

Odor Control

Feed ingredient reduces fecal odor from market broilers

Background

The Texas A&M Poultry Science Department conducted an experiment to determine the effect of feeding BiOWiSH™ to broilers, on volatile odor compound (VOC) emissions from fresh fecal material produced by battery-reared broilers. In addition, growth performance including body weight gain, feed conversion, and feed consumption were determined. Odor compounds were measured by gas chromatography/mass spectrometry (GC/MS) on day 21 of the trial.

Materials and Methods

Design

5 diets × 6 replicates × 12 male chicks, 21 day assay period

Animals required

400 one day old chicks. Chicks were weighed and randomly allotted to battery pens and dietary treatment based on body weight upon arrival to research farm.

Experimental diets

The basal starter diet was corn and soybean meal-based and was typical of diets fed in the US poultry industry. The starter diet was mixed as one large batch and separated into five equal batches. One of the five equal batches was used as the control starter diet, with no BiOWiSH™ inclusion. *BiOWiSH™-Odor* or *BiOWiSH™-Aqua* was added to the remaining batches, at the levels shown in the table below to obtain the four experimental treatments.

Dietary Treatment		
Batch No	Treatment	BiOWiSH™ gm/ton
1	Control	N/A
2	BiOWiSH™-Odor	300
3	BiOWiSH™-Odor	600
4	BiOWiSH™-Odor	900
5	BiOWiSH™-Aqua	900

Parameters

All pens will be weighed and feed consumption determined at 7, 14, and 21 days of age.

Fecal Collection

On day 20, manure pans in the batteries were thoroughly cleaned and manure was collected for 24 hours. After 24 hours, manure pans were moved to a clean, well ventilated area for odor assessment via flux chamber method. The flux chamber had a sampling port for the collection of odor samples. Odor samples were collected by sorbent tubes and transported to West Texas A&M University (WTAMU) Olfactometry Laboratory for analysis via gas chromatography/mass spectrometry.

Sampling

4 treatments x 6 pens = 30 samples

VOC Analysis

Thermal desorption tube samples were analyzed using a PAL® autosampler and an Agilent® 6890 GC/MS.

Statistical Analysis

Data were analyzed via a one-way Analysis of Variance using the General Linear Model. Means were deemed significantly different at $p \leq 0.05$ and separated using a Duncan's Multiple Range Test.

Results and Discussion

1. Reduced Odor

The inclusion of *BiOWiSH™-Odor* and *BiOWiSH™-Aqua* resulted in up to 88% reduction ($p \leq 0.05$) in multiple VOC compounds that have been strongly associated with odor.

Table 1. Profile of odor compounds collected off of 1 kg of fresh fecal material from 21 day old broilers following a 20 minute collection period and the removal of outliers as determined by the relative difference calculation. There were four samples removed following the procedure to identify outliers (1 from treatment 1, 2, 3, and 4).

Trt	Isovaleric*	Valeric	Hexanoic	P-cresol	4-ethyl	Indole	Skatole
Control	24.0193 ^a	68.6764 ^a	260.3634 ^a	4.9360 ^a	13.5227 ^a	0.0819 ^a	0.1487 ^a
BiOWiSH™-Odor 300g	16.2903 ^{ab}	22.9996 ^b	104.2003 ^b	1.7000 ^b	1.6497 ^c	0.0237 ^b	0.0701 ^b
BiOWiSH™-Odor 600g	6.3023 ^b	18.7355 ^b	124.8027 ^b	2.5506 ^b	2.1503 ^{bc}	0.0351 ^b	0.0583 ^b
BiOWiSH™-Odor 900g	13.7929 ^{ab}	26.6175 ^b	103.6171 ^b	2.6459 ^b	4.0986 ^b	0.0164 ^b	0.0379 ^b
BiOWiSH™-Aqua 900g	15.7238 ^{ab}	29.3477 ^b	162.0526 ^b	1.9609 ^b	1.7007 ^c	0.0246 ^b	0.0425 ^b

* P = 0.097

2. Increased Body Weight

The addition of *BiOWiSH™-Aqua* at 900 g/ton resulted in an increased body weight beginning as early as day with a 3.5% increase. Increased body weight gain continued throughout the remainder of the study with a significant increase ($p \leq 0.05$) in day 21 body weight with a 5% increase.

Table 2. Average broiler body weights ± SE fed BiOWiSH™-Odor or BiOWiSH™-Aqua.

Trt #	Treatment Description	Body Weight Day 0 (g)	Body Weight Day 7 (g)	Body Weight Day 14 (g)	Body Weight Day 21 (g)
1	Control	41.73 ± 0.07	161.0 ± 2.8	450.8 ± 5.5	909.7 ± 9.2 ^b
2	BiOWiSH™-Odor 300g	41.75 ± 0.06	161.9 ± 2.3	456.5 ± 5.4	906.2 ± 9.6 ^b
3	BiOWiSH™-Odor 600g	41.72 ± 0.05	159.2 ± 2.3	452.7 ± 8.3	908.6 ± 15.2 ^b
4	BiOWiSH™-Odor 900g	41.78 ± 0.09	162.3 ± 2.7	454.6 ± 6.9	908.7 ± 9.0 ^b
5	BiOWiSH™-Aqua 900g	41.77 ± 0.06	167.2 ± 2.7	470.4 ± 6.3	946.5 ± 8.8 ^a

The results of this experiment confirm the ability of *BiOWiSH™-Odor* and *BiOWiSH™-Aqua* to reduce VOC concentrations from fresh fecal material and indicate growth improvement with *BiOWiSH™-Aqua* dietary inclusion. These data support a full scale investigation into performance and odor profiles taking broilers to market age with a view to having the product registered for use as a feed additive.

About BiOWiSH™

A result of over 18 years of research and development, BiOWiSH™ is a powerful biocatalyst that accelerates the transformation of complex organic molecules into useful, safe and natural end products such as carbon dioxide, nitrogen gas and water. Today, BiOWiSH™ technology continues to evolve across a variety of settings as a 100% natural, non-toxic and safe means of degrading and digesting organic matter; reducing odors and organic emissions, improving soil condition and enhancing water quality. BiOWiSH™ is used extensively and available in Asia, Australia, Europe, North America and Latin America.

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“The results of this experiment confirm the ability of BiOWiSH™ to reduce VOC concentrations from fresh fecal material and indicate growth improvement with dietary inclusion of one of the products.”
- Dr Jason Lee, Lead Researcher,
Texas A&M Poultry Research Center

Biological help for the human race



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