Effect of a Phytogenic Water Additive on Growth Performance, Nutrients Digestibility and Gene Expression of Amino Acids Transporters in Nursery Pigs Fed with Low Protein Diets



Cedrick N. Shili*, Mohammad Habibi*, Julia Sutton*, Jessie Barnes*, Jacob Burch-Konda*, Dorris Jeffrey# and Adel Pezeshki* ^{*}Department of Animal and Food Sciences, Oklahoma State University, Stillwater, OK 74078; [#]Herbanimals Supplement LLC, Oklahoma City, OK 73120

INTRODUCTION

- Slightly low protein diets supplemented with essential amino acids decrease nitrogen excretion from the swine production, but growth performance of pigs fed with these diets needs to be further improved.
- performance of pigs fed with these diets.
- **Objective:** The objective was to investigate the effect of a phytogenic water additive (PWA; Herbanimal[®]) on the following parameters in nursery pigs fed with low protein diets:
 - Growth performance
 - Blood metabolites
 - Nutrients digestibility
 - Gene expression of amino acids transporters in the jejunum and muscle

MATERIALS & METHODS

- **Animals:** A total of forty-eight weanling (3 weeks old) crossbred barrows were used. **Experimental groups:** Following 2 weeks of adaptation, all pigs $(9.02 \pm 0.17 \text{ kg body weight})$ were weightmatched and randomly allotted to 6 dietary treatments (n=8/treatment) for 4 weeks:
 - CON-NS: standard protein (24% CP) diet-no PWA supplemented
 - CON-LS: standard protein (24% CP) diet-low PWA dose (4 ml/L) supplemented
 - CON-HS: standard protein (24% CP) diet-high PWA dose (8 ml/L) supplemented
 - LP-NS: low protein (17% CP) diet-no PWA supplemented
 - LP-LS: low protein (17% CP) diet-low PWA dose (4 ml/L) supplemented
 - LP-HS: low protein (17% CP) diet-high PWA dose (8 ml/L) supplemented
- **Metabolic Measurements:** The feed intake and body weight were recorded daily and weekly, respectively. Nutrients digestibility was determined using chromium oxide as an external marker at week 4.
- **<u>Samples Collection and Analysis</u>**: Blood samples were drawn from the jugular vein of all pigs at week 4. Following euthanasia, the muscle and jejunum samples were collected. The serum concentrations of Ca and P were analyzed using a chemistry analyzer and gene expression of amino acids transporters was determined using qPCR in muscle and jejunum samples.
- **Statistical Analysis:** The data were analyzed by univariate GLM (SPSS[®]) and the means were separated using paired Student's t-test corrected by Benjamini-Hochberg.

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Growth Performance										
	Diets						SEN	P- value		
	CON-NS	CON-LS	CON-HS	LP-NS	LP-LS	LP-HS		Protein	PWA	Protein × PWA
Initial BW kg	8.82±0.30	9.10±0.40	9.63±0.37	9.05±0.59	8.76±0.34	8.76±0.49	0.17	0.36	0.78	0.46
Final BW, kg	25.34±0.9*	26.08±0.71	29.09±0.97*	24.89±1.68	25.00±1.39	23.25±1.68	0.56	0.02	0.72	0.09
ADG, kg/d	0.59±0.03	0.60±0.03	0.70±0.03 ^b	0.57±0.03	0.58±0.03	0.52±0.03	0.16	0.01	0.75	0.07
ADFI, kg/d	0.86±0.04	0.95±0.05	0.97±0.03	0.84±0.07	0.91±0.06	0.86±0.05	0.23	0.23	0.30	0.69
ADWI, L	3.09±0.40	2.98±0.40	4.17±0.43	2.78±0.40	3.54±0.40 ^d	2.98±0.40	0.17	0.35	0.31	0.12
G:F, g/g	0.69±0.02	0.70±0.07	0.72±0.03	0.64±0.02	0.61±0.01	0.61±0.03	0.02	0.01	0.97	0.72
G:P, g/g	2.81±0.09	2.86±0.31	2.93±0.12	3.75±0.13 ^c	3.44±0.17	3.54±0.18	0.9	0.01	0.90	0.68

Hypothesis: Supplementing low protein diets with phytogenic additives would improve the growth





Transcript of SLC6A19 in Jejunum



- those fed with low protein diets.

- with standard protein diets

RESULTS

Transcript of SLC7A11 in Jejunum

CONCLUSION

> PWA improved the growth performance of pigs fed with standard protein diets, but not

> PWA improved the concentrations of serum calcium in pigs fed with standard protein diets and phosphorus in those fed with both standard and low protein diets.

> PWA tended to increase the apparent fecal digestibility of Ca in pigs fed low protein diets. > PWA decreased the mRNA abundance of SLC6A19 and SLC7A11 in the jejunum of pigs fed

> PWA decreased the transcript of SLC7A1 in the muscle of low or standard protein fed pigs.









