Summary

The study was dedicated to a strategy of feeding broiler chickens, comprising modification of dietary fatty acid profile and vitamin E level as well as period of feeding of the modified diet, with the aim to improve the functional properties of chicken meat. The improvement of the functional properties of meat consisted in an increase of polyunsaturated fatty acids (PUFA) omega-3 (n-3), eicosapentaenoic (EPA) and docosahexaenoic (DHA) acids share, lowering of PUFA n-6/n-3 ratio and an increase of antioxidants level. Four experiments were realised: three were carried out on broilers Ross 308 (no 1-3) and one on rats Wistar CrI:WI (no 3a). In the experiment no 1 chickens were fed for the last 3 weeks before slaughter diets containing rapeseed, linseed and fish oil in different proportions, whereas chickens from control group were given diet with lard. The influence of diets on performance, fatty acids (FA) profile and content, and sensory characteristics of chicken meat were evaluated. In the experiment no 2, chickens were given diets with rapeseed or linseed and fish oil during 3, 2 or 1 week before slaughter, whereas chickens from control group were given diet with lard. The performance and the FA profile and content in chicken meat was measured. In the experiment no 3, during the last 3 weeks before slaughter chickens were fed with: i) the control diet containing lard, and the level of vitamin E and selenium (Se) similar as in commercial diets, or ii) diet containing rapeseed and fish oil and levels of vitamin E and Se as in control group; iii) diet like ii but with higher level of vitamin E; iiii) diet like ii but with higher level of vitamin E and Se. Effects on performance, FA profile and content, vitamin E and thiobarbituric acid reactive substances (TBARS) concentration in chicken meat were measured. The functional properties of chicken meat were verified in the experiment no 3a, performed on rats fed with diets containing lyophilized meat of chickens from the experiment no 3. The substitution of lard with fat present in rapeseed and linseed and/or the fish oil

resulted in higher PUFA and lower SFA share of and lower PUFA n-6/n-3 ratio in diets, in comparison with control diet, fish oil provided also EPA and DHA. The FA profile of chicken meat and fat was modified by FA composition of diets, content of EPA and DHA in the chicken meat was higher when diets with rapeseed, linseed and fish oil were fed. However, feed conversion ratio was worse in chickens fed diets with linseed, whereas sensory quality of meat was lower when the diet with 2% of fish oil was fed. The content of EPA and DHA in the meat was higher when chickens were fed with diet containing rapeseed and fish oil for 3 weeks, than for 2 or 1 week. In birds fed the diet with rapeseed and fish oil higher level of vitamin E and Se resulted in a lower concentration of TBARS in breast and thigh meat after frozen storage. In experiment no 3 feeding rats with meat from chickens receiving diets with rapeseed and fish oil, resulted in higher proportion of LC-PUFA and lower PUFA n-6/n-3 ratio in liver and brain lipids than in rats fed meat from control birds. In rats fed meat of chicken obtaining diet with higher level of vitamin E and Se, also the concentration of HDL-cholesterol in blood was Summary 98 increased, while other haematological and biochemical parameters were within the limits for rats and growth performance parameters did not differ from control group. It can be concluded that: 1) The substitution of animal fat in broiler chicken diets by the fat of rapeseed and fish oil did not affect performance and these products may be used for the modification of FA composition of broiler meat; 2) Both meat and fat of broilers fed diets with rapeseed, linseed and fish oil can be considered as products high in PUFA n-3: meat due to high EPA and DHA content, fat due to high ALA content; 3) The dietary level of fish oil should not exceeded 1% in broiler chickens diet, as higher level can deteriorate the meat sensory characteristics; 4) Diets containing alternative fat sources should be fed for 3 weeks before slaughter; 5) Diets with high level of PUFA should be additionally supplemented with vitamin E and Se with the aim to counteract oxidative stress and to extend shelf life of meat during frozen storage; 6) Results of the experiment on rats fed

diets with chicken meat of modified FA composition and higher level of vitamin E and Se confirm that the meat can be considered as a functional product.

Key words: dietary fatty acids, vitamin E level, feeding period, meat functional properties, broiler chickens