

# Abstract

Presented at International  
Poultry Scientific Forum,  
Atlanta, GA – Jan. 2007



## Rapid and dramatic improvement in color intensity of brown egg shells from caged laying hens fed dietary CALSPORIN® (*Bacillus subtilis* C-3102 spores) in a commercial field trial in China.

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China has a population of over 1.3 billion people with about 1.3 billion laying hens of which ~80% are brown egg strains. Uniformity and intensity of brown egg color are important marketing considerations because excellent brown egg color (and shell quality, as reported previously) can extend production, bring a premium price (Japan and Korea), or enhance marketing of natural and organic eggs (U.S.). Brown egg color becomes lighter as hens age. An investigation was conducted using dietary CALSPORIN®, a commercial direct-fed microbial product containing *Bacillus subtilis* C-3102 spores, to demonstrate the brown egg color enhancing effect of CALSPORIN® already observed in other situations. Lohmann brown hens, 65 wk 4 d of age (459 d), at Xiazhuang Egg Farm, Beijing, China and caged in 10 houses of 5,000 birds each, were fed CALSPORIN® for 13 d. Inclusion levels were  $1 \times 10^6$  CFU/g feed (3.33x) for 7 d (459 to 465 d) and  $6 \times 10^5$  CFU/g feed (2x) for 6 d (466 to 471 d). Shell color was determined daily before and during CALSPORIN® feeding, except 1 d (446 d), from 63 wk 3 d (444 d) to 67 wk 1 d (471 d) from ~150 hens designated for the trial (84-125 eggs/d; collection d=26, 13 before and 13 during) using an egg color fan (1=light to 10=dark brown; Ghen Corp.). Daily weighted mean egg shell color scores were: before – 6.02, 5.46, 5.15, 5.72, 5.68, 5.78, 5.83, 5.75, 5.56, 5.82, 5.60, 6.30, 5.92 (5.74, 13 d, n=1,393 eggs); during – 6.12, 5.75, 5.87, 6.20, 6.10, 6.46, 6.60, 6.35, 6.50, 6.22, 6.47, 6.33, 6.84 (6.29, 13 d, n=1,321 eggs, vs 5.74  $P < 0.001$  by 1-way ANOVA). Hen-d egg production was 70.78% before and 68.20% during CALSPORIN® feeding with age progression ( $P=0.20$ ). Compared to the period before, CALSPORIN® feeding increased egg counts in fan color score categories #7 (23.60% vs 14.11%,  $P < 0.001$ ) and #8 (22.78% vs 17.98%,  $P < 0.001$ ), and this shift was associated with a decreased egg count in #3 (5.03% vs 13.16,  $P < 0.001$ ). Dietary CALSPORIN® rapidly and significantly ( $P < 0.001$ ) improved brown egg shell color.

Poultry Science 86:1553 (Abstr.); 2007

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QTI ABST '07 01-12/16

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