

Feeding Trial Report No.	: P 49
HAMLET PROTEIN product	: HP 300
Purpose	: To test different combinations of ingredients to replace blood plasma
Test Animal	: Piglets
Executed by	: CRSAD
Country	: Canada
Time	: 2015

Summary

- ❖ An increased inclusion of **HP 300** in piglet diet can replace the use of blood plasma, without negative effect on the overall performance at slaughter.
- ❖ Additionally, the use of other alternatives, like yeast, fish hydrolysate and egg powder, was not as cost-effective as compared to using higher inclusion levels of **HP 300**.
- ❖ Four different phase 1 and phase 2 piglet feeds were used, all containing different levels of **HP 300**. Pig performance i.e. average daily gain and feed intake from weaning until 108 kg were recorded.

Introduction

- ❖ A lot of attention has been focused on evaluating ingredients and what combination of ingredients and feed additives can be used to replace blood plasma in piglet feeds.
- ❖ **HP 300** is commonly used in piglet feed; however, if there are additional values of combining **HP 300** with other high-quality ingredients for complete replacement of blood plasma it is of interest.
- ❖ The aim of the study is to identify alternatives to blood plasma in weaned piglet feed.

Material and Methods

- ❖ Four treatments with different levels of **HP 300** were fed to weaned piglets.
- ❖ The inclusion level of **HP 300** varied according to inclusion of other high value ingredients.

- ❖ The nursery period (35 days) was divided into 3 phases. In phases 1 and 2 different diets were fed, whilst in phase 3, a common diet was fed across all treatments.
- ❖ The diets are listed in Appendix.
- ❖ The piglets' live weights were on average 5.64 ± 0.60 kg at the beginning of the experiment and the piglets were 21 days old.
- ❖ In total 308 piglets with 11 replicates per treatment were used in the study. The piglets were housed in groups of 7 piglets per pen.
- ❖ Post nursery period the piglets were transferred to finishing pens and mixed together from all four treatments.
- ❖ The experiment ended four weeks before slaughter at an average weight of 106 kg.
- ❖ Piglet performance was recorded during the nursery period, post nursery, and at ~106 kg live weight. As the piglets were mixed in the grower-finishing period only weights were recorded.
- ❖ Feed cost per kg gain was calculated using actual prices at the time of the nursery period of the study.

Results

❖ The results of the nursery period are listed in Table 1.

Table 1. Performance results, production index (PI) and feed cost

Item	Treatment 1	Treatment 2	Treatment 3	Treatment 4	SE	P-value
Phase 1						
Start weight, kg	5.63	5.63	5.66	5.65	0.07	0.99
ADFI, g	303 ^b	263 ^a	268 ^a	267 ^a	5.2	0.001
ADG, g	368 ^b	313 ^a	320 ^a	318 ^a	10.9	0.001
FCR	0.83	0.84	0.84	0.85	0.01	0.76
Phase 2						
ADFI	586 ^a	641 ^b	654 ^b	637 ^b	12.7	0.003
ADG	428 ^a	480 ^b	486 ^b	464 ^{ab}	12.5	0.005
FCR	1.38	1.35	1.36	1.39	0.04	0.91
Phase 3						
ADFI, g	983	948	992	973	15.9	0.24
ADG, g	668 ^{ab}	637 ^a	679 ^b	658 ^{ab}	9.7	0.02
FCR	1.47	1.49	1.46	1.48	0.02	0.71
End weight, kg	24.31	23.45	24.37	23.79	0.31	0.12
Phases 1-3						
ADFI, g	727	691	723	709	11.9	0.16
ADG, g	538	513	539	523	8.3	0.09
FCR	1.35	1.35	1.34	1.36	0.01	0.78
Feed cost ¹	2.29 ^{ab}	2.22 ^a	2.30 ^b	2.30 ^b	0.02	0.05

¹ \$ Feed/kg gain

- ❖ During phase 1, piglets fed blood plasma had a significantly ($P = 0.001$) higher ADG than piglets on other treatments, which was due to a significantly ($P = 0.001$) higher feed intake.
- ❖ The higher ADG for piglets on treatment 1, can partly to fully be explained by a higher amino acid level of the feed.
- ❖ The piglets fed blood plasma (treatment 1) during phase 1, had a significantly lower ADG in phase 2 than piglets on treatment 2 and 3, supposedly due to significantly ($P = 0.003$) lower feed intake during phase 2.

- ❖ During phase 3, piglets on treatment 3 had a significantly ($P = 0.02$) higher ADG, than piglets on treatment 2.
- ❖ At the end of phase 3, piglets on treatment 1 weighed in average 0.94 kg more than piglets on treatment 3, whilst piglets on treatments 2 and 4 were intermediate.
- ❖ Piglets on treatment 2 were fed the highest inclusion level of **HP 300** and found to have a significantly ($P = 0.05$) lower feed cost per kg gain during nursery than compared to treatments 3 and 4 whilst treatment 1 was intermediate.
- ❖ The results of growing and finishing periods are listed in Table 2

Table 2. Performance results during growing and finishing periods.

Item	Treatment 1	Treatment 2	Treatment 3	Treatment 4	SE	P-value
Initial weight, kg	24.3	23.7	24.4	23.7	0.30	0.17
ADG, kg	1.01	1.01	1.02	0.986	11.2	0.16
End weight, kg	107.1	106.2	108.2	104.5	1.02	0.09

- ❖ After 82 days on grower and finisher feeds, piglets on treatment 3 weighed 3.7 kg more than piglets on treatment 4 ($P = 0.09$), whilst piglets on treatments 1 and 2 were intermediate.

Conclusion

- ❖ Overall, it can be concluded that using a cheaper diet based on a higher inclusion level of **HP 300** during phases 1 and 2, resulted in at least the same performance as piglets fed more expensive ingredients instead of **HP 300** as replacement for blood plasma.

Appendix – diet composition, g/kg

Item	Phase 1				Phase 2				Phase 3
	Treatment				Treatment				
	1	2	3	4	1	2	3	4	
Whey permeate	217	217	217	217	87	87	87	87	-
Wheat	200	200	200	200	200	200	200	200	200
SBM	150	150	150	150	250	250	250	250	273
Corn	186	121	150	113	304	302	314	297	461
HP 300	114	217	152	189	78	78	52	58	-
Corn-soy oil (1:1)	49	54	41	56	41	41	36	42	26
Porcine blood plasma	50	-	-	-	-	-	-	-	-
Egg powder	-	-	33	-	-	-	13	-	-
Fish hydrolysate	-	-	18	-	-	-	7	-	-
Yeast cultures	-	-	-	35	-	-	-	25	-
Concentrate calcium butyrate	-	1.2	1.2	1.2	-	0.8	0.8	0.8	-
Arome, sweetener	-	1.0	1.0	1.0	-	-	-	-	-
Amino acids	9.5	10.4	10.1	10.3	9.8	9.8	9.7	9.8	9.6
Minerals + vitamins	19.9	22.1	22.7	23.3	25.0	25.0	24.9	25.1	26.6
Enzyme, acids and antibiotics	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
Calculated composition, %									
DM	90.9	91.8	91.7	91.5	91.0	91.3	90.8	91.1	90.0
CP	24.3	24.7	24.1	25.0	23.2	22.4	23.5	22.6	19.9
CFat	5.9	6.4	6.8	5.8	5.4	5.8	5.8	5.5	4.6
Dig Lys	1.55	1.43	1.43	1.48	1.42	1.38	1.50	1.36	1.27
Dig Met	0.45	0.53	0.53	0.53	0.46	0.47	0.45	0.49	0.38
Dig Met+Cys	0.82	0.83	0.83	0.84	0.77	0.77	0.76	0.78	0.67
Dig Thr	0.90	0.91	0.88	0.93	0.85	0.84	0.86	0.87	0.76
Dig Trp	0.29	0.28	0.28	0.29	0.26	0.26	0.26	0.26	0.23
Net energy, kcal/kg	2650	2650	2650	2650	2550	2550	2550	2550	2475