

## **ADDITION OF LIQUID FLAVOR VITAMIN D<sub>3</sub> IN DRINKING WATER BEFORE CHICKEN TRANSPORT AND ITS EFFECTS ON THE STRESS, CARCASS AND MEAT QUALITY**

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**Key Words:** Chicken, vitamin D3, carcass quality, meat quality.

### **Introduction**

Brazilian chicken meat chain is growing in an expressive way in the last few years. Concerning to the international market in the year 2004 Brazil became the leadership reaching 2.4 million tons, approximately 16% of the total chicken meat produced in Brazil and it is the fourth in meat consumption (35kg/per person/year, AVEWORLD, 2005).

The poultry industry in Brazil is also driving attention on the application of animal welfare principles in the farm and during the pre-slaughter operations aiming to reduce the economic losses as well as to fulfill the requirements from imported countries (INDUSTRIAL POULTRY KEEPING, 2004). Considering these investments made by the chicken industry on the slaughter systems the downgrading of the chicken carcass on the Brazilian abattoir is still high varying from 5 to 15%.

A new feed additive developed in Canada has shown potential to overcome these losses by reducing the agitation of the animals during the pre-slaughter operations. This product is commercially market as a liquid flavor vitamin D3 and it is recommended to add in the drink water 5 to 7 days before the animal transport.

### **Objectives**

The object of this study is to evaluate the addition of liquid flavor vitamin D3 in the drink water of chickens during seven days before slaughtering and its effects on carcass quality (bruise, broken bones and skin damage) and the meat (pH, color, water holding capacity and tenderness).

### **Methodology**

**Animals.** A total of 13.000 chickens divided in two groups (control, n=6.500 and test - liquid flavor vitamin D3, n=6.500) constituted of one genetic line (Hybro) broadly marketed in Brazil was used in this experiment.

**Slaughter.** The fasting period adopted in this experiment was 7 hours. Chickens were transported during 1 hour in commercially haulier at stock density of ...kg/ m<sup>2</sup>. The resting period at the abattoir varied from 0.5 to 1 hour and chickens from each group was electric stunned (1140 Hz and 50V), bled, eviscerated and cooled in a chiller.

**Measurements.** Three hundred chilled carcasses were evaluated according to the USDA (1992) grading systems in three classes A, B and C taking into account the presence of the bruises, broken bones, skin damage.

The *pectoralis major* was removed from carcass and pH measurements at 1h and 24h (ultimate) was carried out.

Instrumental color of *pectoralis major* was measured using Minolta Chromameter and the CIE Lab L\*, a\* and b\* co-ordinates were recorded at 1h and 24h postmortem.

Water Holding Capacity (WHC) of *pectoralis major* was determined according to the methodology described for NAKAMURA & KATOH (1985)

Warner Blatzler shear force (WBS) of 1.27x1.27x2.54 cm core samples sheared perpendicular to the fiber direction in three steaks of *pectoralis major* were determined with a TAXT2i Texture Analyzer (full scale load 5kg/crosshead speed 200 mm/min) attached to a Warner Blatzler accessory, as the methodology proposal for FRONING & UIJTTEENBOOGAART (1988).

The statistical analysis was carried out using SAS (SAS Inst. Inc., Cary, NC, 1993). Carcass quality, pH and other meat quality characteristics (instrumental color, water holding capacity and tenderness) results were assessed by application of chi-square, repeated variance analysis and analysis of variance, respectively.

## Results and Discussion

The statistical results of chicken grading according to the USDA standards are presented in Table 1. Liquid flavor vitamin D3 treatment (group test) was significantly better since the majority of the carcass (77.66%,  $p = 0.03$ ) presented less damage (class A). This represents a good profit to the chicken abattoir because these carcasses normally are driving to the export market. However, the carcasses from control group, mainly class C, were downgraded significantly (51.23%,  $p = 0.03$ ). Normally these carcasses are boned and sold in the internal market or it can be used as a raw material for further processed meat product.

Comparing the pH values obtained during postmortem hours evaluated (Figure 1) it can be said that the treatments studied did not differ significantly ( $p > 0.05$ ). The ultimate pH values reached a range considered as normal meat (5.7 to 5.8) according to Olivo et al., (2001).

The data obtained by CIE L\* a\* b\* system for the *pectoralis major* muscle indicate that the brightness (L\*), redness (a\*) and yellowness (b\*) measured at 24 h *post mortem* were influenced significantly ( $p < 0.05$ ) by the treatments studied. The liquid flavor vitamin D3 (group test) resulted higher L\* and a\* values as it can be seen in Figure 2. In this experiment the variations in the color composition as far as brightness (L\*) values are concerned (50.25 to 51.75) falls into the range considered as normal meat (50 to 52) according to the classification proposed by Olivo et al., (2001).

The statistical analysis of water holding capacity and tenderness results revealed no significant difference ( $p > 0.05$ ) for the treatments studied.

## Conclusions

The liquid flavor vitamin D3 has proved its efficiency in this trial since reduced carcass damaged and had no negative influence on meat quality characteristics. It is necessary to point out that the less agitation of the birds observed in the farm mostly during the catching for transport contributed to this fact positively.

When it is considered the production of the chicken meat in Brazil (8.668.000 tones of meat) the use of liquid flavor vitamin D3 will provided more chickens carcasses (15.48%) which could be exported. This fact combined to the increasing number of the countries to which Brazil is exporting (130 countries) will ensure the success of the Brazilian chicken market.

## References

- AVEWORLD. Ranking of the exportations of the chicken meat in 2004. Yearbook 2005, p.38–43.
- Nakamura, M.; Katoh, K. Several Influence of thawing method on properties of rabbit meat. Bulletin of Agricultural & Environmental Sciences. Department of Poultry Science, 1985.
- Froning, G.W.; Uijttenboogaart, T.G. The effect of post mortem electrical stimulation on color, texture, pH and cooking lose of hot and cold deboned chicken broiler meat. Poultry Sci., v.67,p. 1536–1544, 1988.
- Olivo, R.; To Sound.L., Gone, L.; Shimokomaki, M. Journal Food Biochemistry, 25: 271–283, 2001.SAS Institute. SAS User' s Guide: Statistics Cary, the USA: SAS Inst., 1993.
- USDA. United States Department of Agriculture. United States classes, standards and grades for poultry (AMS 70.200). 2002, 24 p.

Table 1. Number and percentage of the animals graded in class A, B and C according to the treatments Control (1) and Liquid flavor vitamin D3 (2).

Treatments	Classes			Total
	A	B	C	
1	120 62.18%	29 15.03%	44 22.80%	193 100%
2	153 77.66%	21 10.66%	23 11.68%	197 100%

P = 0.03, chi square

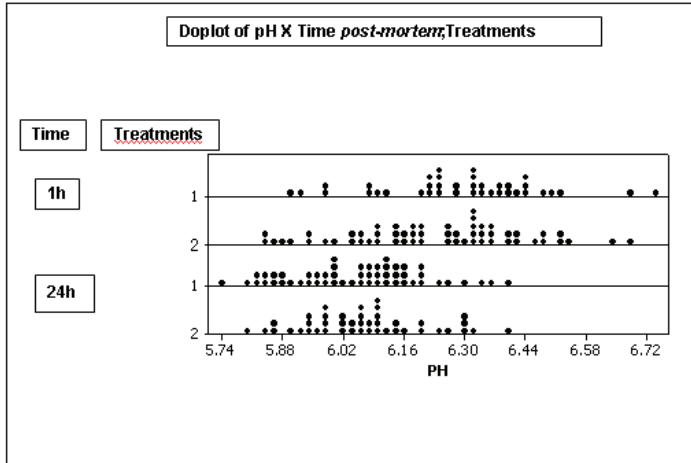


Figure 1. Change in pH values in *pectoralis major* according to the treatments control (1) and liquid flavor vitamin D3 (2)

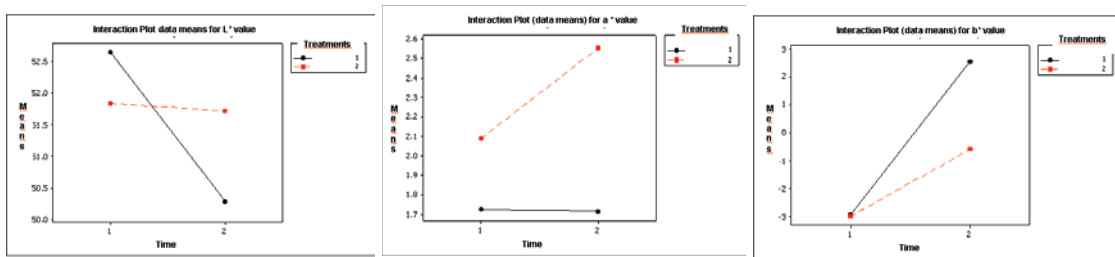


Figure 2. Effect of the treatments control (1) and liquid flavor vitamin D3 (2) on initial and final CIE color values of *pectoralis major*.