

INTRODUCTION

In this work a new plan for waste products of beer fermentation is presented. More specifically residues of malted cereals and especially barley, which is the largest percentage in beer production will be used to form dry food croquettes suitable for pets especially adult dogs. According to the process malted barley residue will be fortified with protein in first phase and in second will be mixed with the rest of the food ingredients, ground and dehydrated into granules.

The current production practice saves raw materials and at the same time reduces the burden on the environment, as until now the by-products of brewing were destroyed. Another factor that makes it a new generation product is that it reduces by almost half the amount of animal products required for the composition of a quality dog food, hence the required number of carcasses. In addition, the price of the final product will be very competitive as a significant percentage of food will have as raw material very economical brewing by-products.

We must also mention that pet industry has shown great development. According to statistics global pet market is worth about \$261 billion. For example, in USA is estimated that people in USA will spend about \$110 billion on their pets in 2022. Last two years there was an 18% increase in pet food sales. Beside that more than 50% of pet owners are willing to pay more for eco-friendly pet care products, fact that highlights the future value of this research in Greek market and in world market at second stage.

EXPERIMENTAL

Most of solid waste of the brewery is destroyed by incineration and only a small part is used as animal feed. This material contains fiber, cellulose, starch and protein, components that remained after the end of process of malting the grain (in most cases of barley) used for production of beer. Obviously, the concentration of required proteins will be less than what is necessary for a dog food and for this reason the residue should be enriched with proteins. Its enrichment can be done by using them as a substrate in solid state fermentations with the fungus *Aspergillus awamori*.

This use of waste reduces the pollution of the environment caused by their incineration, since large quantities of brewery waste can be exploited to produce feed, while it also produces proteins at very low cost, which makes it a viable method.

According the barley residues of the brewery were used in solid fermentations for production of monocyte protein. Various factors were considered, such as low temperature, low pH. It has been observed that microorganism, which is aerobic, grows on the surface of residues. So when a very thin layer of barley residue was used, the production of proteins was high giving a final product with a protein content of 41%. Thus the barley residues of the brewery after their enrichment in proteins give a new product with added value, which can be used as feed with increased nutritional value, since the microorganism used, although it belongs to the *Aspergillus* family, is not toxic.

Solid state fermentation is done by culturing microorganisms on solid substrates which the microorganism has the ability to biotransform. Solid state fermentation over liquid fermentation has the advantage of reducing reactor volume, reducing mass transfer, and increasing productivity. These combined with the relatively short production time and low energy requirements lead to a reduction in the production cost of the product.

Then, the enriched product will be mixed with the other selected ingredients that are necessary for the proper nutrition of the dogs and the production process of the premium dog food will be completed.

PET MARKET

The market for pet food is very large and is dominated by companies with international prestige and large export capacity. The vast majority, however, of the foods on the market are of low quality with low levels of protein and the recipes that are followed are similar, with minimal differences between them.

The new product is highly nutritious as it consists of a very large percentage of proteins from different sources, animal and plant, which is not the case with most other dog foods as the high protein content increases production costs. It is made from local products, of excellent quality, that are recognized by consumers and fed by them. So those who are interested in the well-being of their pet will soon recognize this advantage. Finally, it is made in an innovative way, using as a raw material an ingredient that until now was considered useless, but which with a proper process is enriched with proteins and we end up with a product with added value, while keeping production costs low, thus giving possibility of the final product price fluctuating at normal levels and the product being profitable for the business.

SALES ORIENTATION

Sales orientation will be mainly directed towards internal market. An effort will be made to sell the product abroad, in case goals for internal market are achieved.

According to findings of market research, the target audience of product is adults, mainly under 45 years old, regardless of gender and educational level, who have a pet dog. Two key characteristics of prospective buyers are concern for their dog's health and well-being, as well as having a developed environmental awareness.

A large percentage of consumer public (46.5%) trusts exclusively the veterinarian who visits with the pet, for the choice of food, something that should not go unnoticed, in order to approach veterinarians to promote the product.

PRICING

Pricing for three packages of product will be done in relation to the existing competition in similar products and will fluctuate at same levels, since the high cost of local raw materials will be offset by the very low cost of enriched brewing by-products. According to market research, the majority of consumers would give up to 10 €/ kg of dry food. According to this result and the prices of competing products, the 400g package will be priced at around €4 (ie €10 / kg), the 2kg package will be priced at around €18 (ie €9 / kg) and the 12kg package will be priced at around €84 (ie €7 / kg).

CONCLUSIONS

Waste or by-product of beer production (including also fermentation), are often used as a livestock feed. These have nutritional value as a pet food ingredients. They provide in general protein, fiber, and also energy and can be useful in a variety of diets. Protein in them can meet a significant portion of supplemental protein requirements; in addition, they provide fiber and needed bulk in the diets not only for pets but also of ruminants and horses. These products have also been fed to pigs, sheep, and poultry.

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