REVISED: Positive Impact of AZOMITE® on Commercial Egg Production

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Improving production rates and the quality of hen eggs are topics that concern most societies worldwide, because eggs continue to be a quality nutrition resource for mankind (Jones, 2010). This paper concerns the use of AZOMITE® in layer diets. AZOMITE® (AZO) is the registered trademark name of an ore that contains ~ 70 minerals and trace elements, unique to the deposit from which it is mined. Nutritionists have a good understanding of the biochemical function of ~ 10 essential trace minerals, but it is recognized that several other trace or micro-trace minerals found in AZO are important (Tompkins & Bird, 1998) despite knowledge gaps about their functions.

AZO is classified as a hydrated sodium calcium aluminosilicate (HSCAS, of formula $NaK_2Ca_5Al_{13}S_{21}O_{70}.6\text{-}H_2O$) and is GRAS, U.S. Code of Federal Regulations (21 CRF 582.2729). The improvement in the quality of animal feeds when they contain AZO for shrimp, fish, poultry (Hooge ,2008), pigs, dairy cattle, horses, pets and in agriculture makes it a truly unique product.

Two trials were conducted, one involving Novogen White (W) laying hens, and the other involving Hy-Line Brown (B) laying hens with different dose levels of AZO. In addition, B3 hens were fed a diet containing AZO up to and through week 12. AZO was removed from the diet for the remaining 12 weeks of the (B3) trial.

The results of the two trials are presented together, below, but they were two, separate trials, not one.

AZO Feed Grit was included in isocaloric, isonitrogenous feeds for both Novogen White (W) and Hy-Line Brown (B) laying hens (McNaughton et al. 2015, AH Pharma, Tests AZ-03 and -05).

For each of the W and B hens, 135 pullets were divided into 3 groups of 15 pens/group (3 hens/pen) and then fed test feeds for 16 (W) or 24 (B) weeks.

A basal feed was prepared for the entire trial with AZO replacing an equal amount of corn as appropriate. Soy oil was added to test feeds to produce an isocaloric diet, and the feed was remixed and fed to the different test groups, as shown in Table 1.

In the data sets of Table 1, averaged values for the various groups of 15 pens of 3 hens per pen without a common superscript are different ($p<0.05$) as determined by Least Significance Difference.

<u>Table 1</u>: Egg production in White (W) and Brown (B) Hens, +/- AZOMITE®

Parameter	W1	W2	W3	B1	B2	B3
AZO %w/w	0	0.15	0.3	0	0.25	0.25 (0-12 weeks)
Peak Production %	93.02^{b}	95.48^{a}	97.94^{a}	91.0^{b}	95.0^{a}	95.0^{a}
Bi-Weekly (6-16) Avg. %	91.11^{b}	93.02^{ab}	94.59^{a}	84.34^{b}	87.99^{a}	86.83^{ab}

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Improvements in peak egg production were noted in both W and B flocks feeding on AZO diets, and peak egg productions for both were achieved 7-10 days earlier than control birds feeding on AZO-free diets. % average egg production in both W and B hens were improved ~ 3% by AZOMITE®.

<u>Table 1</u> continued:

		W1	W2	W3	B1	B2	B3
Egg Wt. (g/egg), 12-16 wk		59.32[b]	60.76[ab]	62.24[a]	60.38[b]	64.81[a]	64.19[ab]
Yolk Wts. (g)	16 wk	18.68[b]	19.25[ab]	19.52[a]	18.80[b]	19.30[ab]	19.50[a]
Haugh Units	16 wk	63.35[a]	64.48[a]	65.46[a]	62.41[a]	62.41[a]	62.41[a]
Sp. Gravity,	12 wk	1.078[a]	1.078[a]	1.078[a]	1.055[a]	1.055[a]	1.055[a]

Egg weights of W and B hens were improved nearly 4% and 7%, respectively, with AZO.

B3 egg weight decreased after the 12th week, until it was no greater than B1 at 24 weeks, but yolk weight of B3 was ~ 3.5% greater than B1 yolk weight at week 24, and B3 yolk weight equaled B2 at 24 weeks.

Yolk weights of W2 and W3 hens were greater than the Control (W1). Neither Haugh units nor the specific gravity of W and B eggs were changed by AZO.

<u>Table 1</u> continued:

		W1	W2	W3	B1	B2	B3
Shell Wts (g)	12 wk	6.843[a]	6.840[a]	6.763[a]	6.631[b]	6.826[a]	6.855[a]
	24 wk	N.D.	N.D.	N.D.	7.898[b]	8.287[a]	7.80[b]
Shell Thick (mm), 16 wk		0.346[a]	0.347[a]	0.344[a]	0.322[b]	0.348[a]	0.348[a]

N.D. = Not determined.

Neither shell weight nor shell thickness of W eggs were changed by AZO. Shell thickness : weight ratios were constant in W1, W2 and W3. AZO increased the shell weights of B2 and B3 over B1 at the 12th week.

At the 24th week B2 shell was 4.9% heavier than B1, but B3 and B1 shell weights were identical.

Shell thickness of Brown eggs at 16 weeks was improved ~ 8% by the AZO in both B2 and B3 diets compared to B1. The ratio of shell thickness : shell weights was equal in the test. This translates into fewer broken eggs as egg size increases (Venglovska, 2014).

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<u>Table 1</u> continued:		W1	W2	W3	B1	B2	B3
Feed/doz. Eggs	kg/doz	1.728^{b}	1.668^{ab}	1.644^{a}	1.796^{b}	1.746^{a}	1.729^{a}
Body Wt,	kg/bird Day 0	1.332^{a}	1.313^{a}	1.310^{a}	1.26^{a}	1.261^{a}	1.262^{a}
	At end of Test	1.544^{a}	1.545^{a}	1.562^{a}	1.552^{b}	1.586^{a}	1.562^{ab}
Feed Eaten (g/b/d) Avg		130.94^{a}	129.1^{a}	128.38^{a}	123.38^{a}	125.37^{a}	123.39^{a}

Feed eaten per dozen eggs produced was improved in W flocks by ~ 4.8% and by ~ 3.2% in B flocks. Feed eaten by the two flocks was identical to controls. Body weights of W1, W2 and W3 all weighed the same at the end of the test. However, B2 hens were 34 grams (2.19%) heavier than B1, and B3 hens were 10 grams heavier than B1.

<u>Table 1</u> continued:	W1	W2	W3	B1	B2	B3
Heavy Metal (mg/kg/egg)						
Cadmium (Cd)	N.D.	N.D.	N.D.	0.0105^{a}	0.0105^{a}	N.D.
Lead (Pb)	N.D.	N.D.	N.D.	0.0164^{a}	0.0141^{a}	N.D.
Mercury (Hg)	N.D.	N.D.	N.D.	$<0.010^{a}$	$<0.010^{a}$	N.D.

Cadmium, lead and mercury levels of composite samples of 10 eggs/group were measured (Eurofins Scientific, sample 464-2015-08200193). No differences were detected.

In totally separate work, field trials with 93-101 ^{0}F (~ 36 ^{0}C) temperatures, one customer added 0.5% w/w AZO to half (5,000 birds) of his Lohman hens' feeds at 2 week intervals for 3 ages of hens (8, 37, and 64 weeks). AZO reduced lameness 4-fold at all ages, reduced % broken eggs slightly in the 37 and 64-week hens, but it increased egg/day production 4% in 64 weeks old hens. Another 2-week field test (28 control versus 19 0.5% w/w AZO houses), revealed a 75% improvement in eggshell specific gravity.

CONCLUSIONS.

1. Including AZO in the feeds of Novogen White and Hy-Line Brown layers resulted in achieving peak egg production about 1 week sooner and superior egg production continued until the end of the two studies.
2. Eggs from both AZO-treated hen strains were larger than control feed groups, and the Brown eggs had heavier & thicker shells.
3. Yolk weights were improved by the presence of AZO.
4. The presence of AZO in diets improved feed consumption/dozen eggs produced by 5% in the Novogen hens and 3.7% in the Hy-Line hens.

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5. Body weights of the Novogen hens were not changed by the presence of AZO, but body the weights of Hy-Line birds eating an AZO diet were increased by 34 grams in the 24 week feeding program.
6. The presence of AZO did not change the cadmium, lead or mercury content of AZO eggs compared to control eggs.
7. B3 hens were fed a diet containing 0.25% w/w AZO up to and through week 12. After this these hens were fed an AZO-free diet. The result was that the removal of the Azo from B3 hens caused a reversion to the egg weight performance of the B1 animals, although yolk weight was still improved, at least up to 24 weeks, even though Azo was no longer in the B3 post-12 week diet.
8. Shell weight and thickness of the W eggs were not changed but those of the B eggs were improved by AZO. In the field study during hot weather (~ 33 ^{0}C), the specific gravity of the eggs from the W hens was improved by eating AZO for just 2 weeks.

References.

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