# Using Aquatize® in the Absence of Antibiotics

Obtaining safe meat for human consumption without the use of antibiotics and other traditional additives during the live production phase of meat production is a major objective of all societies as we enter this century. However, in simplistic terms, the task is daunting and almost beyond comprehension; nonetheless, to eliminate the concerns for the spread of antibiotic resistance among microbial species, animal producers have few choices but to rise to the occasion and solve the problems.

The problem of growing animals without antibiotics in the feed is truly immense as enteric bacterial infections are among the most common and economically significant diseases affecting swine and poultry production worldwide. Conservatively, we estimate that as much as 50% of the antibiotic usage in animal production is used to ward off the ravages of enteric diseases.

Clinical signs of enteric microbial infections include diarrhea, reduced growth rate, weight loss, and death of young animals and even death of older animals. Etiological agents include *Escherichia coli, Clostridium perfringens*, *Lawsonia intracellularis*, *Salmonella sp*. *and Brachyspira (Serpulina) sp* and are but a few of the more common pathogens. Histological changes observed in intestines of animals with these enteric infections include colonization without much damage, attaching and effacing lesions with pathogenic *E. coli* and *Brachyspira* and necrotizing and hemorrhagic lesions with many of isolates of *Clostridium perfringens*.

Species of *Clostridium perfringens* are further classified into five toxigenic subtypes (A – E) on the basis of the subtypes ability to produce different toxins. In calves, pigs and poultry, subtypes A and C seem to be more prevalent than the other subtypes. Thus it was important to examine the efficacy of Aquatize to reduce or eliminate one of the more important of these disease agents in a controlled experiment. We also included two other commercial products (BioSentry Iodine and Oxine) that are used to sanitize drinking water.

A model of intestinal necrosis was chosen for study that is easy to reproduce in a laboratory setting and that has economic relevance for the production of meat animals during modern times when society dictates that antibiotics and chemicals treatments must be reduced or eliminated.

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Aquatize Aids the Prevention of Necrotic Enteritis in Broiler Chickens Challenged with *Clostridium perfringens*. James L. McNaughton, PARC Institute, Inc., and Thomas L. Haschen, Papillon Agricultural Products, both of Easton, Maryland

Previous in vivo poultry reports found Aquatize (stabilized sodium chlorite intermediates) reduced the effect of *Salmonella enteritidis* broiler infection, ameliorated the effect of *Bordetella avium* turkey infection, and increased nitrogen retention. Two studies evaluated Aquatize administered via water in preventing necrotic enteritis (NE) in broilers and reducing fecal bacteria. The NE model included challenging each young broiler with 200,000 *Eimeria acervulina* per bird on the 5th day followed by *Clostridium perfringens* (CP) on the 7th day.

To start the test, healthy, newly hatched broiler chicks (Ross x Cobb males from a commercial source) were randomly placed into wire-floor cages. Treatment groups were composed of 100 birds per group distributed into 10 pens of 10 birds/pen. Birds and feed were weighed on day 21 (end of trial). The test groups included:

Uninfected Control (UC),
Infected Control (IC),
Infected Control + 66 ppm salinomycin and 55 ppm bacitracin (IC+M),
Infected Control plus Aquatize()(1:2,000) in the drinking water (IC+A),
Infected Control + Aquatize( + Sodium Bicarbonate (IC + A + B),
Infected Control + Sodium Bicarbonate at 0.30% (IC + B),
Infected Control + BioSentry Iodine at 1:256 dilution (IC + I),
and Infected Control + Oxine at 1:1024 dilution (IC + O).

**Table 1**: **Weight, Feed Conversion, Mortality, Intestinal Lesions and Fecal CFU**

| Trt Group | 21-D Weight (grams) | Feed Conv. (gr/gr) | Lesion Score | Mortality (%) | Fecal CFU (% reduced) |
|---|---|---|---|---|---|
| UC | 520 a | 1.358 a | 0.14 a | 3.0 | 11% |
| IC | 383 d | 1.476 d | 2.64 d | 8.0 | ---- |
| IC+M | 430 c | 1.414 c | 1.61 c | 4.0 | 24% |
| IC+A | 485 b | 1.372 b | 0.74 b | 3.0 | 85% |
| IC+A+B | 505 ab | 1.364 ab | 0.53 b | 3.0 | 92% |
| IC+B | 416 c | 1.452 d | 1.82 c | 4.0 | 35% |
| IC+I | 424 c | 1.410 c | 2.22 d | 4.0 | 46% |
| IC+O | 512 ab | 1.368 ab | 0.69 b | 5.0 | 88% |

Letter superscripts that are different are statistically significantly different at $p < 0.05$. Intestinal lesions were scored as: 0 = no redness present; 1 = red spots and/or strikes present; 2 = ¼ to ½ of the intestine is red; and 3 = intestine is completely red and covered.

As is clear from the data in the Table, infection of broiler chicks severely depressed growth and feed conversion and resulted in a very high lesion score that was significantly different from the uninfected control chicks. Treatment of infected birds with salinomycin and bacitracin helped the birds overcome about 50% of the depression from the dual infection. In marked contrast and much to our surprise, the broilers receiving stabilized sodium chlorite in the drinking water at a 1:2,000 dilution recovered 75% of the weight and displayed a feed conversion that was not different statistically from the uninfected controls. Moreover, fecal bacterial counts were reduced by 85% in the Aquatize group compared to Infected Controls and mortality was fully recovered.

Astonishingly, mixing a small amount of sodium bicarbonate with the Aquatize stock solution allowed the birds to fully recover from the infection in weight, feed conversion, the number of lesions, mortality and to exhibit a reduction in fecal bacteria of 92%. The combination of Aquatize and bicarbonate gave better improvements in performance, livability and bacterial reduction than two other competing products, BioSentry Iodine and Oxine. These astounding results indicate that including stabilized sodium chlorite and a small amount of sodium bicarbonate in the drinking water is a very important means to overcome completely the disastrous impact of exposure to Coccidia and Clostridia in broilers, unfortunately a common experience in field situations.