Waste

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ANNOTATION: The article mainly deals with the technology of obtaining protein from soy products and the stage of separation of quality protein by processing its waste. The shortcomings of the technology and ways to overcome them are given.

KEYWORDS: Soy, protein, concentration, ecology, bioconversion process, microbial protein.

INTRODUCTION

One of the problems with the ever-increasing population of the world is the lack of food, especially the protein component of the human diet, which is and is lacking. According to the Nutrition Research Institute of the Academy of Medical Sciences, dietary protein deficiency has exceeded 1 million tons per year over the past 20 years. Current approaches to solving this problem focus on the use of plant soy protein for food purposes, which serves as a well-known alternative to animal protein. In this regard, in 2003 the Ministry of Agriculture adopted a target program "Development of soybean production and deep processing in the Russian Federation for several years", the implementation of which led to an increase in the volume of cultivation of this crop. Our country produces 740,000 tons a year. It is planned to increase soybean production to 12 million tons by 2020. However, under this program, 95 local soybeans are currently processed for fodder purposes, which makes no sense, as the processing potential of this raw material is much higher. An average of 520 kg of soybean molasses is formed from crushed soybeans. Isolation by isolation of protein from 1 ton of soy flour is accompanied by the formation of about 6 tons of soy whey and 300 kg of deproteinized soy flour. This problem can be solved by traditional methods of processing secondary raw materials into feed products with microbial bioconversion, which is also relevant at the moment, as there is currently a complete shortage of fodder in the livestock industry. There is a problem of poor quality feed - a lack of balance and protein content, which leads to1 a decrease in the genetic potential of animal productivity.Thus, their use for the purpose of enrichment of wastes with microbial protein solves the environmental problems arising from the implementation of soybean processing technologies. In this regard, the aim of this study was to assess the quality of waste generated in technologies for obtaining concentrated protein products, as well as to experimentally substantiate the possibility of using soy protein products to obtain feed additives from production waste. To achieve this goal, the following tasks were set: To assess the impact of technological parameters for the production of concentrated products from soybeans on the composition of the resulting waste; Development of soybean molasses processing technology to obtain a high-protein feed supplement, including: - screening of microbial cultures and selection of a microorganism that can fully assimilate the components of soy carbohydrate extract; - Enhancing the process of bioconversion of soybean molasses under the influence of oxidative stress agents on microorganisms; - to study the effect of cultivation regimes of the selected manufacturer on the parameters of the technological process and the quality of microbial biomass; Development of technology for processing the solid residue of soy flour formed in the production of soy protein isolate into a protein-carbohydrate feed supplement, for which: - fungi on the level of substrate consumption and protein accumulation in biomass screening of cultures. soybean production during solid phase processing in the solid residue of protein isolate; - To study the methods of increasing the bioavailability of waste components for the cultivation of yeast using acid and enzymatic hydrolysis, to determine the optimal parameters of solid waste processing. Scientific novelty of research results. Strains with the highest physiological activity (specific growth rate, maximum biomass accumulation, among the yeast and fungal culture collections capable of growing in a nutrient medium containing local wastes from soybean processing, the amount of protein in the biomass) was determined. When grown in a nutrient medium containing soy molasses, the endomycopsis fibuligera strain is able to assimilate up to 87.5 carbohydrates from molasses, with a biomass content of at least 35.7 true proteins. In a nutrient medium containing soy whey, the Rhodotorua rubric strain can assimilate 76.8 carbohydrates, resulting in a biomass content of 48.0 true protein. Aspergillusnagger strains have optimal properties in the solid phase cultivation of fungi in solid wastes of soy protein

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isolation - the resulting product contains up to 36.4 true proteins. Previously identified patterns of growth in the growth properties of microorganisms were confirmed by the use of hydrogen peroxide-activated inoculum. It has been proven that the filtrate of Endomycopsis fibuligera culture liquid can be used as a nutrient medium for the cultivation of lactic acid bacteria when grown in a soybean-based nutrient medium. The effect of the parameters of obtaining concentrated protein products from soybeans on the composition of the waste was assessed, which allowed to determine the potential value of this raw material for the production of microbial protein products. Soybean molasses processing technology has been developed to obtain endomicopsis fibuligera biomass and a liquid probiotic supplement based on lactic acid bacteria. Feasibility study of the effectiveness of the proposed technology was carried out in accordance with the production capacity of 5,000 tons of processed raw materials per year. Laboratory regulations have been developed for the production of soy molasses and deproteinized soy flour-based nutritional supplements. Approbation of the case. Comparative analysis of the main technologies for obtaining concentrated protein products from soybeans is presented. Information is provided on the generated wastes and methods of their processing by physicochemical and biotechnological methods. Pre-treatment of the substrate, as well as existing methods of enhancing microbial bioconversion processes with the effect of oxidative stress on microorganisms are described. Prospects for the use of agricultural and food industry wastes in the production of food additives are presented. The probiotic activity of lactic acid bacteria obtained as a result of cultivation in soybean molasses is an alkaline reaction of cultures to the effects of high temperatures (C), bile, digestive tract enzymes - trypsin and pepsin, sodium chloride (NaCl), phenol, environment.

Conclusion and discussion Evaluation of the impact of soybean concentrate production on waste production Analysis of published data on methods of obtaining concentrated protein products from soybeans showed that the most promising technology involves pre-degreasing soybeans takes get fat. Preliminary experiments on its use as a carbon source in the processes of microbial synthesis have shown that the most expedient is the aerobic bioconversion of this waste into protein biomass for fodder purposes. The selection of protein producers was carried out among the cultures available in the collection of the department, used to obtain protein feed additives. The selection criteria were the maximum biomass accumulation, the protein content of the biomass, and the rate of consumption of total carbohydrates in soybean molasses. Depending on the target product, further processing develops in two directions: in the production of soy protein concentrates, the most common and fully responsive to the quality of the final product is an alcoholic extract of nitrogen-free compounds from soy flour. Waste soy molasses is formed during the recovery phase of the extract from the extracted carbohydrate extract. The best properties in soy protein isolates are the product formed under the conditions of obtaining alkaline protein from soy flour. In the implementation of this technology, two wastes are formed: solid residue is formed at the filtration stage of the soy flour suspension, and soy whey is formed at the stage of protein separation from the extract.Soybean oil Separation of carbohydrates with alcohol Soy protein concentrate Soybean seed crushing Cleaning Oily soybean leaves extracting renewal Solvent oil extraction Soybean flour carbohydrate extract and concentrated protein products from soybean processing scheme, soybean extract the basic parameters of the main stage of production vary in a certain range for different enterprises, which does not clearly affect the characteristics of the main products. However, some changes in mining conditions may affect the composition of the waste, which is important in the study of subsequent methods of processing secondary raw materials in feed additives. Medium with a content of soybean molasses of 50 g / l for total carbohydrates with recirculation of the culture liquid filtrate. It was found that with a complete return of the filtrate to the cultivation stage, taking into account losses during filtration, after 1 cycle, the degree of carbohydrate consumption decreases to 55. The optimal return is 60 of the filtrate obtained at the stage of biomass extraction. In this case, no pronounced suppression of growth characteristics is observed, and the concentration of residual carbohydrates from the 5th cycle is stabilized at the level of 14.5 g / l. The resulting filtrate is characterized by a significant content of residual carbohydrates. One of the possible ways to increase the degree of utilization of carbohydrate components of soybean molasses may be the sequential cultivation of several types of microorganisms. Therefore, the first stage of our study is to evaluate the effect of extraction parameters (temperature, duration, extracting concentration, amount of dry matter in suspension) on the resulting waste composition. At the same time, the quality of the soy protein concentrate and the target product of the isolate were evaluated. Extraction of nitrogen-free extractives from soy flour. As a result of the study, the optimal conditions for obtaining soy carbohydrate extract without losing the quality of the target product - soy protein concentrate are: duration 60 minutes, ethanol concentration - 70, temperature 60 C, dry matter content in suspension 14.5 extraction temperature of waste composition and soy protein concentrate, 0 (C). Extractor is the amount of dry matter in suspension the main product of the studied technology - the analysis of the composition of soy protein concentrate showed that it contains about 70 proteins and no more than 5 carbohydrates. The necessary technological stage of the process is the restoration of the extraction along with the change in the chemical composition of the evaporated extract. Different changes in the acidity of the extract allowed the pH to reach 5.5, which leads not only to a

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decrease in foaming during evaporation, but also to partial hydrolysis of carbohydrates and an increase in the content of reducing substances in the extract.

II.CONCLUSION

The technology of deep processing of soybeans abroad is actively developed for the production of protein products: concentrates and isolates, which are widely used in the food industry. The development of deep soy processing technologies requires a comprehensive approach, taking into account the shortcomings of already known technologies and the country's need for secondary processing of raw materials. An analysis of the literature has shown that the main drawback of technologies for the production of concentrated protein products from soybeans is the large amount of waste that requires further processing. Taking this into account is to recycle waste and reduce the amount of waste by increasing the amount of protein.

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