THE EFFECT OF DIETARY ENERGY DENSITY ON PAYLEAN RESPONSES IN FINISHING PIGS

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Report prepared for the
Co-operative Research Centre for an Internationally Competitive Pork Industry

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Executive Summary

Genetic selection in commercial pigs in recent years has resulted in a marked decrease in the backfat levels of market pigs. This has prompted interest in raising the energy density of grower/finisher diets to exploit the greater growth potential as the need for backfat control has waned. Paylean (Ractopamine) is known to improve protein deposition capacity and improve the meatiness of carcasses (increased eye muscle area, more lean meat in the streak). One aspect of Paylean application that has not previously been studied in isolation is the effect of dietary energy density on the response to Paylean. There is now a need to establish the responses to Paylean under a range of energy densities to determine the economic optimum dietary energy level.

The experiment involved the evaluation of 3 energy levels with or without Paylean. The 3 energy levels chosen were 13.4 MJ DE/kg (current commercial recommendations for Paylean diets), 14.2 MJ DE/kg and 15.0 MJ DE/kg. All diets were formulated to contain 0.58 gm of available lysine/MJ DE. This design allows the response to energy density *per se* to be extracted independently, and then the response to Paylean at each energy level to also be evaluated. The level of Paylean applied was 7.5 ppm.

Paylean is known to express its greatest effect in the first 2 weeks of application, beyond which the response wanes. This phenomenon was observed in this trial but although the response declined in the second 14 day period it still remained positive. The response to the range of energy densities in the first 14 day period was mainly in the form of reduced feed intake and lower FCR values rather than any change in growth rate. When the cost of the diets is taken into consideration the improved FCR is largely negated by the increased diet cost resulting in only minor improvements in net profitability. The addition of Paylean to all the diets stimulated an increase in carcass weight gain which more than offsets the cost of the additive, combining the Paylean and energy density responses also improved the profitability. These improvements have been somewhat muted by the relatively high April 2011 cost of additives to create the energy uplift, however under more “normal” circumstances, this would extend the $5.10/pig profit figure to $6.85/ pig, or from 7 to 9c/kg carcass.

For most modern genotypes a Paylean x high energy density combination should improve overall profitability with little risk of backfat drift.

Table of Contents

1. Introduction

Genetic selection in commercial pigs in recent years has resulted in a marked decrease in the backfat levels of market pigs. This has prompted interest in raising the energy density of grower/finisher diets to exploit the greater growth potential as the need for backfat control has waned.

Paylean (Ractopamine) is known to improve protein deposition capacity and improve the meatiness of carcasses (increased eye muscle area, more lean meat in the streak). The reported responses to the commercial application of Paylean have been variable, in contrast to the more consistent responses recorded in USA herds. A common feature of USA diets is their relatively higher energy level being based on corn and soybean meal with added fat.

One aspect of Paylean application that has not previously been studied in isolation is the effect of dietary energy density on the response to Paylean.

Current industry recommendations for the nutrient specification of finishing diets where Paylean is being applied are somewhat dated and may be unnecessarily conservative. Recent CRC sponsored studies have identified the optimum amino acid specifications for Paylean diets, so there is now a need to establish the responses to Paylean under a range of energy densities to determine the economic optimum dietary energy level.

The hypothesis to be tested is that the response to Paylean in finisher pigs is energy dependent.

2. Methodology

Location

This experiment was conducted at the APFG Brinkley Research Facility and the protocol was approved by the Pork CRC Research Committee and the SARDI Animal Ethics Committee. The animals were handled according to the Australian Code of Practice for the care and use of animals for scientific purposes (HNMRC, 2004). The facilities are representative of normal commercial growing conditions. The pens measured 4.7 x 3.0 metres, with partially slatted floors and natural ventilation.

Animals

960 commercial grow-out pigs [(Landrace x Large White) x TS] were drawn from a regular consignment of approximately 1200 pigs placed in the grow-out facility at approximately 25 kg live weight and 9 weeks of age and grown out on the standard commercial programme to 75 kg live weight. These pigs were placed in 48 pens of 20 pigs utilizing a common feeder between each 2 pens. This then yielded 48 groups for growth rate evaluation but only 24 groups for feed intake and FCR calculations.

The pigs were graded on arrival into heavy, medium and light weight categories and treatments were allocated equally within each weight category. The starting point for each weight category was staggered such that the average starting weight was similar for each category (approximately one week difference between categories).

Treatments

The experiment involved the evaluation of 3 energy levels with or without Paylean. The 3 energy levels chosen were 13.4 MJ DE/kg (current commercial recommendations for Paylean diets), 14.2 MJ DE/kg and 15.0 MJ DE/kg.

All diets were formulated to contain 0.58 gm of available lysine/MJ DE (a level determined as adequate for female pigs by a previous CRC sponsored project conducted by Charles Rickard Bell).

This design allows the response to energy density per se to be extracted independently and then the response to Paylean at each energy level to also be evaluated.

The level of Paylean applied was 7.5 ppm based on recent USA experience and a previous experience at APFG. A summary of dietary treatments is presented in Table 1.

Table 1 - Summary of Dietary Treatments, with levels of Energy and Paylean

Treatment	Dietary Energy (MJ DE/kg)	Paylean Inclusion (ppm)
A	13.4	-
AP	13.4	7.5
B	14.2	-
BP	14.2	7.5
C	15	-
CP	15	7.5

Measurements

The dietary treatments were applied for 28 days from 75 kg live weight. The pigs were weighed in pen lots of 20, initially and then at day 14 and day 28 at which point the pigs were presented for slaughter at the Big River Abattoir the following day. Due to the staggered start, the slaughter program followed a similar staggered pattern but each treatment was equally represented within each consignment.

The data recorded was growth rate in each 14 days period, with corresponding feed intake and FCR values. At slaughter individual carcass weight and P2 backfat values were recorded.

Diets employed

The 3 base diets were derived by variable blends of the standard diets utilized at the unit. The Brinkley Research Unit employs a Big Dutchman Blend Feeding system which allows a specific blend of feeds to be delivered to each feed hopper. The Paylean dosing of the Paylean positive treatments was via an independent concentrate which the system is programmed to include as required.

Samples of each feed collected at the feed hopper level were sent for nutrient analysis and Paylean recovery.

Details of the base diets, the blends, and theoretical analyses are presented in Appendix 1.

Additional Treatment

As space was available an additional treatment was included in the experiment which was not mentioned in the original protocol. This involved trialling a higher Paylean level (20 ppm) in the 15.0 MJ DE/kg diet. This additional treatment was then compared to the other 15.0 MJ DE/kg treatments (Table 2).

Table 2 - Summary of additional evaluation of Paylean dose

Treatment	Dietary Energy (MJ DE/kg)	Paylean Inclusion (ppm)
C	15	-
CP	15	7.5
HP20	15	20

Statistics

All statistical analysis was conducted using the multi-factorial analysis of variance (MANOVA) procedure in STATGRAPHICS PLUS 5.1 (Statistical Graphics Corp. Warrenton, VA).

The pens were used as the experimental unit for ADG, bodyweight and carcass data, while the feeder was used as the experimental unit for feed intake and FCR.

Differences between means were identified by the least significant difference (LSD) and considered significant when ≤ 0.05.

3. Outcomes

The initial average starting live weight across all treatments and grading categories was 75.5 kg and the average final weight after 28 days on trial was 100.58 kg (implying an overall growth rate of 896 gm/day). There was no statistical difference in average starting weight between treatments.

Feed intake, growth rate and FCR results for each period are presented in Table 3.

Across all treatments feed intake in the 15 – 28 day period was marginally higher than in the 0 – 14 day period (1.4% increase) but growth rates declined by 6.8% resulting in an overall deterioration in FCR of 9.6%.

In the first 14 days on test there were no differences in growth rate in response to the various energy densities of the diets. Feed intake tended to decline as energy density rose. Average feed intakes in the initial period were 2.64, 2.50, and 2.47 kg/day for the 13.4, 14.2, and 15.0 MJ DE/kg diets respectively. The corresponding FCR values were 2.95, 2.88 and 2.80 respectively. These differences were not statistically significant.

In the 14 – 28 day period feed intake again declined with increasing energy density but growth tended to increase (817, 825 and 859 gm/day respectively) with corresponding improvements in FCR (3.31, 3.12, 2.96).

The inclusion of Paylean in the diets resulted in no change in feed intake but significant improvements in growth rate, with the magnitude of the response increasing with energy density (e.g. 2.7, 10.9 and 13.8% increases in growth rate for the 13.4, 14.2 and 15.0 MJ DE/kg diets respectively in the first 14 days).

In the 14 – 28 day period the growth rate responses to Paylean declined and were not responsive to changes in energy density (e.g. 7.3, 7.0 and 4.4% for the 13.4, 14.2 and 15.0 MJ DE/kg diets respectively). Given the similar feed intake rates, the FCR responses were similar to the growth rate responses.

Overall increasing energy density by 6 and 12% (13.4, 14.2, 15.0 MJ DE/kg) resulted in feed intake reductions of 4.9% and 5.6% (incomplete compensation,)and growth rate increases of 1.1% and 1.9%, and FCR improvements of 6.1% and 7.6% respectively.

When Paylean was applied to each diet, feed intake was unaffected, growth rate improved by 4.9%, 6.8% and 9.3% at each respective energy density, and FCR improved by 7.4%, 4.7% and 8.0% respectively.

Table 3 - Feed Intake (FI), Average Daily Gain (ADG) and Feed Conversion Ratio (FCR) for 0-14 days and 15-28 days, and for the total period

DIET	Paylean	0-14			15-28			0-28		
		FI	ADG	FCR	FI	ADG	FCR	FI	ADG	FCR
A	-	2.63	894^{ab}	2.951^{c}	2.68	817	3.312^{c}	2.66	855	3.118^{c}
	+	2.56	918^{ab}	2.796^{bc}	2.61	877	2.985^{ab}	2.59	897	2.888^{b}
B	-	2.50	869^{a}	2.884^{c}	2.56	825	3.123^{bc}	2.53	864	2.93^{b}
	+	2.55	964^{bc}	2.644^{ab}	2.60	883	2.957^{ab}	2.57	923	2.792^{ab}
C	-	2.47	883^{a}	2.8^{bc}	2.54	859	2.963^{ab}	2.51	871	2.88^{b}
	+	2.50	1005^{c}	2.496^{a}	2.54	897	2.83^{a}	2.52	952	2.65^{a}
	SEM	0.063	23.8	0.0754	0.083	40.3	0.0900	0.068	24.7	0.0589
P-Value	DIET	0.216	0.276	0.027	0.450	0.719	0.038	0.277	0.384	0.003
	PL	0.978	0.001	0.001	0.822	0.134	0.011	0.904	0.007	0.001
	DXPL	0.602	0.133	0.623	0.783	0.958	0.525	0.683	0.744	0.676
				B,AB,A			B,AB,A			B,A,A
6 x 1 P-value			<0.05	<0.05			<0.05			<0.05

Initial and final average live weight and carcass data have been presented in Table 4. The change in carcass weight across the 28 day test period (Δ carcass) was calculated as final carcass weight – (INITIAL LIVEWEIGHT x 0.76). This parameter was adopted to remove any carcass weight bias associated with variation in the initial live weight between treatments.

There were no significant differences between energy density treatments in terms of initial live weight, final live weight and P2 backfat. However, there were progressive improvements in dressing percentage with increasing energy density

(75.31, 75.66 and 76.5% from 13.4, 14.2 and 15.0 MJ DE/kg diets respectively) creating a similar response in Δ carcass values (17.55, 18.16 and 19.01 kg CARCASS GAIN respectively).

When the Paylean was applied there was an improvement in dressing percentage at each energy level of 0.83, 0.82 and 0.61 percentage units respectively creating increases in Δ carcass of 1.74, 2.02 and 2.42 kg above the base values at each energy level.

The total combined advantage of increasing the energy density from 13.4 to 15.0 MJ DE/kg and adding Paylean was 3.88 kg Δ carcass/ pig.

There was no significant effect of energy density or Paylean on P2 backfat.

Table 4 - Effects of dietary energy and Paylean (PL) on live weight, carcass weight, carcass weight gain, P2 backfat and dressing percentage

DIET	Paylean	Initial Wt	Final Wt	Carcass Wt	P2	DRESS %	Δ CARCASS
A	-	75.41	99.4	74.87	10.36	75.31[a]	17.55[a]
	+	76.31	101.45	77.28	10.23	76.14[bc]	19.29[bc]
B	-	74.24	98.56	74.58	9.98	75.66[ab]	18.16[ab]
	+	76.33	102.21	78.19	10.34	76.48[cd]	20.18[cd]
C	-	75.08	99.5	76.08	10.91	76.5[cd]	19.01[abc]
	+	75.65	102.34	78.92	10.51	77.11[d]	21.43[d]
	SEM	1.108	1.334	1.174	0.238	0.282	0.540
P-VALUE	DIET	0.854	0.906	0.45	0.062	0.002	0.007
	PL	0.198	0.012	0.0036	0.766	0.002	0.001
	D X PL	0.770	0.837	0.876	0.279	0.915	0.823
					AB, A,B	A,A,B	A,AB,B
6 x 1 P-value				.		<0.05	<0.05
Note: Δ Carcass = carcass weight - (initial live weight x 0.76)							

In the additional experiment, there was no difference in feed intake across all 3 treatments but the Paylean additions significantly improved growth rate and feed efficiency (Table 5). Although the 20 ppm Paylean recorded numerically superior performance there was no statistically significant differences between the two Paylean levels (Table 6).

Table 5 - Effects of Paylean dose on the Feed Intake, ADG and FCR of pigs offered the diet of highest energy content (Diet C - 15.0 MJ DE/kg)

	0-14			15-28			0-28		
Paylean	FI	ADG	FCR	FI	ADG	FCR	FI	ADG	FCR
0	2.47	883	2.800	2.43	859	2.963	2.51	871	2.880
7.5	2.50	1005	2.496	2.54	897	2.830	2.52	952	2.650
20	2.43	1028	2.367	2.42	911	2.658	2.42	970	2.498
SEM	0.061	28.5	0.0587	0.096	26.1	0.0834	0.062	21.3	0.0560
P Value	0.711	0.012	0.002	0.654	0.391	0.082	0.506	0.021	0.003
		A,B,B	B,A,A			Y,XY,X		A,B,B	B,A,A

Table 6 - Effects of Paylean on Carcass traits in pigs offered the diet of highest energy content (Diet C - 15.0 MJ DE/kg)

Paylean	INT WT	FINAL WT	CARCASS WT	P2	DRESS %	Δ CARCASS
0	75.08	99.5	76.08	10.91	76.5	19.01
7.5	75.65	102.34	78.92	10.51	77.11	21.43
20	74.34	101.5	76.96	10.00	75.8	20.46
SEM	1.390	1.667	1.408	0.202	0.341	0.612
P Value	0.801	0.478	0.361	0.016	0.042	0.035
				B,AB,A	AB,B,A	A,B,AB

4. Application of Research

In Australia, the response to Paylean in commercial operations has been variable. Where backfat has been an issue finisher diets are often formulated to modest energy density levels to contain backfat levels. It could well be that this aspect has limited the response to Paylean.

Paylean is known to express its greatest effect in the first 2 weeks of application, beyond which the response wanes. This phenomenon was observed in this trial but although the response declined in the second 14 day period it still remained positive.

The response to the range of energy densities in the first 14 day period was mainly in the form of reduced feed intake and lower FCR values rather than any change in growth rate. In the second 14 day period, there were similar intake reductions, and modest growth rate improvements (817, 825, 859 gm/day for the 13.4, 14.2 and 15.0 MJ/DE diets respectively) which magnified the FCR responses. When the cost of the diets is taken into consideration the improved FCR is largely negated by the increased diet cost resulting in only minor improvements in net profitability (Table 7).

The addition of Paylean to all the diets stimulated an increase in carcass weight gain which more than offsets the cost of the additive. The addition of Paylean to the various energy level base diets resulted in a net profit (income – feed costs, all other aspects assumed to be common) of $3.30, $2.97 and $4.25/pig for the 13.4, 14.2, and 15.0 MJ DE/kg base diets respectively.

Combining the Paylean and energy density responses the improved profitability per pig was $3.30, $3.61 and $5.10 / pig for the increasing energy densities respectively (Table 7).

Table 7 – Economic Analysis of Energy and Paylean Responses for all diets

Diet	Feed Consumed	Cost of Feed		Δ Carcass	$ Value	IMFC	Δ$/Pig		
	(kg/pig)	$/ tonne	$/pig	(kg/pig)	@ $2.80/ kg	($/pig)	Energy	Paylean	Both
A	74.54	290.00	21.62	17.55	49.14	27.52	-	-	-
AP	72.46	320.00	23.19	19.29	54.01	30.82	-	3.30	3.30

Diet	Feed Consumed	Cost of Feed		Δ Carcass	$ Value	IMFC	Δ$/Pig		
	(kg/pig)	$/ tonne	$/pig	(kg/pig)	@ $2.80/ kg	($/pig)	Energy	Paylean	Both
B	70.90	320.00	22.69	18.16	50.85	28.16	0.64	-	-
BP	72.07	352.00	25.37	20.18	56.50	31.13	-	2.97	3.61
C	70.02	355.00	24.86	19.01	53.23	28.37	0.85	-	-
CP	70.56	388.00	27.38	21.43	60.00	32.62	-	4.25	5.10

Assumptions:

- Feed cost - based on April 2011 raw material costs + $50/tonne manufacturing costs
- Paylean costed at $85/kg for 20g active/kg
- Carcass Value - $2.80/kg as per "Eyes and Ears" April 2011
- IMFC = Income minus feed costs

The profitability improvements reported here have been muted somewhat by the relatively high April 2011 cost of tallow or oil added to achieve the energy uplifts. The diet costs in Table 7 indicate a cost per additional MJ DE/kg in the diet of around $40/tonne due to the high cost of the tallow. Under more "normal" circumstances this may be more like $30/tonne per each additional MJ DE/kg in the diet. This would extend the $5.10/pig profit figure to $6.85/ pig or from 7c/kg to 9c/kg carcass.

The 20 ppm level of Paylean did not produce any greater carcass weight though it did reduce backfat (which is consistent with the improved FCR). Economically however, the minor improvements in growth rate, FCE and backfat did not offset the added expense for the 20ppm level of Paylean (Table 8)

Table 8 - Economic Analysis of Paylean Responses for pigs offered the diet of highest energy content (Diet C - 15.0 MJ DE/kg)

Treatment	Feed Consumed	Cost of Feed		Δ Carcass	$ Value	IMFC	Δ$/Pig
	(kg/pig)	$/tonne	$/pig	(kg/pig)	@ $2.80/kg	($/pig)	Paylean
C	70.02	355.00	24.86	19.01	52.23	28.37	-
CP	70.56	388.00	27.38	21.43	60.00	32.62	4.25
HP-20	67.84	422.00	29.99	20.46	57.29	27.30	-1.07

Energetic Efficiency

The efficiency of utilization of digestible energy for carcass gain is presented in Table 9. Increasing energy density had little effect on energetic efficiency. In contrast the inclusion of Paylean improved energetic efficiency by approximately 10%. This would imply a substantial shift in the lean: fat ratio in the carcass gain but this was not reflected in the P2 backfat values.

A similar FCR response to Paylean was reported by Rickard-Bell *et al* (2005), and as a part of the same experiment (Dunshea *et al*, 2005), it was demonstrated that although there was no effect on P2 backfat in females, there was a substantial shift in the lean: fat ratio as revealed by dual energy x-ray absorptiometry.

Table 9 – Effects of diet DE and Paylean on the efficiency of use of DE for Carcass Gain (MJ DE/kg Carcass)

Treatment	Base Diet	+ Paylean	% Improvement
A (13.4 MJ DE/kg)	56.9	50.3	11.6
B (14.2 MJ DE/kg)	55.4	50.7	8.5
C (15.0 MJ DE/kg)	55.4	49.4	10.8

5. Conclusion

Increasing energy density resulted in only a minor increase in overall energy intake as the pigs compensated by lowering their intake. This minor elevation in energy intake resulted in a modest increase in growth but with no apparent shift in energetic efficiency.

Adding Paylean to the diets had no effect on feed intake but increased carcass weight by around 2.0 kg on average across all 3 energy levels with no effect on P2 backfat.

There was an interaction between energy density and Paylean inclusion, whereby the response to Paylean increased as energy density increased. The inference from this is that the response to Paylean will only be maximized, if supported by a higher energy base diet.

As energy density was raised largely by added tallow in this experiment, there is the possibility that the response was, in fact, to added fat rather than energy density *per se*. This differentiation may require further research.

The true tissue repartition benefits of Paylean are not recognised by the current simplistic carcass assessment methods based only on carcass weight and P2 backfat.

6. Limitations/Risks

Adding Paylean to low density finisher diets will no doubt limit its response potential.

7. Recommendations

For most modern genotypes a Paylean x high energy density combination should improve overall profitability with little risk of backfat drift.

Economically the minor improvements in growth rate, FCE and backfat did not offset the added expense for the 20ppm level of Paylean.

8. References

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Appendix 1 - Composition and theoretical analysis of standard diets used to create the trial base diets by blending

	Grower 1	Presale	Hi-En Finisher	Paylean Conc
Wheat - 14	10.00	10.00	24.05	10.00
Barley - 12.5	30.00	43.30	-	30.00
Triticale - 12	17.30	16.40	30.00	16.80
Peas	11.70	5.00	12.00	12.00
Millmix	9.50	16.00	-	8.20
Canola - Exp	12.00	5.00	12.00	12.00
Meatmeal 52	2.00	2.00	2.25	2.00
Bloodmeal	1.70	-	-	1.70
Tallow	3.30	-	4.50	3.80
Salt	0.20	0.20	0.20	0.20
Limestone	1.50	1.70	1.25	1.50
Biofos. MDCP	0.17	-	0.25	0.17
Choline Chloride 60	-	0.01	-	-
Alimet	0.07	0.01	-	-
Threonine	0.06	0.01	0.06	0.07
Lysine Sulphate	0.35	0.20	0.18	0.36
Paylean - 20g/kg	-	-	-	1.25
Avizyme 1210	0.02	0.02	0.02	0.02
Phyzyme 5000	0.01	0.01	0.01	0.01
Grower PMX	0.20	0.20	0.20	0.20
	100.08	**100.05**	**100.03**	**100.04**
DE MJ/kg	14.00	12.90	15.00	14.00
Protein %	18.40	15.30	18.40	18.30
Fat %	6.30	2.80	7.30	6.80
Av. Lysine %	0.96	0.62	0.87	0.96
gm Av. Lys/MJ DE	0.68	0.48	0.58	0.68

Appendix 2 - Blending proportions to make the actual test diets and their theoretical analysis

	Diets					
Std Diets	**A**	**AP**	**B**	**BP**	**C**	**CP**
Grower 1	47.0	44.0	23.5	20.5	-	-
Presale	53.0	53.0	26.5	26.5	-	-
Hi - En Finisher	-	-	50.0	50.0	100.0	97.0
Paylean Conc.	-	3.0	-	3.0	-	3.0
	100.0	100.0	100.0	100.0	100.0	100.0
DE MJ/kg	13.4	13.4	14.2	14.2	15.0	15.0
Protein %	16.8	16.8	17.6	17.6	18.4	18.4
Fat %	4.5	4.5	5.9	5.9	7.3	7.3
Fibre %	5.3	5.3	4.9	4.9	4.5	4.5
Ca %	0.98	0.98	0.96	0.96	0.93	0.93
Av. P%	0.38	0.38	0.39	0.39	0.40	0.40
gm Av. Lys/DE	0.58	0.58	0.58	0.58	0.58	0.58
Meth : Lys	0.31	0.31	0.31	0.31	0.30	0.30
M + C : Lys	0.70	0.70	0.68	0.68	0.66	0.66
Threo : Lys	0.70	0.70	0.70	0.70	0.70	0.70
Iso : Lys	0.64	0.64	0.65	0.65	0.67	0.66
Try : Lys	0.20	0.20	0.19	0.19	0.18	0.18
Paylean ppm	-	7.50	-	7.50	-	7.50

Appendix 3 - Analysis of Trial Diets

	Diet								
Wet Chemistry	**A Theor**	**A**	**AP**	**B Theor**	**B**	**BP**	**C Theor**	**C**	**CP**
Protein %	**16.8**	16.7	17.2	**17.6**	18.0	17.4	**18.4**	18.6	18.2
		17.3	17.4		17.5	17.5		18.0	18.9
Fat %	**4.5**	5.1	4.7	**5.9**	5.8	6.3	**7.3**	7.2	7.0
		4.8	4.4		5.5	5.5		6.1	6.8
Moisture %	**10.0**	8.9	8.1	**9.8**	8.2	8.5	**9.6**	7.9	7.9
		9.5	9.4		9.2	9.4		9.5	9.1
Ash %	**5.2**	4.8	5.1	**4.9**	4.8	4.9	**4.5**	4.5	4.5
		5.2	5.6		5.1	5.0		4.8	4.8
Crude Fibre %	**5.3**	4.3	3.8	**4.9**	3.7	3.5	**4.6**	3.2	3.3
		5.6	5.2		5.3	5.6		4.6	4.4
DE (DM) MJ/kg	**-**	16.1	16.1	**-**	16.5	16.5	**-**	17.1	17.0
	-	15.4	15.3	**-**	15.7	15.7	**-**	16.4	16.5
DE (AS IS) MJ/kg	**13.4**	14.6	14.8	**14.2**	15.1	15.1	**15.0**	15.7	15.7
		13.9	13.9		14.3	14.2		14.8	15.0
				NIR					
Protein %	**16.8**	18.1	17.8	**17.6**	18.5	18.6	**18.4**	18.7	18.8
Fat %	**4.5**	5.0	4.9	**5.9**	5.8	6.2	**7.3**	7.0	7.0
Ash %	**5.2**	5.5	5.4	**4.9**	5.1	5.1	**4.5**	4.6	4.7
Fibre %	**5.3**	5.2	5.2	**4.9**	4.7	4.0	**4.6**	2.4	3.0
DE MJ/kg	**-**	14.2	14.0	**-**	14.3	14.5	**-**	14.9	14.7
ILEAL DE MJ/kg	**-**	11.8	11.8	**-**	12.2	12.3	**-**	12.8	12.8
Paylean Recovery (mg/kg)	**7.5**	-	4.0	**7.5**	-	3.0	**7.5**	-	4.0
		-	2.0		-	5.0		-	5.0
Recovery values for Paylean Concentrate. Theoretical 250 - Actual 225,359									

The SYMBIO ALLIANCE Lab analysed the trial diets both by wet chemistry and applied a NOBLET & PEREZ (1993) regression equation to determine DE, as well as by AUSSCAN NIR (which is not really calibrated for finished feeds but was undertaken to see what it might produce). Samples were analysed by wet chemistry on 2 separate occasions.

Comments: Most analysis seemed to be reasonably accurate but it would appear that Diet A was closer in energy to diet B than intended. This was reflected in both wet chemistry and NIR analysis. The AUSSCAN NIR estimates of DE were quite robust. Paylean recovery appears somewhat problematic and discussion is on-going with the laboratory as to how these may be improved. However the assays reveal the negative diets to have no detectable Paylean and the positive diets to have recognisable levels (if not particularly accurate or consistent).