

Effect of sodium bentonite containing ferric oxide for treatment of cottonseed meal on egg quality

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Introduction Gossypol's toxicity has been major complicating factor in the use of cottonseed meal (CSM) as a plant protein source for non-ruminant livestock. Feeding of laying hens with diets containing Free Gossypol (FG) can produce eggs that have olive or brown yolk discoloration after cold storage (Davis *et al.*, 2002). Sodium bentonite (SB) is an aluminium silicate powder that can absorb water. Three layer structure complexes of SB allow internal absorption of ions into the interlayer sheets (Trekova *et al.*, 2004). Hashemipour *et al.* (2008) reported that by including SB into the diet of laying hens, yolk colour index decreased.

Materials and methods In a 3×3 factorial arrangement in a completely randomized design with 9 dietary treatments in 4 replicates consisting of 3 levels of SB (0, 1 and 2%) and 3 levels of CSM (0, 10 and 20%) were tested. Nine mash diets were

Item	Egg production (%)	Egg weight (g)	SG	Shell thickness (mm)	Shell%	Yolk Colour	Index
0% SB	80.52 ^a	64.38	1.078	0.339	8.88	7.239 ^a	
1% SB	82.99 ^a	64.09	1.077	0.334	8.74	7.050 ^b	
2% SB	77.80 ^b	64.82	1.077	0.339	8.86	7.099 ^b	
SE	1.467	0.431	0.0005	0.003	0.074	0.0344	
0% CSM	81.72 ^a	65.07 ^a	1.077	0.338	8.76	6.939 ^b	
10% CSM	82.27 ^a	64.80 ^{ab}	1.077	0.336	8.74	7.167 ^b	
20% CSM	77.33 ^b	63.41 ^b	1.078	0.339	8.97	7.284 ^a	
SE	1.467	0.431	0.0005	0.003	0.074	0.0344	
0%SB×0%CSM	79.45	65.56	1.077	0.340	8.79	7.156 ^b	
0%SB×10%CSM	81.91	64.64	1.078	0.337	8.89	7.170 ^b	
0%SB×20%CSM	80.20	62.93	1.078	0.340	8.97	7.392 ^b	
1%SB×0%CSM	84.84	64.64	1.077	0.336	8.72	6.739 ^b	
1%SB×10%CSM	85.67	64.87	1.076	0.334	8.62	7.166 ^{bc}	
1%SB×20%CSM	78.45	62.75	1.077	0.332	8.87	7.246 ^b	
2%SB×0%CSM	80.87	65.00	1.077	0.337	8.97	6.923 ^{ab}	
2%SB×10%CSM	79.21	64.90	1.077	0.346	8.70	7.166 ^b	
2%SB×20%CSM	73.33	64.55	1.078	0.343	9.08	7.208 ^a	
SE	2.541	0.747	0.0009	0.005	0.129	0.0597	
Source of variation			probability				
SB	0.048	0.495	0.336	0.414	0.360	0.0018	
CSM	0.047	0.025	0.449	0.724	0.070	<0.001	
SB×CSM	0.950	0.580	0.926	0.813	0.800	0.0225	

fed to 288 commercial Hy-Line W-36 hens from 51 to 62 weeks of age. The hens acclimatized to the experimental diets one week prior to the commencement of experiment. Four eggs were randomly collected from each replicate, weighed. Egg specific gravity (SG) was measured by flotation method every other week. Yolk colour score was compared to Roche Yolk Colour Fan. Data were analyzed using the GLM procedure of SAS 9.1 (SAS, 2004). Tukey's Studentized Range (HSD) test was used to compare means ($p < 0.05$).

Results There was no significant effect of SB or CSM or their interaction on SG, shell percent, shell thickness. The egg production and egg weight significantly ($p < 0.05$) decreased and Roche Yolk Colour Fan significantly ($p < 0.01$) increased with increasing of CSM in diet. Roche Yolk Colour Fan significantly ($p < 0.01$) decreased as dietary SB increased. Egg production was decreased at level of 2%SB.

Table 1 The effects of experimental diets on egg production, egg weight, SG, shell thickness, shell percent and yolk colour
Note: Values with different superscripts in each column are significantly different ($p < 0.05$).

Conclusion Under the conditions of this experiment, 1% SB in the diet was useful for reduction of yolk discoloration without any adverse effect on laying hen performance or egg quality, but still more research is needed to confirm this positive effect and the possible absorption of FG.

References

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