

QUALITY OF TURKEY HAMBURGERS PROCESSED WITH GROUND *SCUTELLARIA BAICALENSIS* GEORGI ROOTS

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Introduction

Convenient foodstuffs, including meat products, have become more and more popular, especially in rapidly-growing and well-educated populations. Apart from the fact that people are looking for easy-to-prepare meals, they very often search for products containing natural substances. *Scutellaria baicalensis* Georgi is known for its high antioxidant activity and its incorporation in food products in order to slow down lipid oxidation and prolong shelf-life is now being considered. Lipid oxidation is one of the main limiting factors for the quality and acceptability of meat products. Synthetic and natural antioxidants can inhibit this process (McCarthy *et al.*, 2001, Fernandez-Lopez *et al.*, 2005, Wojdyło *et al.*, 2005). The aim of this study was to evaluate quality parameters of hamburgers made from turkey meat with the addition of *Scutellaria baicalensis* Georgi roots.

Materials and Methods

Ground, dry roots of Skullcap (*Scutellaria baicalensis* Georgi) were analysed by high performance liquid chromatography (HPLC) to determine flavone content (Oszmianski and Wojdyło, 2005). The main study was carried out on turkey hamburgers prepared from mechanically-deboned turkey meat, pork fat, breadcrumbs, potato flour and spices. The addition of 1000 ppm, 3000 ppm and 5000 ppm of Skullcap was tested. All ingredients were carefully mixed with ice and shaped into burgers of 6 cm diameter and 1.5 cm height. Finally they were deep fried in rapeseed oil until a temperature of 72°C was reached in the geometric centre of the product, chilled quickly, vacuum-packed and stored at 4°C for 15 days. Samples were taken at day 0, 5, 10 and 15. Lipid oxidation (TBARS) was determined by the method of Pikul *et al.*, (1989). Sensory evaluation of hamburgers was performed by a trained panel using a 5-point scale of acceptance. Objective measurement of colour (L*, a*, b*) was performed at the surface and in a cross-section of hamburgers. Hardness of the product was analysed on Zwick. All results were statistically analysed using STATISTICA (version 6.0) at a significance level of P=0.05.

Results and Discussion

HPLC analysis of Skullcap powder revealed it to contain baicalin (12.78% w/w), wogonin 7-glucuronoid (3.94% w/w), baicalein (0.04% w/w) and other unidentified compounds (3.24% w/w) (Figure 1). Skullcap used in turkey hamburgers significantly reduced lipid oxidation (Figure 2) as expressed by TBARS value. Sensory evaluation of the products did not reveal any significant differences between the control and hamburgers processed with Skullcap (Table 1). The highest lightness value (L*) of the product was analysed for control samples either on the surface or on the cross-sections (Table 2). However, colour measured on cross-sections during storage of hamburgers processed with Skullcap was more stable. Similarly to the sensory evaluation, instrumental texture profile analysis did not reveal any significant differences between hardness of experimental hamburgers (Figure 3). Moreover, the longer the storage time, the higher the hardness of all analysed products despite the level of added Skullcap roots.

Conclusion

Turkey hamburgers processed with Skullcap roots were characterised by similar to control samples in terms of values for quality parameters tested; however, the range of lipid oxidation was lower than in control samples. Roots of Skullcap can be utilised in hamburger processing.

References

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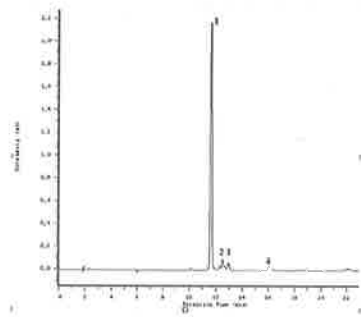


Figure 1. HPLC chromatograms of flavones of skullcap detected at 280 nm: 1-baicalin; 2, 3,- flavones unidentified; 4- baicalein.

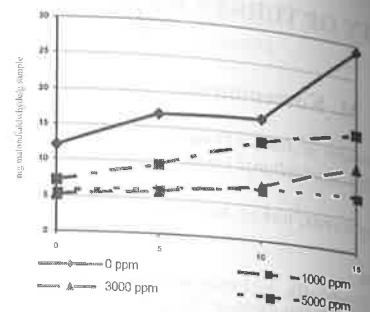


Figure 2. Effect of skullcap root addition on TBARS values of turkey hamburgers stored at 4°C for 15 days.

Table 1: Sensory evaluation of turkey hamburgers processed with roots of *Scutellaria baicalensis* Georgi and stored at 4°C for 15 days (sensory evaluation scale: 1-not acceptable, 5-very acceptable).

Storage time [days]	Colour				Flavour				Taste				Consistency				Overall acceptability			
	0	5	10	15	0	5	10	15	0	5	10	15	0	5	10	15	0	5	10	15
control	4.49	4.28	4.17	3.99	4.37	4.20	4.25	4.05	4.07	4.02	4.21	4.07	4.24	4.15	3.97	4.14	4.33	4.30	4.19	4.13
1000 ppm	4.27	4.09	4.09	3.73	4.22	4.28	4.06	3.77	4.10	3.87	4.23	3.96	4.30	4.10	3.61	3.94	4.19	4.15	4.12	3.77
3000 ppm	3.97	4.06	3.80	3.69	4.29	4.18	4.01	4.03	4.26	4.36	4.14	3.99	4.18	4.13	3.95	4.04	4.29	4.17	4.03	3.89
5000 ppm	3.96	3.54	3.53	3.40	4.35	4.20	4.05	3.81	4.13	4.08	4.01	3.90	4.20	4.19	3.98	3.81	4.29	4.08	3.84	3.88

Table 2: Colour measurements taken on the surface and cross-sections of turkey hamburgers processed with roots of *Scutellaria baicalensis* Georgi and stored at 4°C for 15 days (L*a*b* scale).

Storage time [days]	Colour of the hamburger surface				Colour of the hamburger cross-sections			
	0	5	10	15	0	5	10	15
*L parameter								
control	51.68	53.89	53.82	54.64	57.78	58.72	58.72	58.88
1000 ppm	49.56	52.10	53.46	52.79	56.42	56.93	56.61	56.80
3000 ppm	46.40	50.62	50.29	50.42	55.47	55.75	55.49	55.86
5000 ppm	45.76	49.70	48.63	50.93	54.29	55.46	53.84	54.61
a* parameter								
control	5.56	4.83	5.54	4.74	3.78	4.35	3.81	3.97
1000 ppm	4.72	4.23	3.70	3.62	2.88	3.21	3.03	3.06
3000 ppm	4.88	3.25	3.54	3.93	2.59	3.11	2.68	2.55
5000 ppm	4.53	3.80	4.19	3.18	2.76	3.02	2.66	2.90
b* parameter								
control	16.39	16.49	17.07	16.81	12.77	11.76	12.14	11.68
1000 ppm	15.30	15.28	14.17	14.26	11.89	11.30	10.83	10.88
3000 ppm	15.70	14.56	13.40	12.87	12.38	11.19	10.75	10.71
5000 ppm	14.61	14.93	13.32	12.00	12.67	11.79	11.03	10.62

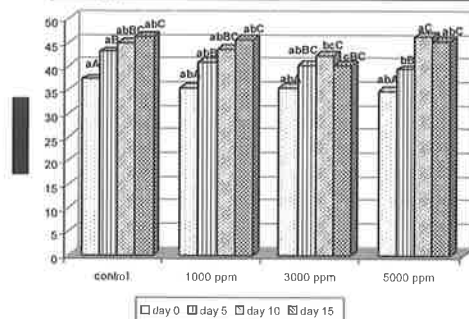


Figure 3: Effect of skullcap root addition on hardness of turkey hamburgers stored at 4°C for 15 days measured on Zwick equipment. a,b,c - means with different superscripts are significantly ($p \leq 0.05$) different when analysed for Skullcap addition, ABC - means with different superscripts are significantly ($p \leq 0.05$) different when analysed for storage time.

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