It can be assumed that among the most important objectives of poultry production is to produce more meet at less feed utilization. Without negatively effecting meet quality, animal health and the environment. The above targets to a considerable extent were achieved by genetic progress because broiler chickens used at the present time are characterized by a high feed conversion ratio amounting to approximately 1.4. These means that in order to gain 1 kg of body weight birds use only 1.4 kg of feed. However broiler genetic potentials can be utilized to their full extent only in the case of ensuring appropriate and precise feeding adjusted to birds' requirements. Despite high meet production potentials of broiler chickens, increasing consumer demand for this high quality product "at relatively low price" requires elaboration of proper nutritional strategy which will meet requirements of rapidly growing birds. This can be achieved using precise feeding appropriate for the needs of fast growing chickens. The basic factor limiting affective nutrient utilization by birds is the content in plant raw materials of antinutritional compounds. These include some complex carbohydrates such as non-starch polysaccharides (NSP) e.g. xylans, arabinoxylans, β-xylans etc. The above mentioned compound are not digested by chickens and their negative influence consist in increasing digesta viscosity in the gastro-intestinal tract which limits utilization of feed energy and nutrients, causes deterioration of rearing results exerts a negative impact on the qualitative and quantitate composition of symbiotic bacterial microflora, and indirectly on birds' immune system.

One of the ways to reduce the negative impact of the above mentioned NSPs is employment of the exogenous enzymes. These enzymes break down complex carbohydrates in to smaller molecules, decreasing this way their viscosity and water holding capacity and consequently increasing their availability for endogenous bacterial enzymes. In the performed experiments it was demonstrated that the employment in diets for broiler chickens of enzymes – carbohydrases, it is possible to limit the unwelcome impact of NSPs on digestive and absorptive processes. On the other hand emulsifiers comprise a group of feed additives improving the utilization of one of the most expensive feed component – fats. Moreover scientific studies showed that the application of emulsifiers in diets for chickens can improve fat digestibility and, to some extent also digestibility of complex carbohydrates. However so far researchers have not been able to determine the impact of mode of action and/or mutual interactions between carbohydrases and emulsifiers in chickens nutrition on digestive and absorption processes as well as composition of symbiotic bacterial microflora in birds digestive tract. Recognition of the above mechanisms and processes may contribute the development of a nutritional strategy directed towards increased utilization of nutrients from feed raw materials without negatively effecting the health status of birds.

The adopted research hypothesis assumes that the application of emulsifiers in chicken diets will contribute to a better fat utilization due to its more effective emulsifications. Simultaneously, application of carbohydrases will improve nutrient utilization (also fats) but thru reduced digesta viscosity (or release of encapsulated nutrient from plant cells). On the other hand, the use of the above mentioned additives simultaneously will exert a synergistic effect, especially with respect to the utilization of earlier undigested part of the feed (e.g. some fractions of carbohydrates).

During **stage one** of the proposed project a series of nutritional experiments will be carried out in which broiler chickens will be fed diets containing an emulsifier or carbohydrases or combination of both. Experiments will be conducted on 1 – 35 d old broiler chickens and will be divided in to two stages, stage one will be carried out on smaller population of birds kept in metabolic cages. 200 birds per experiment in 4 trials. In the course of these trials, birds will be fed diets based on maize/maize starch, soybean isolate protein fish meal and tallow (to provide saturated fatty acids) and individual structural carbohydrates (cellulose, beta-glucan etc.) will be added to the diet. During the **second stage,** six nutritional experiments are planned. In individual trials, different carbohydrases will be used depending on dominating carbohydrates in the diets**.** In the course of the project realization we will employed diets based on different cereals (maize, wheat, triticale or rye) or different dominating protein raw materials (soybean meal, rapeseed meal, yellow lupine meal or sunflower meal) in order to provide carbohydrates with different chemical and physico-chemical proprieties. Summing up, the aim of these stages is to examine impact of structural carbohydrates as well emulsifier and carbohydrases on microbial fermentation tract and nutrient utilization in poultry digestive.

A specific objective will be to ascertain the effect of the added emulsifier or carbohydrase or combination of both in diets with different raw materials, on bacterial fermentation products concentrations, Enterococcus, Lactobacillus, Escherichia coli, Lactobacillus, Streptococcus, bifidobacterium and Clostridium population in ileum and caecum digesta. In addition, we plan to determine the degree of dietary nutrient utilization. Furthermore, expression of the most important nutrient transporters at mRNA and protein level in small intestine (or caeca) will be investigated to hasten scientific hypothesis verification.