IMPROVED LIVABILITY WITH THE USE OF WEAN FUEL™ FOR NURSERY PIGS FED EITHER A SIMPLE HIGH SOYBEAN MEAL DIET OR A COMPLEX HIGH LYSINE DIET

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INTRODUCTION

Wean Fuel™ is combination of polyclonal egg antibodies and phytonutrients. With the rules changing for the use of antibiotics, extensive research has been conducted in the development and use of polyclonal egg antibodies. There continues to be a growing amount of evidence showing the practical use of this technology (1, 2, 3) to support livability and to protect the gut for lifetime performance, such as feed efficiency. Pigs fed an antibiotic free, vegetarian diet containing Wean Fuel™ had a significantly improved livability (93.5%) compared with controls (88.7%) and numerically greater than the positive control (91.8%), which contained both animal plasma and antibiotics (3). Previous work has shown that protection of gut structure in terms of improved crypt and villi during a controlled challenge study can lead to improved overall feed efficiency (2). As part of a continuous program, two separate experiments are reported where the responses to Wean Fuel™ is characterized in pigs raised in a commercial research facility (2400 head wean to finish barns) under normal health challenge conditions on growth performance and health status of nursery pigs.

MATERIALS & METHODS

Dietary Treatments

- Exp. 1
  - → Control 1 (CON1) – simple diet containing high SBM inclusion (30%)
  - → Wean Fuel™ 1 (WF1) – CON1 + 30 lb/ton of Wean Fuel™
- Exp. 2
  - → Control 2 (CON1) – diet containing 15% SBM & 0.1% higher SID Lys than its estimated requirements
  - → Wean Fuel™ 1 (WF1) – CON2 + 30 lb/ton of Wean Fuel™
- Exp. 1 – 409 weaned, commercial nursery pigs (avg. 13.4 lb & 19 days of age)
  - → 7 reps; 27-31 pigs/pen
- Exp. 2 – 425 weaned, commercial nursery pigs (avg. 13.1 lb & 19 days of age)
  - → 7-8 reps; 25-34 pigs/pen

MATERIALS & METHODS CONT.

- Blocked by weight & barn environment & stratified by sex & sow farm
- Housed in a commercial wean-to-finish barn
- 3-phase meal form feeding program – Wean Fuel™ being fed in phase 1 & 2
  - → Common N3 for Exp. 1 and common N3 for Exp. 2
- 49-day study
- FANCOM feeding system
- Diets met or exceeded 2012 NRC requirements

Performance

- Pens of pigs weighed on day 0, 21 & 49
- Feed disappearance measured
- ADG, ADFI and FCR calculated

Morbidity, Mortality, & Treatments

- Medical treatments recorded daily
- Pigs unresponsive to injectable treatments
  - → Tagged & moved to sick pen
- Morbidity – tagged pigs that remained as viable pigs
- Mortality – pigs that died

Statistical Analysis

- RCBD
- Minitab
  - → GLM procedure
  - → Fisher's t-test to determine differences
- Experimental Unit = pen
- Means reported as Adjusted Means

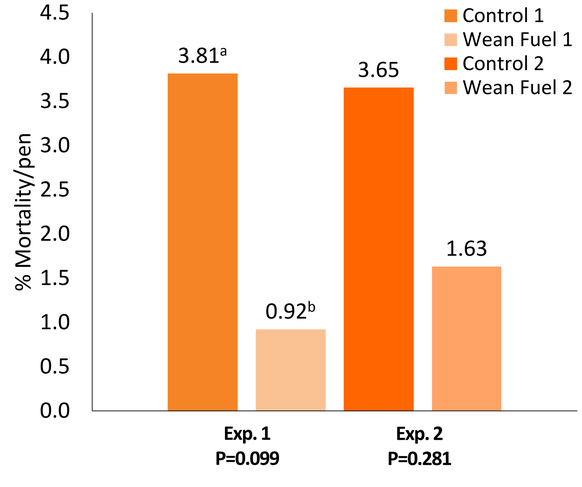
DIETS

Table 1: Composition of Phase 1 (14-20 lb)

INGREDIENT	CON1	WF1	CON2	WF2
Crumbled Nursery Concentrate	600.00	600.00	650.00	650.00
Corn	533.98	502.56	543.38	522.05
Soybean Meal	600.00	600.00	375.00	340.65
Gold Pro™	-	-	176.47	200.00
Whey Permeate	97.16	97.16	85.01	85.01
Choice White Grease	75.23	77.95	57.17	59.91
Nursery Premix	50.00	50.00	50.00	50.00
Mecadox 2.5	20.00	20.00	20.00	20.00
Lysine	4.16	3.57	6.33	6.31
Wean Fuel™	-	30.00	-	30.00
Other[1]	19.47	18.76	36.64	36.07
TOTAL	2000	2000	2000	2000

[1]**Other** – limestone, monocalcium phosphate, salt, enzymes, acidifier, methionine, threonine, tryptophan, & valine.

Figure 1: Effect of Wean Fuel™ on % Mortality per Pen



RESULTS

Table 2: D 0-49 Results and D 21-29 F:G

	Exp. 1			
	CON1	WF1	SE	P-value
ADG, lb	1.12	1.11	0.066	0.643
ADFI, lb	1.66	1.64	0.122	0.550
F:G	1.47	1.48	0.028	0.500
% Morbidity/pen	1.77	5.11	3.490	0.158
Treats/pen	42.3	40.1	9.35	0.705
d 21-49 F:G	1.57	1.59	0.204	0.257
	Exp .2			
	CON1	WF1	SE	P-value
ADG, lb	1.16	1.16	0.088	0.957
ADFI, lb	1.67	1.65	0.091	0.545
F:G	1.44	1.42	0.041	0.279
% Morbidity/pen	1.77	1.88	2.487	0.934
Treats/pen	38.6	37.6	10.22	0.861
d 21-49 F:G	1.56	1.52	0.055	0.163

CONCLUSION

- Wean Fuel™ reduced % mortality by 75% & 55%, respectively in Exp. 1 & Exp. 2.
- Exp. 2, the d 21-49 F:G was numerically improved by 2% when Wean Fuel™ was fed.
- However, this was not the case with Exp. 1, which could be due to the high SBM levels causing another type of gut damage that may not be protected by Wean Fuel™.
- Further research is needed to study the interactions between feed ingredients & Wean Fuel™ in improving feed efficiency & livability.

REFERENCES

1. Diraviyam et al. (2014) PLoS ONE 9(5): e97716.
2. Owusu-Asiedu et al. (2003) J Anim Sci: 81:1790-1798.
3. Sandberg et al. (2015) J Anim Sci: 93(2):140.

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Introduction: Wean Fuel™ is a combination of polyclonal egg antibodies and phytonutrients. With changing rules of the use of antibiotics extensive research has been conducted into the development and use of polyclonal egg antibodies, and a growing body of evidence exists showing the practical use of this technology (1, 2, 3) to support livability, and protect gut structure for life time performance such as feed efficiency. Pigs fed an antibiotic free vegetarian diet containing Wean Fuel™ had a significantly improved livability (93.5%) compared with controls (88.7%) and numerically greater than positive control (91.8%) which contained both animal plasma and antibiotics (3). Previous work has shown that protection of gut structure in terms of improved crypt and villi during a controlled challenge study can lead to improved overall feed efficiency (2). As part of a continuous program two separate trials are reported where the responses to Wean Fuel is characterized in pigs raised in a commercial research facility (2400 head wean to finish barns) under normal health challenge conditions, on growth performance and health status of nursery pigs.

Materials & Methods: In two separate experiments, the pigs were blocked by weight and barn environment, and stratified by sex and sow farm. The pigs were placed on dietary treatments immediately upon arrival. Experiment 1 (Exp. 1) used 409 weaned commercial pigs (19 days of age, 13.4 lb; 7 reps; 27-31 pigs/pen). Control (CON1) was a simple diet containing a relatively high soybean meal inclusion for a first stage starter ration (30%), and a treatment diet where 30 lbs per ton of Wean Fuel™ was added to control (WF1). Experiment 2 (Exp. 2) utilized 425 weaned commercial pigs (19 days of age; 13.1 lb; 7-8 reps; 25-34 pigs/pen) with 2 dietary treatments. The treatments were a control (CON2) formulated with 15% soybean meal and to contain 0.1% higher SID Lys than its estimated requirements and the same diet with 30 lbs per ton of Wean Fuel™ added (WF2). Each experiment utilized a 3-phase meal form feeding program, where the Wean Fuel™ was fed in phases 1 and 2 for approximately the first 21 days, and phase 3 was common within each experiement. A FANCOM feeding system was used to deliver feed. Pens of pigs were weighed and feed disappearances were recorded on d 0, 21, and 49. This data was used to calculated ADG, ADFI, and F:G. In order to simulate commercial practice, pigs were treated if required, and those that did not respond to injectable antibiotic were tagged, removed from their pen, and placed in sick pens. At the end of each experiment, the true number of dead (% mortality) and viable pigs (% morbidity) were calculated. Data were analyzed as a randomized complete block design using the GLM procedure in Minitab with Fisher's t-test to determine differences between dietary treatments.

Results and Discussion: For d 0-21 Exp. 1 results, there were no differences (P≥0.768) observed in ADG, ADFI, or F:G. No differences were observed for d 0-21 mortality per pen or treats per pen. There were no differences (P≥0.735) observed for d 0-21 ADG, ADFI, or F:G for Exp. 2. Also, no differences (P≥0.148) were observed for morbidity, mortality, or treats for d 0-21.

Table 1. Exp. 1 D 0-49 Results and D 21-49 F:G

	CON1	WF1	SE	P-value
ADG, lb	1.12	1.11	0.066	0.643
ADFI, lb	1.66	1.64	0.122	0.550
F:G	1.47	1.48	0.028	0.500
% Morbidity/pen	1.77	5.11	3.490	0.158
% Mortality/pen	3.81[a]	0.92[b]	2.475	0.099
Treats/pen	42.3	40.1	9.35	0.705
d 21-49 F:G	1.57	1.59	0.204	0.257

Table 2. Exp. 2 D 0-49 Results and D 21-49 F:G

	CON2	WF2	SE	P-value
ADG, lb	1.16	1.16	0.088	0.957
ADFI, lb	1.67	1.65	0.091	0.545
F:G	1.44	1.42	0.041	0.279
% Morbidity/pen	1.77	1.88	2.487	0.934
% Mortality/pen	3.65	1.63	3.183	0.281
Treats/pen	38.6	37.6	10.22	0.861
d 21-49 F:G	1.56	1.52	0.055	0.163

In Exp. 1 overall mortality was reduced from 3.81% to 0.92% (P<0.1; Table 1) and in Exp. 2 mortality was numerically reduced from 3.65% to 1.63% (P=0.281; Table 2). In Exp 2. the use of Wean Fuel lead to a numerical improvement of 2.6% on feed efficiency from day 21-49 (P=0.163), but this was not the case where 30% soybean meal was used. This may suggest that another type of damage occurred to the gut from soybean meal that could not be protected by the use of Wean Fuel. Further research will focus on the interactions between feeding ingredients and the use of Wean Fuel in supporting livability and improving life time feed efficiency.

Conclusions: Wean Fuel may be a significant tool for reducing mortality in swine production, and further testing to support life time feed efficiency is warranted.

References:

1. Diraviyam et al. (2014) PLoS ONE 9(5): e97716.
2. Owusu-Asiedu et al. (2003) J Anim Sci: 81:1790-1798.
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