THE EFFECT OF SUPPLEMENTED VITAMIN E ON POULTRY PSE

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BACKGROUND

In the past, PSE (Pale, Soft, Exudative) in poultry has been regarded to occur particularly related to turkey meat texture (Froning et al. 1978). This subject has recently been sparked by Barbut and co-workers whom reported the occurrence of PSE in mature turkeys hens and its consequence on the meat functional properties (Barbut, 1997a). They also investigated the seasonal effect on poultry meat in which during summer season there was an increase in numbers of PSE birds therefore related to warm weather conditions (McCurdy et al. 1996). Since most of Brazil regions are considered to be located in tropical area, it is reasonable to believe a significant economical problem is related to Brazilian poultry PSE. The 1997 annual production in chicken meat is reckoned to be over 4.4 millions of tons, a second producer country in the world. A tentative statistical measurement of chicken death during transportation could vary between 0.1 to 3.0% which would represent an enormous economical loss for poultry industries (Olivo et al. 1998). It is well established the beneficial effect of supplemented vitamin E to inhibit lipid oxidation and to stabilize color of meat (Buckley & Morrissey, 1992). In this work, we are reporting evidence of the occurrence of PSE in chicken meat and the minimization of its effects by supplementation of α-tocopherol to the birds.

OBJECTIVES

To investigate the effect of supplemented α-tocopherol to control PSE chicken meat

METHODS

Heat Stress: 32 commercially chickens of 49 days of age were exposed to heat treatment of 42°C for 1h and other 32 birds of the same flock were left in the control pre-slaughtering conditions to be used as control (cold) (Froning et al. 1978). All analyses were carried out in breast samples, *Pectoralis. m.*

pH : pH was determined in triplicate by Methrom pHmeter, model 744.

Drip loss : Drip loss was measured according to Dirinck et al. (1996).

Chicken and diets : Commercial chicken (n=64) were selected at random and divided into two groups (n=32) and fed basal diets containing successively 150 IU/kg for 0 to 21 days, 30 IU/kg for 22 to 42 days and 7.7 IU/kg for 43 to 49 days to the first group. To the second group, supplemented diets were given containing also successively 150 IU/kg for 0 to 21 days and 200 IU/kg for 22 to 49 days of α-tocopheryl acetate (Roche).

RESULTS AND DISCUSSION

pH

Fig. 1 shows the results of pH values monitored with time in *Pectoralis m.* from both heat-treated and cold samples. Unsupplemented cold and heat-treated birds present the lowest slop values having tendency for PSE formation whilst supplemented cold and heat-treated samples show the highest slop values. This fact is an indication of inhibition of PSE induction by vitamin E. Moreover, this is not a complete inhibition since the ultimate pH for the supplemented heat-treated meat is reached within 25-30 min against 15-20 min for the unsupplemented cold birds. It should be emphasized this ultimate pH for supplemented and cold meat is reached within 40-45 min. These results are in accordance with other reports. Cheah et al (1995) state that the rapid onset of rigor in pig PSE meat is due to an excessive liberation of Ca^{2+} and vitamin E would stabilize the integrity of mitochondria membrane with inhibition of phospholipase A2 activity. In addition, the rapid decline of pH in 15 min at relatively high temperature denatures muscle proteins in heated samples whereas supplemented meat samples delayed the pH fall and muscle will be in rigor and myosin is protected from further denaturation by combination with actin (Offer, 1991).

Drip losses

Table 1 shows that meat from cold and cold supplemented birds present the lowest value of drip loss and conversely the highest values for heat and supplemented heat treated birds. However, there is 28.8% more drip loss in unsupplemented heat treated sample indicating there is more dramatic drip loss in meat without vitamin E. The faster the rate of glycolysis the greater is the amount of drip loss indicating under the conditions of our experiment the myofibrillar and sarcoplasmic proteins are denatured therefore would not retain water efficiently.

CONCLUSIONS

Supplementation of vitamin E in diets is effective to slow down the onset of rigor in chicken meat measured by the rate of pH fall therefore preventing PSE formation through inhibition of myofibrillar and sarcoplasmic proteins denaturation

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TABLE 1 - Meat Drip Loss from birds measured within 72 hours *post mortem*

Treatment	Mean [1]	Standard Deviation	Comparison[2]	Significant difference
Cold	1.70	0.4318	Cold vs Supplemented	no
Heat treated	3.31	1.2120	Cold vs Heat treated	yes
Cold Supplemented	1.85	0.3100	Cold vs Heat treated Supplemented	yes
Heat treated Supplemented	2.57	0.5367	Supplemented vs Heat treated	yes
			Supplemented vs Heat treated Treated	no
			Heat treated vs Heat treated-Supplemented	no

n=15

1 - % of weight loss

2 -.Tukey-Kramer Multiple Comparisons Test

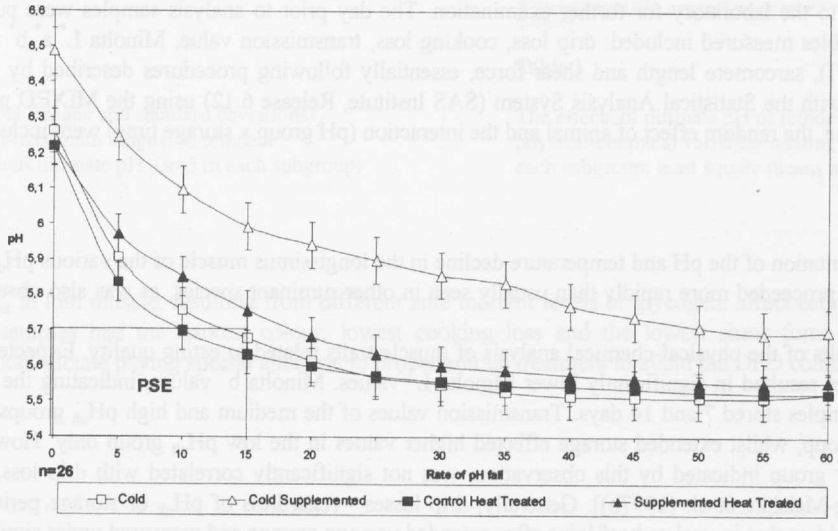

Fig.1 – Rate of pH fall (units/min) in breast muscle (*Pectorals m.*). The indicated area is the lag time to occur PSE in chicken meat according to Barbut (1997b)

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