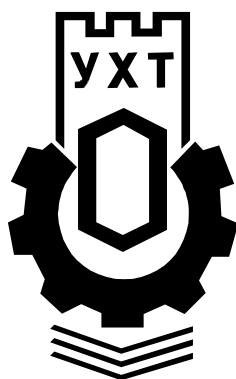


**УНИВЕРСИТЕТ ПО ХРАНИТЕЛНИ ТЕХНОЛОГИИ -
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components while retaining the desired product quality. The production of meat products with reduced amounts of fat is one of the fastest growing sectors in the food industry in the U.S. (Mc. Donagh et.al. 2004). As a substitute for fat



in meat products, usually natural plant fibers are used from carrots, oats, peas, potatoes, citrus, soy, oats and etc. Richest with proteins of all of these are soybean and poorest are those from peas. Dietary fibers improve digestion, reduce cholesterol, prevent intestinal cancer, arteriosclerosis (Huberet.al..2000 Mc. Donagh et.al. sar. 2004). But when using any of these supplements, it should be taken care that sausages as products retain their characteristic features. Therefore the best sausages are the fermented ones that when added the above supplements are actually functional food.(Sieg 2005;Miler 2006; Jilnemez Colmenero 2007). Fiber can be used for enrichment of meat products with dietary fiber, for reducing the calories, improving the structure of the products. Fermented sausages which in its composition have a higher percentage of fat have softer consistency and vice versa, lower percentage of fat - less juicy, are firm and with a saltier (Muguerza 2002). With the addition of 2-3% fiber, the consistency of sausage becomes solid. Fermented sausages with a higher percentage of unsaturated fatty acids have a softer consistency (Rubio et.al. 2007,.McDonahx et.al. 2004) added the dietary fiber of peas, potatoes, oats, wheat and citrus in pork sausages during which they found that the reduction of fat in the sausages and replacing them with plant fibers led to a reduction of taste and acceptability of the products.

The aim of our study was to see the impact of soy fiber added in different amounts on the pH, loss of weight, chemical composition and sensory properties of the dried sausages.

Material and method

As test material we used fermented sausages like dried sausage. In total, five samples were made of 50 kg. mixture of dried sausage. Sample 1. Standard - conventional fermented sausage produced from beef 35% second category, second category of pork 35% and hard fat tissue 30%.Sample 2. Functional fermented sausage produced from beef 35% second category, second category of pork 35% and hard fat tissue 29.5% and fiber of dietary soybean (FIBROTEX BU2) 0,5% grams per 50 kg. mixture.

Sample 3. Functional fermented sausage produced from beef 35% second category, second category of pork 35% and hard fat tissue 29.0% and fiber from vegetable soybean (FIBROTEX BU2) 1.0% 50 grams per kg. mixture.Sample 4. Functional fermented sausage produced from beef second category 35%, pork 35% second category and hard fat tissue 28.5% and fiber from vegetable soybean (FIBROTEX BU2) 1,5 grams per 50 kg. Sample 5. Functional fermented sausage produced from beef second category 35%, pork second category 35%, hard fat tissue 28% and soy fibers (FIBROTEX BU2) 2% kg per 50 kg. When producing the three samples 1,200 kg. salt was added as well as spicy mixture for dried sausage (Raps) 0,300 grams glukon delta lactone 0,100 grams, vitamin C 0,005 grams, 0,075 grams dextrose. Dietary fibers are in the form of white powder and contain the highest percentage of soy, then starch and antioxidant.

After mixing them, they were stuffed into artificial collagen wrapper whit diameter fi - 32 mm. After filling the sausages are left to drain, then 5 days are smoked at a temperature of 20 to 22 ° C. Then subjected to a 22 day ripening. The early ripening chamber air temperature was 20 ° C and relative humidity 98%, at the end of ripening, climate chamber temperature was 15 ° C and 75% relative humidity.

Examination of pH

Examination of the pH was done with pH - meter mark Ebro with a combined electrode. The test is performed by making holes on several places, starting from the center and going to the periphery of the product and then the medium value was calculated.

Loss of weight

The loss of mass is determined by measuring the differences in the sausage immediately after filling it and measuring the sausage immediately after ripening drying.

Chemical testing

As regards chemical tests, the content of water was checked in the sausage by the method ISO 1442/1998, proteins according to the method of kjeldahl, total fat according to ISO 1443/1992, mineral substances by ISO 936/1999. Salt content in the end product was examined by the



method ISO 1841-1/1999. Nitrites content by ISO2918.

Sensory examination

As regards sensory properties of the sausages, the following were examined: external appearance, color of section, smell, taste, consistency. The evaluation was performed by a panel of 8 experienced specialists by the method of VNIMP Moscow.

Statistical processing

The results were statistically processed by using computer program Statistica vol.6. Stat Soft Excel, program 1997-2003

Results and discussion

The distribution of the pH value

In the control sample pH on the 1 day of production was 5.75, 10 th day 4.98 and on the 21th day 5.11. Sample 2, the first day was 5.70, 10th day - 4.92, 21th day - 4.88. In sample 3 - 1st day 5.72, 10 th day 4.90, 21th day - 4.85. In sample 4, the 1st day - 5.78, 10th day - 4.92, 21th day - 4.80. In sample 5. 1st day was 5.77, 10th day 4.98 and 21th day - 4.82. As seen from the graph, there are no large differences in the movement of pH in the control and experiment samples. PH values in all experimentally fermented sausages are typical for this type of product and are similar to values cited by other authors (Garcia et.al., 2002;Miguerza et.al.,2003).

Loss of weight
The results obtained during the ripening and drying of dried sausage in terms of mass loss are given in table 1

Table 1. Loos of weight in the tested fermented sausages

Loss of weight	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
40 day	35,25+/- 3,52*	34,92+/- 3,72	34,52+/- 3,32	33,52+/- 3,40	32,20+/- 3,12*

The table shows that most of the mass was lost during ripening and drying of sample 1, and least was lost in sample 5 (with the addition of 2% fiber). The differences in weight loss

between test 1 and test 5 are statistically significant. ($P < 0,05$). It is as a result of fibers added to the sample 5 which affects the reducing of weight during ripening and drying of sausages. Differences between other variants are small and insignificant. The loss of mass determined in our studies is consistent with the findings of Huber and Sar, 2002. They found seasoning weight loss for 4-6% of raw sausages with fiber.

Chemical testing

The results of chemical testing are given in Table 2.

Table 2. Chemical composition of the studied samples of lasting sausages

Chemical parameters%	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
Water	28,25+/- 3,52*	29,30+/- 3,72	29,92+/- 3,32	30,52+/- 3,40	30,82+/- 3,12*
Fat	32,80+/- 5,28*	32,22+/- 5,55	32,52+/- 5,25	32,72+/- 5,20	30,52+/- 5,12*
Proteins	22,50+/- 2,82*	22,22+/- 2,58	22,88+/- 3,20	24,53+/- 2,82	25,22+/- 2,22*
Mineral materials	4,54+/- 2,02	4,32+/- 2,10	4,28+/- 2,55	4,25+/- 2,05	4,12+/- 2,08
Salt	4,30+/- 0,52	4,32+/- 0,88	4,35+/- 0,52	4,38+/- 0,48	4,26+/- 0,42
Content of nitrites (mg / kg)	4,52+/- 0,20	4,55+/- 0,22	4,58+/- 0,18	4,50+/- 0,20	4,8+/- 0,25

In terms of tests on the chemical composition of all experimental sausages, it can be seen that there is statistically significant difference in protein content between sample 1 (the control sample) and sample number 5 (with the addition of 2% fiber) ($p < 0,05$) and the water content of samples between 1 and 5 (with 2% dietary fiber)



($p < 0,05$). While differences in water content among other trials are small and insignificant. The higher protein content in the sample 5 compared to 1 is probably due to the use of fiber from soy protein that contains proteins in its amino acid composition, and as regards digestion is very similar to the protein of meat. (Soybean seed containing from 35 to 50% protein). The lower water content in sample 1 compared to sample 5 is due to greater weight loss during ripening and drying. The results in terms of water content in our studies are consistent with results cited by Joksimovich et al (1981) who say that the water content in dried sausage ranges from 29.60 to 33.0%.

The results in terms of protein content in accordance with the test results of the Saar and Garcija.(2002), Stamenkovich et al. (1988) who say that the content of protein in dried sausage ranges from 17.69 to 26.53 %. Fat content in the tested samples ranges from 30.52 to 32.80 % depending on the involvement of fat tissue. The results that we got in terms of fat content are consistent with the results obtained by Joksimovich et al (198) Stamenkovich et al (1988) who say that the fat content in sausages ranges from 20.96 to 46.04 %. Mineral matter content ranged from 4.12 to 4.54 %. The differences between the samples are small and insignificant. Our results regarding the content of mineral substances are within the limit values that indicated Grujich et.al. (1987) and ranging from 4.15 to 4.55. Content of salt of the studied samples ranged from 4.26 to 4.38 %. These differences are small and statistically insignificant. The values in the content of salt are the same as the results obtained by (Gasparik-Reichardt et.al., 2005 Operta et. al..2007 ; Siriken et.al. (2009) Papadima et.al.. (1999) the Greek Comi et. al. (2005) which indicated that the content of salt in dried sausage ranges from 3.31 to 8.31 %. Regarding the content of nitrite in the table shows that in all samples examined, the residual nitrite content is low. According to the Rulebook on quality of meat products (63/ 2013), the brine meat products must not contain more than 20mg. sodium salts per 100 grams of product. Residual nitrite content in all five examined samples fulfilled the requirements of the Rulebook.

Nitrites although in small amounts, have important role in the formation of a stable product color and have antioxidant effect .

Sensory testing

The results of sensory testing are given in Table 3.

Table 3. Sensory evaluation of the samples of dried sausage

Sensory properties	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
External appearance	7,10+/- 0,28*	7,28+/- 0,25	7,45+/- 0,20	7,92+/- 0,8	8,45+/- 0,20*
Color of section	7,90+/- 0,12	8,18+/- 0,15	8,15+/- 0,22	8,25+/- 0,28	8,28+/- 0,40
Consistency	8,40+/- 0,10	8,25+/- 0,12	8,28+/- 0,15	8,22+/- 0,18	8,25+/- 0,20
Scent	7,42+/- 0,18	7,45+/- 0,20	7,52+/- 0,25	7,72+/- 0,42	7,75+/- 0,40
Taste	7,28+/- 0,25	7,22+/- 0,42	7,45+/- 0,40	7,48+/- 0,52	7,55+/- 0,48

The table shows that there are no major differences between the examined samples in terms of all parameters of sensory testing. Just in terms of external appearance, there is statistically significant difference between the control sample (sample 1) and sample 5 ($p < 0,05$). This is probably due to the greater crinkly wrapper. The control test samples 2,3,4 , and 5 received higher average grades in all tested sensory properties compared with the sample 1. Sample 5 compared to sample 1 had better color of surface and intersection , better consistency , and on palpation was firm without noticeable cavities. The results that we got in terms of sensory properties are consistent with the results cited by (Fernandez Lopez et.al. 2004;. Rodel and Stiebing 1987; Muguerza et.al. 2002 Garcia 2002; Huber et.al..2002; Mc.Donagh 2004; Miller 2006 and Saar Eim.2008). The above mentioned shows that differences in the amount of fat tissue that are applied in the production of



dried sausages (differences in the composition and properties of fat tissue) and amount of meat that is added in the production of dried sausages affect the strength of the dried sausages as determined by our tests. Also fiber in fermented sausages on one hand increases the dry matter content in the sausage, accelerates its drying that contributes to greater consistency - firmness of the product.

Conclusions

Based on the results of our tests we can conclude the following:

The addition of fibers in the manufacture of dried sausage does not affect the movement of the pH during ripening and drying of the sausage. The fiber added in the production of dried sausage in an amount of 2 % affects by reducing the seasoning weight during ripening and drying of the sausage, and by increasing the content of protein in the sausage, the color of the surface and the intersection of sausage, firmer consistency without noticeable cavities. Therefore, the use of dietary fibers of soy in the production of dried sausage can be recommended.

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