EVALUATION OF SKINNED AND UNSKINNED CHICKEN MEAT FROM THE VIEW POINTS OF FATTY MATERIALS

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SUMMARY: Fresh chicken meat with and without skin were frozen at -40°C and stored at -18°C upto 8 months. At 0,2,4,6 and 8 months of frozen storage, the oxidative rancidity of chicken fat was evaluated. Thiobarbituric acid (TBA), acid value (AV) and saponification value (SV) were determined. Frozen chicken meat were also treated after each storage period with the common processing techniques including: smoking and cooking in boiling water or cooking in conventional oven with subsequent storage at 4°. After these treatments (TBA) number, (AV) and (SV) were also concerned. Removing of sking accelerated the oxidative deterioration of the treated samples. Smoking had no significant effect on fatty acid compositions compared to the value obtained immediately after freezing.

INTRODUCTION: It is well known that oxidation of food and food products and the development of rancid flavour is partially due to the presence of unsaturated fatty acids. Technological processing such as mechanical deboning (Dawson and Gartner,1983), frozen storage (Igene et al.,1980), cooking (Newburg and Concon, 1980; Yamauchi et al., 1982) refrigerated storage after cooking (Yamauchi et al., 1982), lead to a remarkable and undergoes deterioration in meat owing to autoxidation of the unsaturated fatty acids of the meat fat. Chicken meat is especially susceptible to oxidative rancidity because of it contains heigher level of polyunsaturated fatty acids(Marion and Woodroof, 1965; Edwards et al.,1973; Fristron and Weihrauch,1976).

In this work, the cumulative effects of common household techniques of processing on oxidative changes in chicken meat were studied. The development of lipid autoxidation for skinned and unskinned chicken meat samples was evaluated by the determination of (TBA) values, acidity and saponification numbers.

The effect of freezing and smoking on the fatty acid composition of the investigated chicken meat samples was also investigated.

MATERIALS AND METHODS

Materials: Fresh slaughtered chicken samples were obtained from El-Shark-El-Awsat Company. They are devided into two categories i,e., with and without skin; frozen at -40°C and warpped in polyethylene. These samples were transported to the EL-ABBASSA FISH FARM,EL-SHARKIAH GOVERNORATE, Egypt, stored at -18°C and after 2,4,6 and 8 months of frozen storage; samples were either smoked or cooked in water or in conventional oven. Samples were also withdrawn for chemical analysis within the suggested storage periods.

Methods:

Cooking condition: For experimental cooking the two categories of chicken samples were cooked in both water and conventional oven. Boiling was extended for 40 min., while in a conventional oven, the samples were cooked until the average temperature in the center of chicken meat was 75°C for one hour.

Smoking conditions : Smoking was carried out for 3 hours at 60°C using MECO smoker series 5000 available at ABBASSA FISH FARM, EL-SHARKIAH GOVERNORATE,EGYPT. Hard wood (Beech type) was used as a source of smoke according to Wheaton and Lawson (1985).

Analytical Methods: For chemical analysis, chicken meat samples were minced and a representative samples were taken for analysis. For fatty acid compositions,Pye-unicum gas liquid chromatography, series 104 Model 64, was used and methylated fatty acids was prepared as described by Gouglitz and Lehman 1963, injected in the columnn and peak areas were calculated.

Thiobarbituric acid was analysed with protection against autoxidation according to the detalied methods of Pikul et al., (1983). Acid and saponification values were given by the procedures recommended by the AoAC (1980).

RESULTS AND DISCUSSION:

TBA values in chicken meat: The TBA values of chicken meat samples (with and without skin) were calculated and presented in Table (1) . The differences between the investigated samples were calculated as percentages and given for the samples up to 8 months of storage at -18°C. It was noticed that TBA values of the unskinned chicken meat samples showed higher values especially within the first 4 months of storage than that of the skinned samples. These results are mainly due to the differentiation in the level of the fatty materials which are expected to be lower in the sample free of skin. Similar result were obtained by Pikul et al., (1984).

Changes in TBA values of chicken meat samples as a result of smoking or during storage under refrigerating conditions were largly higher especially when storage period

was prolonged. These trends that occur during smoking of chicken meat are a function of smoked gases that postulated and accelerated oxidation of fatty materials in the presence of atmospheric oxygen.

The calculated TBA number after cooking (in water or in convention oven) showed no differences in the skinned or in the unskinned samples. On the other hand, TBA numbers were increased after cooking ; a trend which may be related to that loss of juices during cooking lead to a moticeable increment in the fatty material of the investigated samples.

Changes in AV and SV: The progress of fatty changes was also followed by the determination of the AV and SV (Table 2 and 3). In frozen, smoking and cooking samples there is a noticeable increament of AV during storage such trend may be related to one of the following reasons:

- Lipase enzyme, still active or regenerated after inhibition by the investigated technological treatments.
- Auto-oxidation which could occur in the presence of oxygen especially when storage period was extended more than 4 months.

Effect of smoking process on the fatty acid composition:

The fatty acids patterns of the skinned and unskinned were concerned for the smoked samples in relation to the frozen one as seen in Table (4) . The obtained data indicated the main following points:

- Smoked samples realized lower concentration of the individual fatty acids in relation to the frozen samples.
- The skinned chicken meat samples indicaler a low concentration of fatty acids in frozen samples as well as in the smoked one in relation to the unskinned samples.

CONCLUSIONS: From the aforementioned results it could be concluded that it is preferable to use whole chicken for preparing the suggested chicken product because of:

- Removing of skin failed to improve the quality of the tested samples especially from the view points of the changes that occur in fatty materials . In other words, removing of skin accelerated the oxidative deterioration of chicken meat samples.
- The presence of fatty materials is expected to improve organoleptic properties of the tested samples especially in the smoked one.

Table (1): Change in T.B.A. values of skinned and unskinned chicken meat stored for 8 months at-18°C.

Chicken samples prepared in the form of	Skinned Storage periods (in months) at -18°C					Unskinned				
	0	2	4	6	8	0	2	4	6	8
Freezing	0.158	0.212	0.258	0.346	0.548	0.212	0.34	0.316	0.403	0.581
Smoking	0.219	0.293	0.320	0.443	0.620	0.286	0.324	0.343	0.494	0.688
T·A*	0.351	0.418	0.450	0.559	0.765	0.379	0.447	0.498	0.638	0.557
T.B.**	0.874	0.809	1.039	1.199	1.219	1.09	1.175	1.254	1.345	1.254
Cooking in water	0.283	0.342	0.381	0.439	0.717	0.332	0.377	0.419	0.489	0.771
T.C.***	0.202	0.909	0.969	1.054	1.067	0.915	0.955	1.035	1.209	1.122
Cooking in convention over	0.255	0.283	0.318	0.387	0.648	0.308	0.329	0.381	0.469	0.698
T.D.***	0.637	0.395	0.442	0.529	0.825	0.638	0.719	0.815	1.004	0.948

*T.A= Smoked samples stored for 10 days.at 4°C.

**T.B.= Smoked samples stored for 30 days at 4°C

***T.C,D= Cooked samples stored for 4 days at 4°C.

Table (2): Changes in AV of skinned and unskinned chicken meat stored for 8 months at -18°C.

Chicken samples prepared in the form of	Skinned Storage periods (in months)					Unskinned at -18 °C				
	0	2	4	6	8	0	2	4	6	8
Freezing	0.379	0.474	0.524	0.564	0.599	0.497	0.548	0.582	0.638	0.698
Smoking	0.419	0.508	0.569	0.609	0.654	0.547	0.591	0.626	0.688	0.764
T.A.*	0.514	0.598	0.657	0.719	0.728	0.607	0.662	0.672	0.744	0.824
T.B.**	1.342	1.643	1.720	1.773	1.823	1.386	1.716	1.742	1.794	1.849
Cooking in water	0.454	0.548	0.603	0.648	0.693	0.556	0.620	0.655	0.712	0.771
T.C.***	0.629	0.664	0.752	0.816	0.855	0.701	0.765	0.804	0.862	0.995
Cooking in con-vention oven	0.429	0.533	0.587	0.643	0.683	0.531	0.606	0.641	0.686	0.759
T.D.***	0.557	0.612	0.669	0.737	0.752	0.597	0.682	0.716	0.807	0.899

* T.A. = Smoked samples stored for 10 days at 4°C.

**T.B. = Smoked samples stored for 30 days at 4°C

***T.C.D= Cooked samples stored for 4 days at 4°C.

Table (3): Changes in SV of skinned and unskinned chicken meat stored for 8 months at-18°C

Chicken samples prepared in the form of	Skinned					Unskinned				
	Storage periods (in months) at -18°C									
	0	2	4	6	8	0	2	4	6	8
Freezing	158.44	159.17	159.25	159.35	159.40	159.92	160.22	160.32	160.39	160.50
Smoking	158.45	159.82	159.20	159.97	160.04	160.41	160.95	161.00	161.07	161.19
T.A*	159.73	160.65	160.80	160.90	160.97	160.77	161.55	161.61	161.69	161.77
T.B.**	160.72	162.12	162.27	162.36	162.43	161.87	162.95	163.04	163.09	163.29
Cooking in water	159.21	160.09	160.27	160.32	160.36	160.76	161.42	161.50	161.59	161.74
T.C.***	160.34	160.76	161.04	161.12	161.19	161.49	162.22	162.24	161.32	162.53
Cookin in convention oven	160.09	159.94	160.02	160.17	160.22	160.47	160.85	160.09	161.17	161.39
T.D.***	160.23	160.41	160.48	160.69	160.69	160.81	161.75	161.81	161.89	162.07

* T.A. = Smoked samples stored for 10 days at 4°C.

**T.B. = Smoked samples stored for 30 days at 4°C

***T.C,D= Cooked samples stored for 4 days at 4°C.

Table (4): Changes in fatty acids (weight %) of skinned and unskinned chicken meat.

Fatty acids	Skinned Samples prepared in the form of		Unskinned Samples prepared in the form of	
	Frozen	Smoked	Frozen	Smoked
10:0	0.1296	0.16	0.1496	0.1449
12:0	0.2549	0.2397	0.2846	0.2645
12:1	0.0547	0.0447	0.06928	0.05916
13:0	0.06	0.05	0.06480	0.05477
13:1	0.1949	0.1749	0.2049	0.19
14:0	4.2949	4.3548	4.3699	4.3347
14:1	1.0698	1.0498	1.1698	1.12
15:0	0.5748	0.5899	0.5899	0.5896
15:1	0.1248	0.1148	0.1449	0.1349
16:0	15.1299	15.2343	15.3049	15.2293
16:1	20.1399	20.0149	20.19	20.0449
17:0	0.1849	0.1797	0.1849	0.1788
17:1	0.2592	0.2097	0.2898	0.2549
18:0	2.3349	2.30	2.4049	2.3445
18:1	4.2595	4.1090	4.3749	4.3099
18:2	9.2697	9.1099	9.7586	9.6488
18:3	1.3442	1.1264	1.3690	1.2289
18:4	2.6848	2.6049	2.7498	2.5747
20:0	0.2097	0.2097	0.2249	0.2144
20:3	0.06480	0.04472	0.0748	0.05
20:4	0.2738	0.2626	0.28	0.2489

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