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MINERAL Writes

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In this issue:

Does supplementation with direct fed microbials influence performance?

Whether combating production challenges such as animal stress, mycotoxins, poor economics, or to improve ADG (average daily gains) or FCR (feed conversion ratios), livestock and poultry producers are increasingly seeking innovative natural solutions. Often, consumers' safety concerns fuel the search for more "natural" products to use versus traditional chemicals, hormones and antibiotics. Regardless of specific reasons, direct fed microbials (DFM) offer an area that has gained a lot of attention and much research is being done to determine if adding prebiotics, probiotics, digestive enzymes, yeast, or any combination of these would improve the immunity and gut health of the animal and contribute to overall enhancement in feed conversions, ADG and other performance factors to ultimately produce an animal ready for market in a shorter period of time.

There are numerous reported research studies covering all species of livestock/poultry under different feeding scenarios with various positive outcomes. An initial goal of reviewing the literature per species turned out to be a huge undertaking for just one edition of ***Mineral Writes***.

Instead, a recent article published in the "The Journal of Poultry Science March 2018" (Vol.97 No.3) was chosen to illustrate this matter as well as an article in "The Journal of Applied Poultry Research March 2018" (Vol. 27 No.1).

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First, let's define what Direct Fed Microbials are and what role they play. In a recent article authored by Dr. Mike Hutjens (University of Illinois, Urbana, IL).,he describes the role of DFM as the following: Producing anti-bacterial compounds (such as acids, bacteriocins *of non-pathogenic bacteria*, or antibiotics to prevent or treat bacterial infections).

Thus, DFMs….

- Compete against undesirable (pathogenic) organisms for nutrients and/or colonization of the digestive tract (competitive exclusion)
- Produce nutrients or growth factors
- Stimulate production of enzymes and/or stimulate growth of natural beneficial bacteria
- Metabolize or detoxify undesirable compounds (such as lactic acid, mycotoxins, etc.)
- Stimulate the immune system

A probiotic is made up of colonies of live beneficial bacteria that collectively improve the intestinal microbial balance in the host animal. The term probiotic describes viable microbial cultures, culture extracts, enzyme preparations, or various combinations of these. A yeast culture is a yeast-fermented feed additive that contains both live and dead yeast cells, the culture media the yeast cells were grown on, and the metabolic byproducts produced by the yeast cells during fermentation.
A study was reported in the March 2018 issue of the Journal of Poultry Science dealing with chickens by a team of Italian researchers led by C. Forte. It was titled, "Dietary Lactobacillus acidophilus positively influences growth performance, gut morphology, and gut microbiology in rurally reared chickens." The researchers set out to determine if in a market undergoing constant evolution, the production of chicken meat that consumers would perceive as "natural" and animal friendly would prove crucial. The use of probiotics in rurally reared chickens could represent a major opportunity to achieve mutual benefits for the industry and consumers in Italy.

Findings

Refer to *Performance Table*. At d 21 and 42, L birds showed better performance in terms of body weight, average daily gain, and feed conversion ratio. Enterococci, staphylococci, and *Escherichia coli*, populations were not influenced by dietary treatment. On the contrary, Lactobacillus population increased in the L group. Furthermore, a tendency was observed for the coliforms to be influenced by diet, with lower values in the L group in comparison to the C group. Histological techniques revealed that the number of goblet cell containing neutral mucins was lower in the C group. Morphometric evaluation demonstrates that the probiotic supplementation in-

creased the height of the mucosal layer by improving villus height, while crypt depth was unaffected.

Effect of dietary treatment on body weight (BW), average daily gain (ADG) and feed conversion efficiency (FCE).

Item	Sampling time	C	L	SEM	P
	T1	45.18	45.13	0.396	0.930
BW	T2	511.67 b	550.66 a	8.159	<0.001
	T3	1444.03 b	1636.40 a	18.845	<0.001
	T1-T2	22.21 b	24.01 a	0.549	0.038
ADG					
	T2-T3	44.39	51.70	1.082	<0.001
	Overall	34.97 b	39.78 a	0.0591	<0.001
FCE	T1-T2	2.57 a	2.31 b	0.052	0.018
	T2-T3	3.13 a	2.68 b	0.118	0.028
	Overall	2.94 b	2.56 b	0.079	<0.001

T1: d1; T2: d21; T3: d42
C: basal diet; L: basal diet supplemented with 2.0 g/100kg (20 g/ton) of Lactobacillus acidophilus D2/CSL
Different letters in the same row denote significant difference.

What this means for the industry

An increase in intestinal villus height suggests greater surface area for more nutrient absorption which in turn promises greater performance. Speculatively, as in many biological as well as mechanical areas of functionality, success is limited to the extent of any missing link. Preventative measures improving nutrient absorption and utilization tend to fill in that missing link. To accomplish such in a more natural, less potentially threatening manner would be a positive.

Among the many nutrients to benefit by improved absorption, *calcium* should not be overlooked. Skeletal development is vital in production for a variety of reasons, but certainly its support contribution to both muscle development and rapid growth is vital.

A Corroborating Study of interest

An article reported in the March 2018 issue of the Journal of Applied Poultry Research took this matter one step further. The researchers looked at diets of broiler breeder hens and evaluated the hens as well as their progeny when fed a diet that contained hydrolyzed yeast. The Brazilian team lead by L.F. Araujo was able to determine that there was an improvement in hen performance and their progeny. “Evaluating hydrolyzed yeast in the diet of broiler breeder hens.”

Experiment

A total of 80 Cobb 500 broiler breeder hens were used, starting at 25 weeks of age, and were distributed randomly between two treatments (with and without hydrolyzed yeast supplementation), with 10 replicates of 4 hens per experimental unit. The experiment was conducted with the breeder hens during the period from 25 to 45 weeks of age. At 35 weeks and 45 weeks, the birds were inseminated, and the eggs produced afterward were incubated.
A total of 300 male progeny broilers from the breeder hens that received the hydrolyzed yeast were used in a completely randomized design in the 2 experimental treatments, with 10 replicates of 15 broilers each, for a period of 1 to 45 days.

The experiments were divided into 3 rearing stages: the initial stage (1 to 21 d), growth stage 21 to 38 d), and final stage (39 to 45 d). The poultry received feed and water ad libitum. The poultry were weighed 3 times during the trial, once during the start of each rearing stage to assess animal performance.

Findings

Supplementation of the diet of the breeder hens with the hydrolyzed yeast resulted in a 2.14% increase in egg product, 1.7% fertility improvement and incubated egg hatchability improved by 4.79% and fertile egg hatchability improved 2.56%. The progeny demonstrated better weight gain and feed conversion.

The implications of the study suggest that supplementing the diet with hydrolyzed yeast had a positive effect on the development of the intestinal mucosa, a decrease in pathogens commonly found in the digestive tract of broilers and aided in enriching the lactobacilli present in the small intestine. All of this improved intestinal health leading to an increase in nutrient absorption by the hens, and consequently the improved nutrient deposition in the eggs. The nutrients deposited in the eggs were most likely used for embryo development and, consequently, improved the metabolism of the progeny and thus improved the body deposition rate and growth rate.

What this means for the industry

More and more published research is documenting better utilization of feedstuffs as a result of the addition of DFM. What this means is that the producer is getting a better ROI due to improve overall health of the hens and could possibly lead to an economic impact on the next generation.