Feed Formulation and Feed Price

Teagasc
Agriculture and Food Development Authority

Introduction

- Price : Cost Squeeze
- You can do little to increase pig price
- But you have some control over feed cost per kg gain
- Addressing many factors can help ↓ feed cost per kg gain
- Not just the price paid per tonne of feed, but
- Here we look at ways to make a tonne of feed less expensive
  1. Diet formulation / Ingredient composition
  2. Pelleting
  3. Enzyme addition
  4. Model
  5. More accurate formulation

1. Diet formulation / Ingredients

1. Ingredient composition

- Ingredient prices from 3 commercial sources
- Formulated a series of finisher diets based on a distinct spec.

Item	Constraints
Crude protein	≤ 16%
Net Energy	9.8 MJ/Kg
SID lysine	0.96 %*
Digestible P	≥ 2.4g/kg
Crude Fibre	2.5 - 5.0 %

* Ideal Protein: Thr, 65%; Met, 30%, Met + Cys, 60%; Trp, 19%; Val , 65%; Ile, 53%; Leu, 100%

1. Ingredient composition

a. Cereal diet

Ingredient	% Inclusion	Min.	Max.
Wheat	50.0		50.0
Barley	32.9		
Soya Hi-Pro	14.3		
Soya oil	0.5		
Balance	2.3		
	100.0		

Baseline

€258.54 / tonne

1. Ingredient composition

b. Least Cost diet

Ingredient	% Inclusion	Price (€/t).	Upper (€/t)
Maize	74.3	195	216
Sunflower Ext	11.9	225	241
Soya Hi-Pro	11.2	340	351
Balance	2.6		
	100.0		

€237.29 / tonne

↓ €21.25 /tonne

Sunflower?

1. Ingredient composition

c. Least Cost Diet – excluding sunflower & PK

Ingredient	% Inclusion	Price (€/t).	Upper (€/t)
Maize	67.1	195	215
Rape seed meal 00	21.9	270	278
Soya Hi-Pro	5.0	340	414
Wheat pollard EU	4.0	225	236
Balance	2.1		
Total	100.0		

€240.00 / tonne

↓ €18.54 /tonne

(+€2.71/tonne)

Wet feeding?

1. Ingredient composition

d. Maize capped at 20% inclusion*

Ingredient	% Inclusion	Min.	Max.	Price (€/t).	Upper (€/t)
Wheat	49.2		50	225	237
Maize	20.0		20	195	215
Soya Hi-Pro	17.8			340	348
Wheat pollard	10.9			225	228
Balance	2.1				
Total	100.0				

€249.73 / tonne

↓ €8.81 /tonne

Less blockages?

* To within €1/tonne of other LC formulations. Reduced ingredient no.

1. Ingredient composition

e. Maize only

Ingredient	% Inclusion	Price (€/t).	Upper (€/t)
Barley	40.8	227	264
Maize (Corn) EP	39.7	195	211
Soya Hi-Pro EP	17.2	340	376
Balance	2.3		
	100.0		

€249.37 / tonne

↓ €9.17 /tonne

Will get twice the price reduction by bringing in more than just maize.

1. Ingredient composition

RECAP

a. Cereal diet - €258.54 / tonne
b. Least Cost diet - €237.29 / tonne
c. Least Cost Diet (Low risk) - €240.00 / tonne
d. Maize capped at 20% inclusion - €249.73 / tonne
e. Maize only - €249.37 / tonne

Can realise a €21.25 / tonne price reduction

1. Ingredient composition

Caution

- Spot prices on Sept 5th for Sept-Nov 2018
- Some ingredients can vary greatly in AA and energy content
- Get as much information on the ingredient batch as possible
- Ideally formulate using this information
- May have to set inclusion limits for some ingredients
- Ensure the premix is changed!!

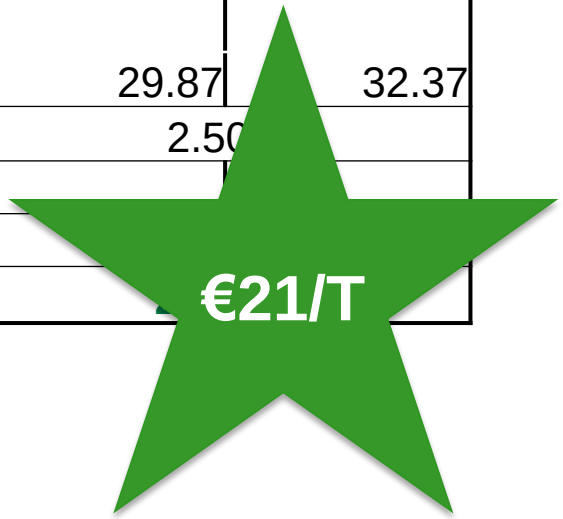
1. Pelleting

Cost Benefit of Pelleting
To a target slaughter weight of 105kg

	Meal	Pellet
FCR	2.34	2.26
Initial wt (kg)	33.6	33.7
Kill Out (%)	74.6	75.1
Final weight (kg)	110	110
Feed price (€/tonne)	290	290
Total Feed/ pig (Kg)	178.78	172.44
Total feed cost (€/pig)	51.85	50.01
Price per kg DW (€/kg)	1.38	1.38
Carcass weight increase (kg)	59.21	59.69
Value of increased Carcass weight (€)	81.71	82.38
Margin over feed (€/pig)	29.87	32.37

Benefit of Pelleting
To a target slaughter weight of 110kg

	Meal	Pellet
Final weight (kg)	**110**	**110**
Margin over feed (€/pig)	29.87	32.37
Benefit of feeding pellets (€/pig)	2.50	
Margin over feed (€/tonne of feed)		
Benefit of feeding pellets (€/tonne of feed)		



2. Pelleting

- Pelleting improves FCE:
  - ↑ nutrient digestibility
  - ↑ nutrient density per unit volume
  - ↓ feed wastage during feeding

- If purchasing feed and Dry or Wet/Dry feeding:

  Feeding a pelleted diet is worth €20-21/tonne of feed

  Net benefit of €15-16/tonne of finisher feed

3. Enzyme addition

3. Enzyme addition

Role for enzymes when diets are formulated close to pigs requirements

Improve FCE & financial benefit ↑ when feed price ↑

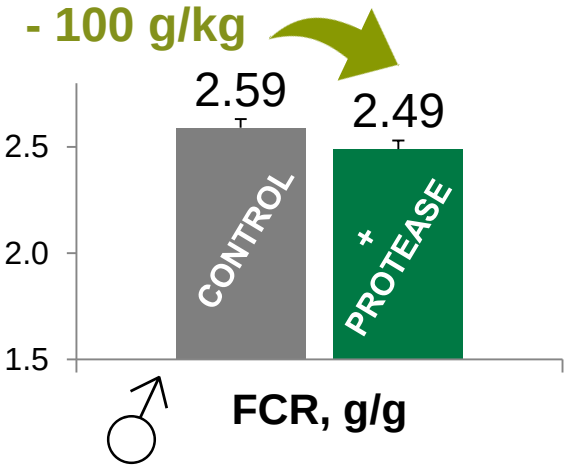
Most consistent results when:

- **Mannanase** was supplemented to **corn** based diets
- **Complex of enzymes** supplemented to **corn**, **wheat** or **barley** diets
- **Protease** supplemented to **barley** diets
- **Low density diets**

PIG-ZYME:

Exp.1: Rapeseed-based diets (dry-pellets)

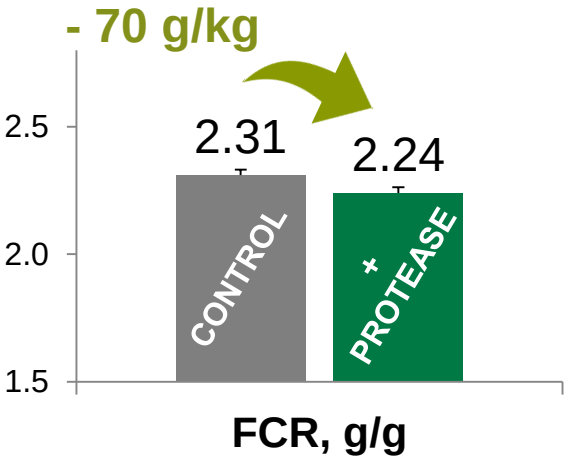
- Phytase: ✓
- Protease: ✓



PIG-ZYME:

Exp.2: Field beans-based diets (dry-pellets)

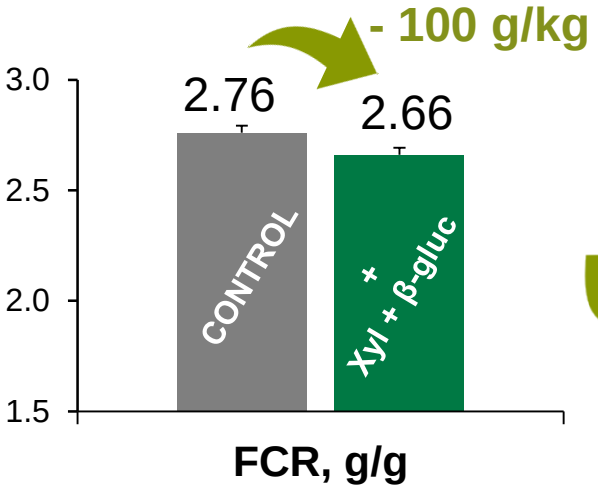
- **Protease:** ✓



PIG-ZYME:

Exp. 4: Liquid feeding and cereal based diets

- Xylanase + β-glucanase: ✓



4. More Accurate Diet formulation

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‘One size no longer fits all’ – we simply don’t have the luxury

- Range of growth rates and intakes on Irish units
- Yet few feed unit specific diets

- Must know the growth rate and the intake of your pigs
- Allows formulation of ‘bespoke diets’ for your pigs
- Optimising growth and efficiency
- Cost reduction

5. Modelling and feeding program

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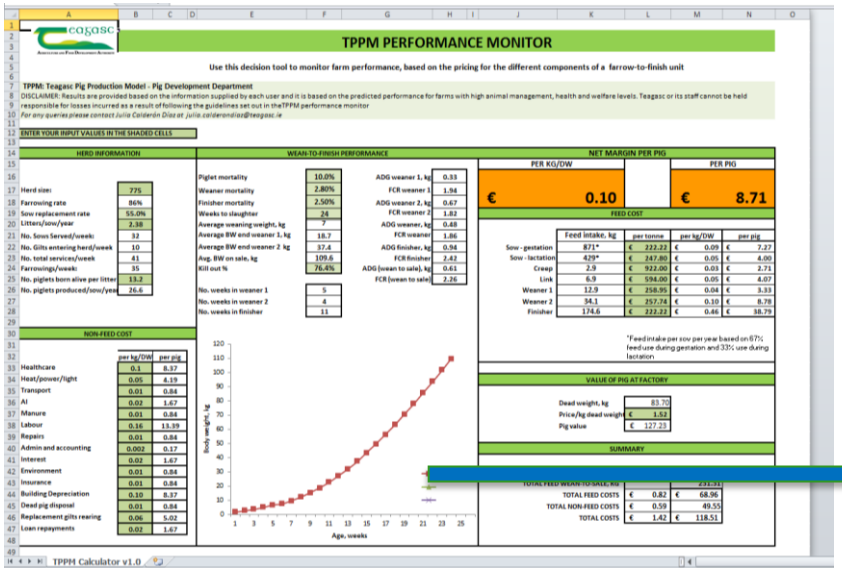
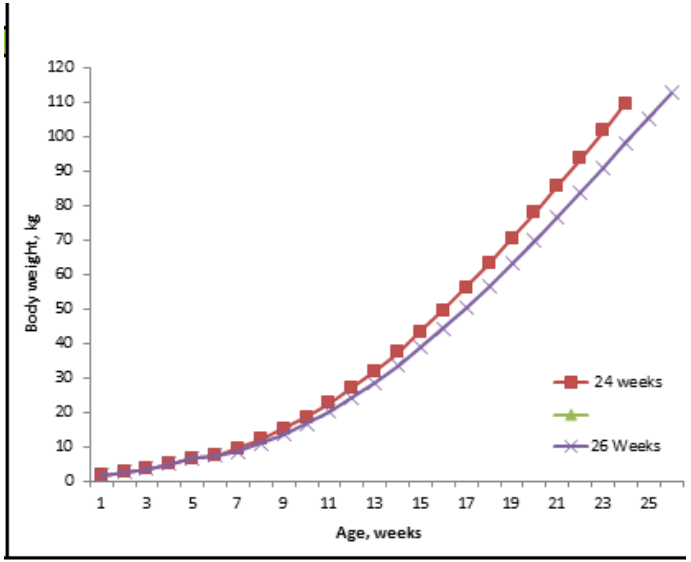


More precise if you use your own data.

Get your growth and intake curves



Budgetary stochastic model based on the data available in the ePM monitor.

Compares scenarios and provides costs

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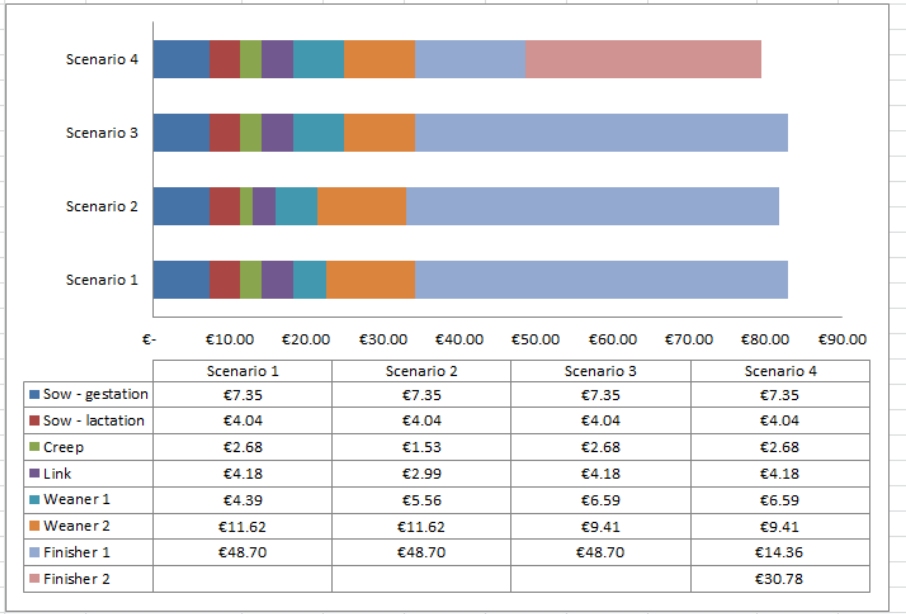
5. Modelling and feeding program

COST PER KG DW	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8
Sow - gestation	€ 0.09	€ 0.09	€ 0.09	€ 0.09	€ 0.09	€ 0.09	€ 0.09	€ 0.09
Sow - lactation	€ 0.05	€ 0.05	€ 0.05	€ 0.05	€ 0.05	€ 0.05	€ 0.05	€ 0.05
Creep	€ 0.03	€ 0.02	€ 0.03	€ 0.03	€ 0.03	€ 0.02	€ 0.03	€ 0.03
Link	€ 0.05	€ 0.04	€ 0.05	€ 0.05	€ 0.05	€ 0.04	€ 0.05	€ 0.05
Weaner 1	€ 0.05	€ 0.07	€ 0.08	€ 0.08	€ 0.05	€ 0.06	€ 0.08	€ 0.08
Weaner 2	€ 0.14	€ 0.14	€ 0.11	€ 0.11	€ 0.18	€ 0.18	€ 0.15	€ 0.15
Finisher 1	€ 0.58	€ 0.58	€ 0.58	€ 0.17	€ 0.60	€ 0.60	€ 0.60	€ 0.18
Finisher 2				€ 0.37				€ 0.38
TOTAL	**€ 0.99**	**€ 0.98**	**€ 0.99**	**€ 0.95**	**€ 1.05**	**€ 1.04**	**€ 1.05**	**€ 1.01**

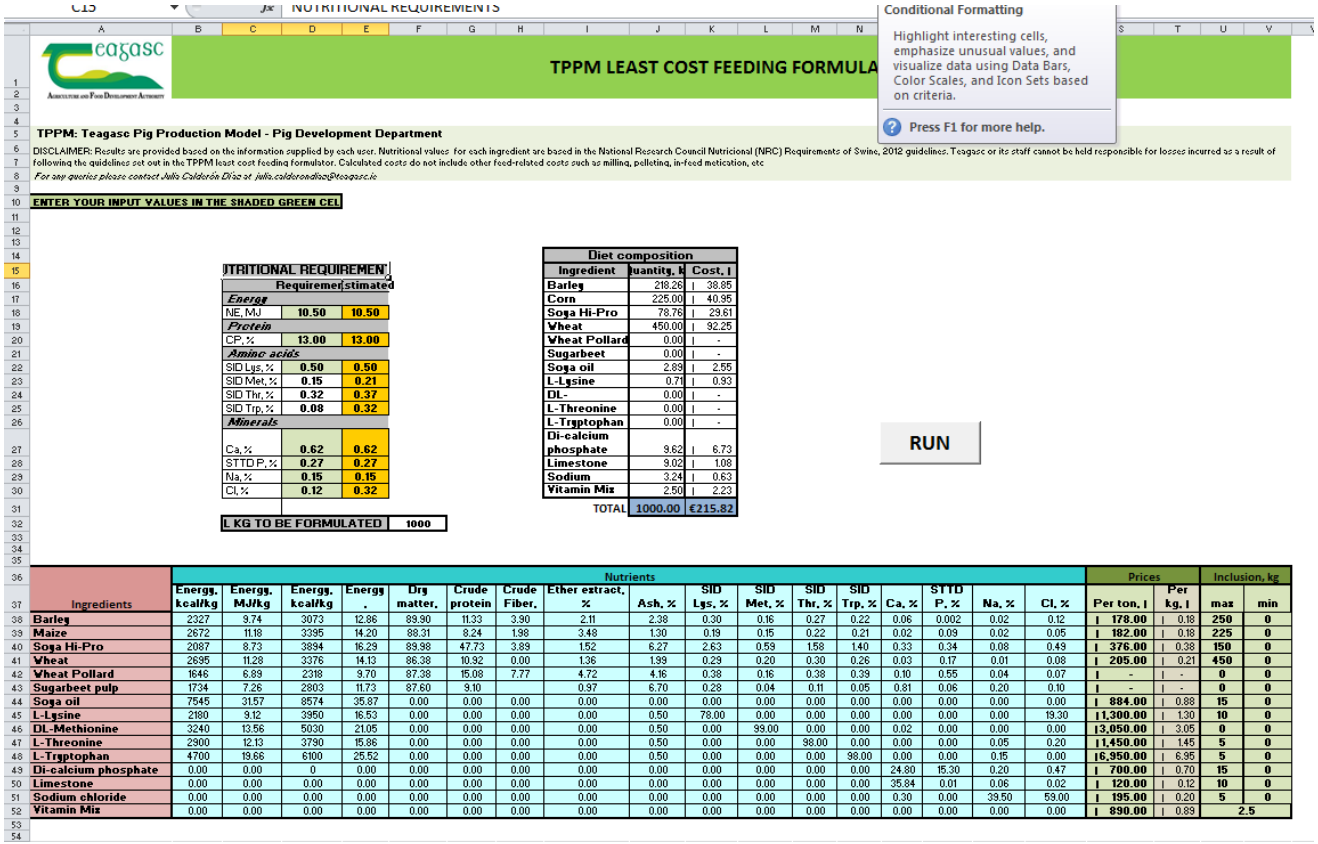
COST PER PIG	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8
Sow - gestation	€ 7.35	€ 7.35	€ 7.35	€ 7.35	€ 7.35	€ 7.35	€ 7.35	€ 7.35
Sow - lactation	€ 4.04	€ 4.04	€ 4.04	€ 4.04	€ 4.04	€ 4.04	€ 4.04	€ 4.04
Creep	€ 2.68	€ 1.53	€ 2.68	€ 2.68	€ 2.68	€ 1.53	€ 2.68	€ 2.68
Link	€ 4.18	€ 2.99	€ 4.18	€ 4.18	€ 4.18	€ 2.99	€ 4.18	€ 4.18
Weaner 1	€ 4.39	€ 5.56	€ 6.59	€ 6.59	€ 4.35	€ 5.52	€ 6.56	€ 6.56
Weaner 2	€ 11.62	€ 11.62	€ 9.41	€ 9.41	€ 15.30	€ 15.30	€ 13.09	€ 13.09
Finisher 1	€ 48.70	€ 48.70	€ 48.70	€ 14.36	€ 51.25	€ 51.25	€ 51.25	€ 15.58
Finisher 2				€ 30.78				€ 31.96
TOTAL	**€ 82.96**	**€ 81.79**	**€ 82.96**	**€ 79.39**	**€ 89.15**	**€ 87.98**	**€ 89.15**	**€ 85.44**



	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Sow - gestation	€7.35	€7.35	€7.35	€7.35
Sow - lactation	€4.04	€4.04	€4.04	€4.04
Creep	€2.68	€1.53	€2.68	€2.68
Link	€4.18	€2.99	€4.18	€4.18
Weaner 1	€4.39	€5.56	€6.59	€6.59
Weaner 2	€11.62	€11.62	€9.41	€9.41
Finisher 1	€48.70	€48.70	€48.70	€14.36
Finisher 2				€30.78

Calculates the cost of the feeding plans based on intake and growth

Linking formulation and growth



TPPM LEAST COST FEEDING FORMULA

TPPM: Teagasc Pig Production Model - Pig Development Department

DISCLAIMER: Results are provided based on the information supplied by each user. Nutritional values for each ingredient are based in the National Research Council Nutricional (NRC) Requirements of Swine, 2012 guidelines. Teagasc or its staff cannot be held responsible for losses incurred as a result of following the guidelines set out in the TPPM least cost feeding formulator. Calculated costs do not include other feed-related costs such as milling, pelleting, in-feed medication, etc

For any queries please contact Julio Calderón Díaz at julio.calderondiaz@teagasc.ie

ENTER YOUR INPUT VALUES IN THE SHADED GREEN CEL

Conditional Formatting

Highlight interesting cells, emphasize unusual values, and visualize data using Data Bars, Color Scales, and Icon Sets based on criteria.

Press F1 for more help.

JTRITIONAL REQUIREMEN	Requiremer	stimated
Energy		
NE, MJ	10.50	10.50
Protein		
CP, %	13.00	13.00
Amino acids		
SID Lys, %	0.50	0.50
SID Met, %	0.15	0.21
SID Thr, %	0.32	0.37
SID Trp, %	0.08	0.32
Minerals		
Ca, %	0.62	0.62
STTD P, %	0.27	0.27
Na, %	0.15	0.15
Cl, %	0.12	0.32

L KG TO BE FORMULATED 1000

Diet composition		
Ingredient	uantity, k	Cost, l
Barley	218.26	l 38.85
Corn	225.00	l 40.95
Soya Hi-Pro	78.76	l 29.61
Wheat	450.00	l 92.25
Wheat Pollard	0.00	l -
Sugarbeet	0.00	l -
Soya oil	2.89	l 2.55
L-Lysine	0.71	l 0.93
DL-	0.00	l -
L-Threonine	0.00	l -
L-Tryptophan	0.00	l -
Di-calcium phosphate	9.62	l 6.73
Limestone	9.02	l 1.08
Sodium	3.24	l 0.63
Vitamin Mix	2.50	l 2.23
TOTAL	1000.00	€215.82

RUN

	Nutrients																Prices		Inclusion, kg	
Ingredients	Energy, kcal/kg	Energy, MJ/kg	Energy, kcal/kg	Energy .	Dry matter,	Crude protein	Crude Fiber,	Ether extract, %	Ash, %	SID Lys, %	SID Met, %	SID Thr, %	SID Trp, %	Ca, %	STTD P, %	Na, %	Cl, %	Per ton, l	Per kg, l	max	min
Barley	2327	9.74	3073	12.86	89.90	11.33	3.90	2.11	2.38	0.30	0.16	0.27	0.22	0.06	0.002	0.02	0.12	l 178.00	l 0.18	250	0
Maize	2672	11.18	3395	14.20	88.31	8.24	1.98	3.48	1.30	0.19	0.15	0.22	0.21	0.02	0.09	0.02	0.05	l 182.00	l 0.18	225	0
Soya Hi-Pro	2087	8.73	3894	16.29	89.98	47.73	3.89	1.52	6.27	2.63	0.59	1.58	1.40	0.33	0.34	0.08	0.49	l 376.00	l 0.38	150	0
Wheat	2695	11.28	3376	14.13	86.38	10.92	0.00	1.36	1.99	0.29	0.20	0.30	0.26	0.03	0.17	0.01	0.08	l 205.00	l 0.21	450	0
Wheat Pollard	1646	6.89	2318	9.70	87.38	15.08	7.77	4.72	4.16	0.38	0.16	0.38	0.39	0.10	0.55	0.04	0.07	l -	l -	0	0
Sugarbeet pulp	1734	7.26	2803	11.73	87.60	9.10		0.97	6.70	0.28	0.04	0.11	0.05	0.81	0.06	0.20	0.10	l -	l -	0	0
Soya oil	7545	31.57	8574	35.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	l 884.00	l 0.88	15	0
L-Lysine	2180	9.12	3950	16.53	0.00	0.00	0.00	0.00	0.50	78.00	0.00	0.00	0.00	0.00	0.00	0.00	19.30	l 1,300.00	l 1.30	10	0
DL-Methionine	3240	13.56	5030	21.05	0.00	0.00	0.00	0.00	0.50	0.00	99.00	0.00	0.00	0.02	0.00	0.00	0.00	l 3,050.00	l 3.05	0	0
L-Threonine	2900	12.13	3790	15.86	0.00	0.00	0.00	0.00	0.50	0.00	0.00	98.00	0.00	0.00	0.00	0.05	0.20	l 1,450.00	l 1.45	5	0
L-Tryptophan	4700	19.66	6100	25.52	0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	98.00	0.00	0.00	0.15	0.00	l 6,950.00	l 6.95	5	0
Di-calcium phosphate	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.80	15.30	0.20	0.47	l 700.00	l 0.70	15	0
Limestone	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.84	0.01	0.06	0.02	l 120.00	l 0.12	10	0
Sodium chloride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.00	39.50	59.00	l 195.00	l 0.20	5	0
Vitamin Mix	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	l 890.00	l 0.89	2.5	

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Summary

- Changing diet formulation can reduce feed price by ~€21/t
- If feeding purchased diets the net benefit from pelleting is ~€15/t
- Selected enzyme addition esp. to low density diets is worth ~€12/t
- “One size no longer fits all” we need to feed ‘bespoke diets’
- Remember its not only feed price per tonne that dictates your feed cost per kg gain!