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Gustor and feed digestibility

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INTRODUCTION

Sodium butyrate is a raw material with proven bactericide effects (against both gram- (Fernández-Rubio, 2009) and gram+ (Jerzsele, 2011) if it is enhanced by essential oils) as well as physiological effects on the animal (Guilloteau, 2010). The effects on the animal can be summarized as follows: control of the intestinal barrier, pathogen reduction, increase of mucin synthesis, immune response regulation, and effects on the intestinal epithelium: controlling the cellular apoptosis (reducing the normal cell degradation and increasing the malign cell degradation), energy supply for the colonocytes and enterocytes (under ATP form) and enhancing the intestinal cells proliferation, differentiation and maturation (Guilloteau, 2010)

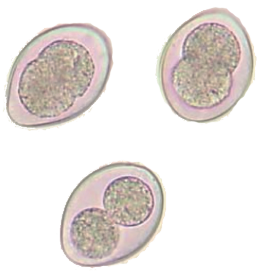
The better development of the intestinal epithelium allows an increased intestinal surface that will be in contact with the feed bolus and thus causing its better digestion (Pluske, 1996). In such a way, the use of sodium butyrate in broilers chicken will result in animals with a well developed intestinal epithelium that make them better digest the feed that they receive. This diet digestibility improvement may explain the reduction in feed conversion rate that is normally observed with the use of sodium butyrate (Mallo, 2010)

In an attempt to evaluate the effect that Gustor (sodium butyrate from NOREL) has on feed digestibility in poultry, a trial was set up. Full report was presented at the 48th AECA Scientific Poultry Symposium (2011) p 343-349

CONDITIONS OF THE TRIAL

750 one day old broilers Cobb 400 were randomly distributed in 30 groups of 25 animals each (10 replicates per treatment). The animals were identified with bands in the wings and housed in raised wire-floored stainless steel battery brooder pens in open sided poultry shed

Room temperature was kept at 35 0.5C up to the 7 days age, and was progressively decreased to 27 1C at 21 days of age, after which, the animals were kept at room temperature (25-33oC). The animals were vaccinated against Newcastle and infectious diseases of the bursa as per normal vaccination schedule. The feed composition of the feeds is reported in Table 1



Ingredients (kg/t)	Pre-starter	Starter	Finisher
Age, d	**1-11**	**12-21**	**22-42**
Corn	521.30	564.80	608.20
Soybean meal	407.40	355.30	303.20
Palm Oil	30.70	38.90	47.10
Salt	4.50	4.50	4.50
Dicalcium phosphate	18.90	19.20	19.63
Shell grit	7.20	7.46	7.75
DL methionine	2.41	2.15	1.89
L lysine	1.23	1.44	1.64
Threonine	1.73	1.61	1.50
Premix[a]	5.00	5.00	5.00
Metabolizable Energy[c], kcal/kg	2,950	3,050	3,150
Crude Protein[b], %	23.0	21.0	19.0
Lysine[c] , %	1.38	1.26	1.14
Methionine[c] , %	0.575	0.525	0.475
Threonine[c] , %	0.925	0.844	0.764
Calcium[c], %	0.90	0.90	0.90
Non-phytate P[c], %	0.45	0.45	0.45

a Premix composition (mg kg-1 diet): thiamin 1; pyridoxine, 2; cyanocobalamin, 0.01; niacin, 15; pantothenic acid, 10; α - tocopherol, 10; riboflavin, 10; biotin, 0.08; menadione, 2; retinol acetate, 2.75; cholecalcipherol, 0.03; choline, 650; copper, 8; iron, 45; manganese, 80; zinc, 60; selenium, 0.18; sodium monensin, 100; and hydrated sodium calcium aluminosilicates, 800
b Analyzed values
c Calculated based on analyzed values of individual feed ingredients; ME was based on the values published by NRC (NRC, 1994)

Table 1.- Composition of experimental diets

RESULTS

Besides clear effects on development of villi, Sodium butyrate supplement, in both amounts (500 and 1,000 grams per ton of feed), significantly increased energy retention of the animals (see Table 2), but sodium butyrate did not produce a linear effect, as there were no differences among the inclusion levels of the salt of the organic acid. Equally, protein retention was also better in animals receiving sodium butyrate in the diet; in this case, there were differences among butyrate levels of the feed: protein digestibility was higher in animals receiving 1,000 grams of sodium butyrate per ton of feed than for the ones receiving 500 grams per ton.

Treatment	Energy	Protein	Villi # 21d		Villi # 42d	
	kcal/kg	%	Length, mm	Width, µm	Length, mm	Width, µm
Control	3,105[b]	64.69[c]	0.977[c]	224.7	0.944	138.5[b]
Gustor 0.5 g/kg	3,264[a]	65.81[b]	1.516[a]	260.8	1.314	314.2[a]
Gustor 1.0 g/kg	3,285[a]	67.70[a]	1.243[b]	197.7	1.116	317.2[a]
P	0.001	0.001	0.001	0.137	0.068	0.001
N	4	4	6	6	6	6
SEM	22.117	0.336	0.0597	12.71	0.0657	22.24

Measure protocol scanning electron microscope (SEM)

Table 2.- Digestibility of energy and protein in commercial broilers fed different concentrations of sodium butyrate; Development of intestinal villi on 21 and 42 days of age

COMMENTS

Based on the results, it could be concluded that supplementation of sodium butyrate in broilers with 500 or 1,000 g per ton of feed can improve the energy and protein digestibility of the diet, probably because of a higher intestinal villi length of the animals (21 days of age) and its higher width (42 days of age)

Digestibility of energy was improved by 5.1% at the 500 grams dosage and 5.8% at 1,000 grams per ton. Protein digestibility was also improved, by 1.7% at the 500 grams dosage and 4.7% at 1,000 grams per ton

CONCLUSION

Based on these results, and also based on previous trials evaluating the benefits of using Gustor on FCR of broilers or layers, it can be recommended to adjust energy value of the diet by 3% and protein value by 2% when using Gustor in poultry diets. Further research is planned to evaluate more precisely the benefits of using Gustor on feed digestibility