



# PERFORMANCE AND NUTRIENT DIGESTIBILITY IN BROILERS IN RESPONSE TO INCREASING DOSES OF PHYTASE

**Monday, 20 April 2015**

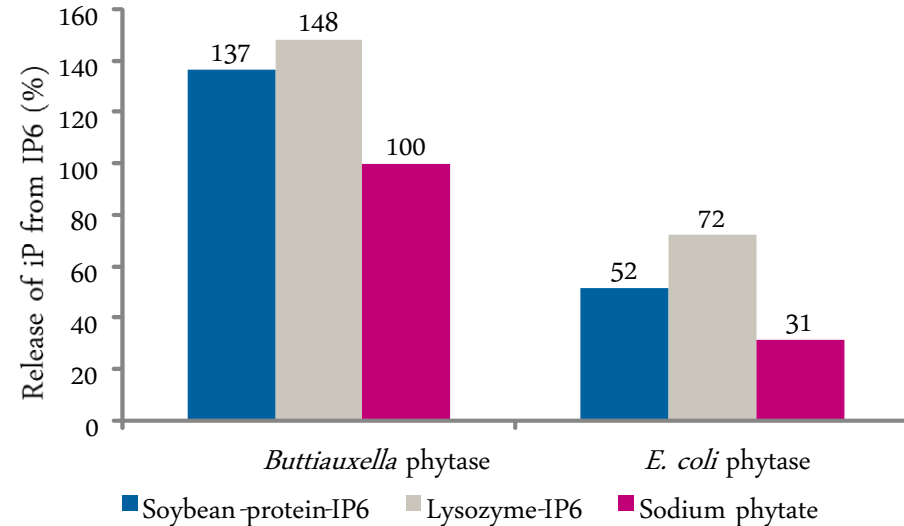
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# Introduction

## Background:

- Phytase is traditionally used at a standard dose of 500FTU/kg
- High phytase doses result in extra-phosphoric effect
- Different generation phytases may vary in bio-efficacy due to the characteristics of the phytases



*In vitro* test, all values expressed relative to release of iP by *Buttiauxella* sp phytase on sodium phytate substrate

DuPont Laboratory, 2012

## Objectives:

- To determine dose response of a new generation phytase (*Buttiauxella* sp phytase produced in *Trichoderma reesei*) on performance and P digestibility in broilers
- To compare efficacy of *Buttiauxella* phytase with an *E. coli* phytase

## Methods: meta-analysis of several trial data

### 1: Dose response

- Data from 7 trials were collected
- Five treatments:
  - PC (adequate in all nutrients)
  - NC (reduced 0.2 MJ/kg ME, 0.17 % AvP, 0.15 % Ca vs PC)
  - NC+ 500, 1000 and 2000 FTU/kg *Buttiauxella* phytase
- Diets based mainly on corn and soybean meal
- Performance parameters: 0-21 and 0-42 days; digestibility: 21day

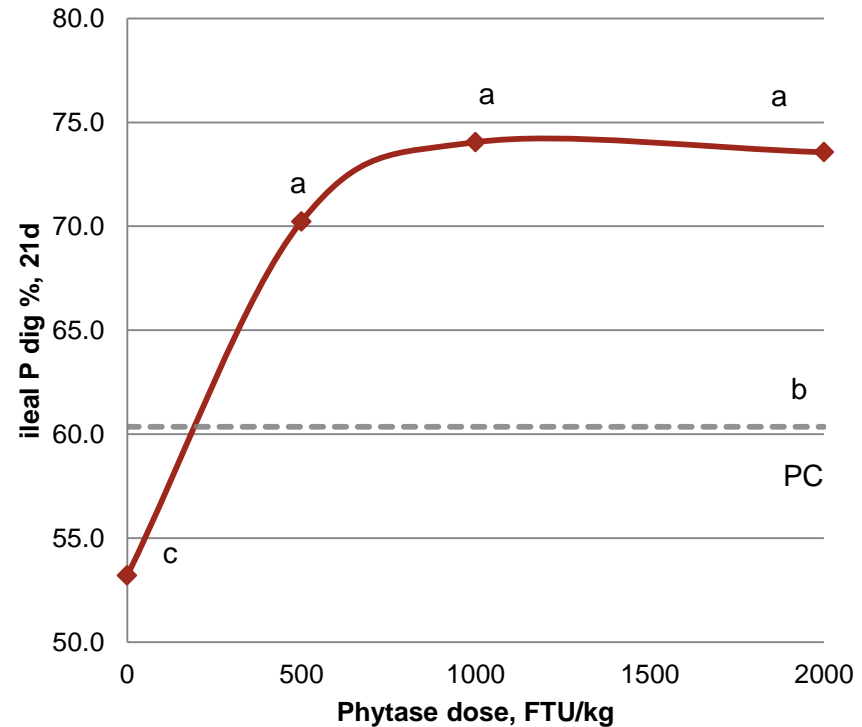
### 2: Compare phytase sources

- Data from 4 trials were collected
- Five treatments:
  - PC (adequate in all nutrients)
  - NC (reduced 0.2 MJ/kg ME, 0.17 % AvP, 0.16 % Ca vs PC)
  - NC+ 250, 500 and 1000 FTU/kg either *Buttiauxella* or *E. coli* phytase.
- Diets based mainly on corn and soybean meal
- Birds were fed test diets from 0-42days

Statistics conducted using the Fit Model Platform of JMP 11, trial code was included in the model as a random effect. Tukey's HSD test was used for means separation.

# Results: dose response 500-2000FTU/kg *Buttiauxella* phytase

- Ileal P digestibility (%) and bone ash plateaued at about 1000FTU/kg phytase
- P and Ca deficient NC diet reduced all performance parameters
- Increasing phytase dose linearly / quadratically improved ADG and feed / energy efficiency



# Results: dose response (continued)



		<i>Buttiauxella</i> Phytase dose, FTU/kg				P value		
		PC	NC	500	1000	2000	Linear	Quadratic
0-21d	ADG, g	39.0a	32.3b	38.5a	39.3a	40.0a	0.0009	0.1300
	ADFI, g	52.6a	46.6b	52.3a	52.5a	53.6a	0.1400	0.6400
	FCR	1.36b	1.47a	1.37b	1.34b	1.35b	0.0003	0.0150
	FCRc*	1.36b	1.51a	1.37b	1.34b	1.34b	<0.0001	0.0008
	E conv**	17.5b	18.7a	17.3b	17.0b	17.1b	0.0050	0.0002
	Bone Ash, %	35.6a	31.0b	34.5a	34.7a	34.4a	0.3230	0.3810
0-42d	ADG, g	71.3b	63.9c	72.9b	73.7ab	75.9a	<0.0001	<0.0001
	ADFI, g	120.9b	112.0c	125.2b	124.8b	130.2a	<0.0001	0.0009
	FCR	1.694b	1.753a	1.718b	1.694b	1.716b	0.0700	0.0050
	FCRc*	1.694b	1.846a	1.700b	1.665b	1.660b	<0.0001	<0.0001
	E conv**	22.6ab	22.8a	22.3ab	22.0b	22.3b	0.0700	0.0044
	Prod day***	42.0	46.9	41.2	40.7	39.5		

<sup>1</sup> 0-21d performance: 7 trials; 0-42d performance: one trial; ileal P digestibility: 3 trials, bone ash: 5 trials

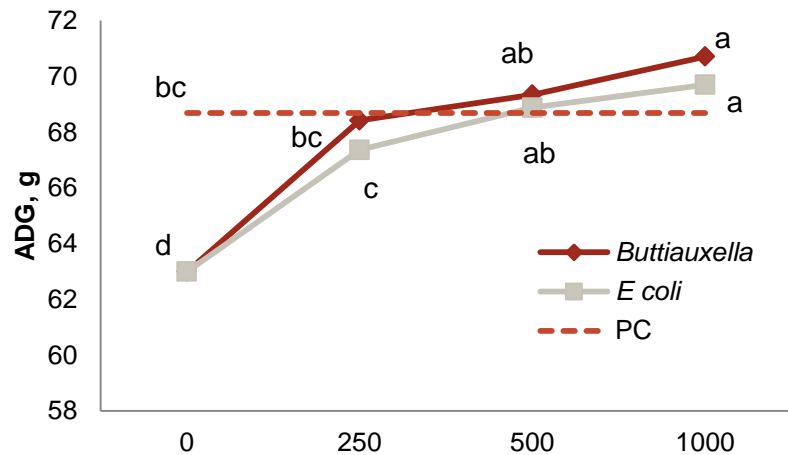
a,b,c Values within rows with the same superscript are not significantly different (P < 0.05)

\* FCRc: correction of 3 points for each 100g body weight difference from PC.

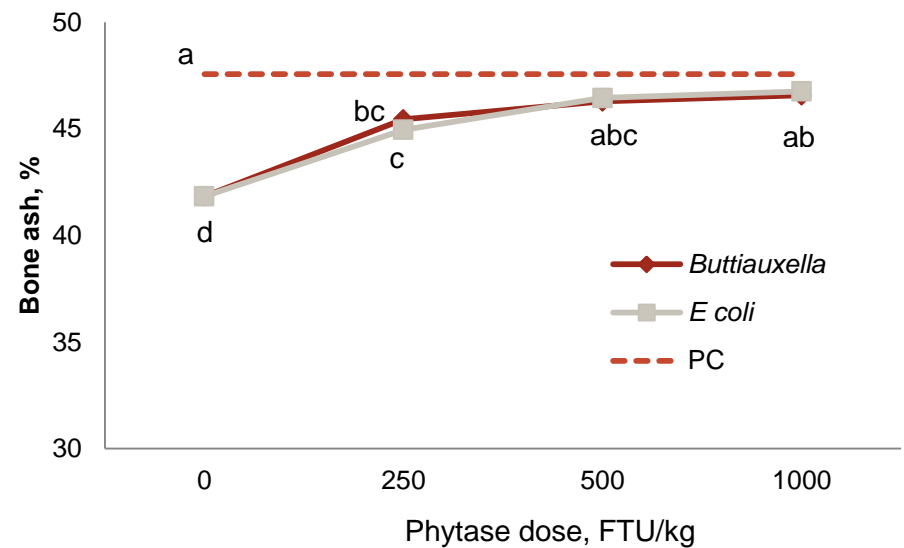
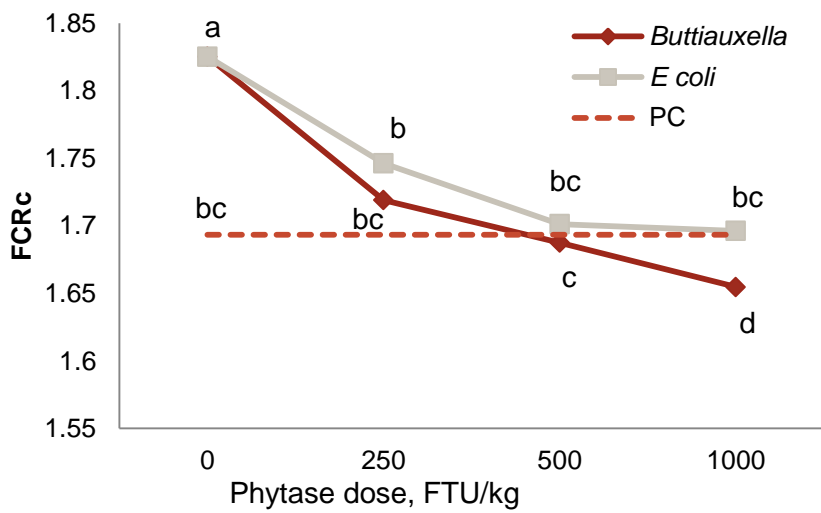
\*\* Energy conversion: MJ/ kg body weight gain

\*\*\*Production day: days needed to produce 3000g live BW broilers estimated based on ADG

# Results: comparison of phytase sources, 0-42d



- Buttiiauxella* phytase at 1000 FTU/kg improved FCRc\* by 4 points vs PC
- Buttiiauxella* phytase improved efficacy compared to *E. coli* phytase



\* FCRc: body weight corrected feed conversion ratio, correction of 3 points for each 100g body weight difference from PC

## Conclusions

- *Buttiauxella* or *E. coli* phytase at a level equal or above 500 FTU/kg replaced 0.17 % available P, 0.15 % total Ca and 0.2 MJ/kg ME in broiler diets
- Phytase dose at 1000-2000 FTU/kg further improved ADFI, ADG, feed and energy efficiency, and reduced rearing days to reach market size in broilers fed a low energy, available P and Ca diet
- The extra phosphoric effect at high dose may result in economic benefit
- Both phytases were effective; however, *Buttiauxella* phytase had a significantly higher efficacy (FCRc,  $P < 0.05$ ) than *E. coli* phytase at 500-1000 FTU/kg

**Thank you for your time**

**Questions**

