VOLATILE COMPOUNDS FORMATION IN FROZEN CARCASS THAT DIPPED IN BUTYLATED HYDROXY TOLUENE AND SODIUM TRYPOLY PHOSPHATE DURING EIGHT WEEK STORAGE

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Abstract

Ninety six CP-707 broiler were dipped in various dosages (0; 150 and 300 ppm) of antioxidants (BUTYLATED HYDROXY TOLUENE – BHT – and SODIUM TRYPOLY PHOSPHATE – STPP) were studied for eight weeks storage, on peroxide and iodine value; using Completely Randomized Design (CRD) with 2 x 3 factorial pattern, and each treatment were four times repeated. The first factor were anti oxidant variety : BUTYLATED HYDROXY TOLUENE – BHT - and SODIUM TRYPOLY PHOSPHATE - STPP; the second factor were the dosage of anti oxidant : 0ppm- as controle; 150ppm and 300ppm. Results indicated that 150ppm STPP could minimized the volatile compounds in carcass during storage.

Key words: frozen carcass, anti oxidant, BUTYLATED HYDROXY TOLUENE and SODIUM TRYPOLY PHOSPHATE

INTRODUCTION

Almost all foods undergo gradual changes during storage. Ignoring the degradation due to microorganisms, the typical cause of spoiling is the presence of oxygen and the products of chemical oxidation. The process of auto oxidation and the development of rancidity involve a free radical chain mechanism with several steps. In addition, lipid quality deteriorates under photo oxidative conditions or oxidation under thermal conditions. For these reasons preservatives with antioxidant activity have been added to packaged foods for many years. Major food preservatives include sorbates, benzoates, and synthetic antioxidants such as butylated hydroxytoluene (BHT), butylated hydroxyanisole (BHA) and sodium trypoly phosphate (STPP). The trends towards improving shelf life for products, away from synthetic chemicals in food and the increasing number of low fat (i.e. high moisture) convenience foods all require safe and effective preservatives. Thus there is renewed interest in the potential of "natural" and more water soluble antioxidants. Antioxidant are a diverse group of chemicals that can be naturally found in vegetables, fruits and plants in general. Antioxidants are also synthesized in the body. Examples of dietary antioxidant are vitamin E, C, A, phenolic acids, selenium, chlorophyl and chlorophyl derivates, carotenoids, flavonoids, glutathione, melatonen and lycopene. Synthetic dietary antioxidant include Butylated Hydroxyanisole (BHA) and Butylated Hydroxytoluene (BHT) and Sodium trypoly phosphate (STPP). Butylated Hydroxy Toluene (BHT) is a synthetic analogue of vitamin E and operates by reducing oxygen radicals and interupting the propagation of oxidation processes. It is widely used as an antioxidant and preservative. It is one of the most commonly used antioxidants for food oils and fats. Has limited application due to instability at high temperature, even it is generally regarded as safe. It is often added to rice, fats, oils and meats(1)

STPP usage as auxilliary agent of foodstuff processing. It also used as a foodpreservative for seafood, meats and poultry. BHA and BHT are phenolic compounds that are often added to foods to preserve fats. BHA and BHT are antioxidants. Oxygen reacts prefer intially with BHA and BHT rather than oxidizing fats or oils, thereby protecting them from spoilages. In addition to being oxidizable, BHA and BHT are fat soluble. BHT prevents oxidative rancidity of fats. It added directly to foods containing fats and oils (2).The USFDA lists BHA, BHT and STPP generally recognized as safe, along with salt, vinegar and baking powder. In food, STPP is used to retain moisture.

Such "biopreservatives" include vitamins C and E, which are natural antioxidants, the tocopherols and herbal extracts, particularly tea-, sage- and rosemary-based antioxidants. STPP is a white particle powder which can be dissolved in water. It's aqueous solution is weak alkalinity, it has great ability to complexing varied metallic cation. There is an especial need for extracts produced without the use of solvents as this is seen as being at odds with consumer concerns about solvents in general. In the light of all these dietary and technological changes, the inherent antioxidant properties of all the plant-based polyphenols offer natural options to food manufacturers. Some of the most commonly occuring polyphenols are the flavonoids with a large number of phenolic hydroxyl groups attached to ring structures that confer the antioxidant activity. They are multifunctional, acting as reducing agents, hydrogen donating antioxidants and singlet oxygen quenchers. They are ubiquitously distributed in the plant kingdom, being present in all vascular plants. They are responsible for the intense colours in all parts of a plant and estimated dietary intakes range from 500-1000mg/day of mixed flavonoids. This far exceeds the daily consumption of vitamin E and ß-carotene. The flavanols in particular, (the monomers catechin, epicatechin and their gallate esters as well as the oligomeric proanthocyanidins) are major constituents of many fruits, grains and beverages such as green and black teas, coffee, chocolate and wine. Thus there is a long history of their presence in the human diet, at rather high levels. Recently, a burgeoning scientific literature has reported on their health benefits. This includes the fact that these constituents of red wine could be at the root of the French Paradox – the low incidence of coronary heart disease in the southern French despite their high fat diet and tendency to smoke – as well as many papers reporting the prevention of cardiovascular diseases and cancer and other degenerative diseases, through their antioxidant and radical scavenging activities. In this series of experiments we have not sought to identify the specific reaction involved in managing the oxidation. Rather, we have simply performed some classical food preservation experiments to show that, at the usage level of 200-400 ppm, have measurable antioxidant activity. In addition, with some standard synthetic food-grade phenolic antioxidants such as BHT and BHA in a variety of model food and drink systems. These ranged from aqueous media to emulsions and oils in order to examine its activity in as many food types as possible.Antioxidant are a diverse group of chemicals that can be naturally found in vegetables, fruits and plants in general. Antioxidants are also synthesized in the body. Examples of dietary antioxidant are vitamin E, C, A, phenolic acids, selenium, chlorophyl and chlorophyl derivates, carotenoids, flavonoids, glutathione, melatonen and lycopene. Synthetic dietary antioxidant include Butylated Hydroxyanisole (BHA) and Butylated Hydroxytoluene (BHT). Sodium Trypoly Phosphate (STPP) is usage as auxiliary agent of foodstuff processing, used as a preservative for seafood, meats and poultry.

Poultry meat is the flesh of domestic birds, and includes that of chickens, turkeys, ducks, geese and guinea fowl. Refrigerated storage of meat is generally limited to relatively short periods, because deteriorative changes continue to occur and the rate of many of these changes accelerates with time. To achieve maximum storage duration while maintaining acceptable quality, all variables influencing storage life must be optimized. Meat storage duration depends on product characteristics. Poultry possess more highly unsaturated fats than beef or lamb, are more susceptible to development of oxidative rancidity, and therefore are seldom stored for more than a few days without vacuum packaging. Total fat in poultry, are 6.6%, and saturated fatty acids are 5.8%; monounsaturated are 6.6%; polyunsaturated are 7.4% and cholesterol are 14.4% Meat inspection regulations allow the use of BHA, BHT, TBHQ, propyl gallate and tocopherolls to retard rancidity. Their use is increasingly common with greatly increased production of products that are subject to lipid oxidation (3).

MATERIAL AND METHOD

Ninety six CP-707 broiler were dipped in various dosages (0; 150 and 300 ppm) of antioxidants (Butylated Hydroxy Toluene – BHT – and Sodium Trypoly Phosphate – STPP) were studied for eight weeks storage, on peroxide and iodine value; using Completely Randomized Design (CRD) with 2 x 3 factorial pattern, and each treatment were four times repeated. The first factor were anti oxidant variety : BHT and STPP; the second factor were the dosage of anti oxidant : 0ppm- as controle; 150ppm and 300ppm. Rancidity was calculated according to Iodine numbers and peroxide numbers.

RESULTS AND DISCUSSION

During the trial periods (eight weeks storage), the broiler carcass was dipped in BHA and STPP and stored for eight weeks in the freezer.

The Effects on Iodine Numbers

The effects of antioxidants (BHT and STPP) on Iodine Numbers were presents in Table 1.

Table 1. Effects of the antioxidants on Iodine Numbers

	Dose				
		I	II	III	IV
BHT	D-1 (0 ppm)	4.73	4.56	4.85	4.65
	D-2 (150 ppm)	2.72	2.85	2.78	2.68
	D-3 (300 ppm)	1.95	1.83	1.76	1.69
STPP	D-1 (0 ppm)	3.68	4.02	3.89	3.92
	D-2 (150 ppm)	2.10	2.05	1.98	2.12
	D-3 (300 ppm)	1.38	1.48	1.32	1.35

Tabel 1 shows that the iodine numbers from BHT and STPP antioksidant at a dose of 0 ppm, 150 ppm and 300 ppm for eight weeks.

In Table 2, the results of iodine numbers shows that BHT has greater values than STPP; and also shows that the greater the doses; the iodine number will become smaller.

Table 2. Total Iodine Numbers between Antioxidants and Dosage

Antioxidants		Dosage		Total
	D-0	D-1	D-2	
BHT	18.79	11.03	7.23	37.05
STPP	15.51	8.25	5.53	29.29
Total	34.30	19.28	12.76	66.34

When viewed from the results that STPP has smaller iodine number, it means that STPP can inhibit the rancidity than using BHT.

The Effects on Peroxide Numbers

The effects of antioxidants (BHT and STPP) on Peroxide Numbers were presents in Table 3.

Table 3. Effects of the Antioxidants on Peroxide Numbers

	Dosage				
		I	II	III	IV
BHT	D-1 (0 ppm)	8.46	8.36	8.48	8.54
	D-2 (150 ppm)	5.74	5.59	5.88	5.63
	D-3 (300 ppm)	3.85	3.93	3.99	3.77
STPP	D-1 (0 ppm)	6.52	6.34	6.69	6.89
	D-2 (150 ppm)	4.20	4.41	4.24	4.38
	D-3 (300 ppm)	2.96	2.84	3.05	2.87

In Table 3, shows the peroxide numbers for eight weeks wtorage, using BHT and STPP at a dose of 0 ppm, 150 ppm and 300 ppm.

Table 4 shows the results of peroxide numbers, that BHT has greater values than STPP. It means that STPP has more antioxidant effects to maintain the broiler carcass in freeze condition.

Table 4. Total Peroxide Numbers between Antioxidants and Dosage

Antioxidants		Dosage		Total
	D-0	D-1	D-2	
BHT	33.84	22.84	15.54	72.22
STPP	26.44	17.23	11.72	55.39
Total	60.28	40.07	27.26	127.61

From the total results of BHT and STPP through eight weeks storage, it shows that STPP was better to maintained freezed broiler carcass than using BHT.

CONCLUSIONS

1. STPP significantly better than BHT in prevents oxidative rancidity of fats in freezed broiler carcass. Frozen broiler carcass will become rancid after eight weeks of storage.

2. 150 ppm STPP could minimized the volatile compounds in broiler carcass during frozen storage.

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