

# 가



1.

1/3 40% 가  
 . 20 가  
 Lupinus angustifolius( Sweet lupin)  
 가 , , 1999/2000  
 , , 1,968 2002/2003 5  
 , , 1,332  
 , 1,050 79%  
 Geraldton Esperance  
 1,000k㎡  
 80% 2002  
 Grain Pool/CBH 100  
 가 , 60~70

1.

( :%)

가

	Whole lupins	Kernels	Hulls
Moisture	9	8	9
Protein	32	36	12.0
Fat	5.5	7	2.1
Ash	2.8	4	2.7
Nitrogen-free extract	37	41	37
Starch	1	1.3	10
Lignin	0.7	0.2	1.2
Crude fibre	14.9	3.2	47
Neutral Detergent Fibre	23	12	71
Acid Detergent Fibre	20	10	62
Alkaloids	0.02	0.02	<0.001
Oligosaccharides	5.0	5.5	

(Kernels) (Hulls)

가

가.

32%

36 ~ 39%

가

가

가

15%

가

3%

가

가

가

가

2. 가

가

2, 3

1/3

가 by-

2.

pass protein

NRC

( :%)

35%

	Lupins		Kernels	
	Total	Digest coeff.	Total	Digest coeff.
Lysine	1.50	0.82	1.65	0.92
Methionine	0.23	0.68	0.28	0.86
M + C	0.70	0.80	0.85	0.90
Tryptophan	0.34	-	0.42	-
Threonine	1.07	0.72	1.25	0.86
Arginine	3.84	0.88	4.50	0.96
Isoleucine	1.27	0.79	1.60	0.90
Valine	1.25	0.78	1.60	0.91

3.

( :%)

Amino Acids	Digest coeff.
Lysine	0.90
Methionine	0.89
Cystine	0.85
M + C	0.87
Threonine	0.91
Arginine	0.95
Isoleucine	0.93
Valine	0.91

\*Source:Degussa Corp.

4.

( : kcal/kg)

	Lupins	Kernels	Hulls
Gross Energy	4,375	4,469	
ME swine	3,227	3,467	2,347
DE swine	3,440	3,752	2,510*
NE swine	1,984	2,270	956
ME poultry	2,050	2,390	
ME cattle	3,035	3,400	2,818

\*Figure for growers. The DE value of lupin hulls for sows is 3,350.

5.

( : %)

	( 5.5%)	( 18%)
-		
C14:0 Myristic Acid	0.2	0.07
C16:0 Palmitic Acid	10.3	9.46
C18:0 Stearic Acid	4.8	4.86
C20:0 Arachidic Acid	0.7	0.46
C22:0 Behenic Acid	1.3	0.5
C24:0 Lignoceric Acid	-	0.16
-	17.3	15.51
-		
C16:1 Palmitoleic Acid	0.1	0.09
C18:1 Oleic Acid	34.0	21.9
C20:1 Gadoleic Acid	0.3	0.19
C18:2 Linoleic Acid	37.0	52.6
C18:3 Linolenic Acid	6.2	7.94
C20:2 Eicosadienoic Acid	0.4	-
-	78	82.72
-	95.3	98.23

5.5%

(pulse)

85%

80%

35%가

( oleic acid), 45%

(linoleic 37%, linolenic 6%, 2%)

2% Sterols

(1% )

90%

Oil

가

가

가

가

3.0 ~ 3.25mm

Na

6

가

Na 가가

6.

( :%)

	Lupins	Kernels	Hulls
Calcium	0.22	0.13	0.67
Phosphorus	0.30	0.39	0.06
Available Phosphorus	0.12	0.25	-
Sodium	0.02	0.03	-
Potassium	0.81	0.80	-
Sulphur	0.23	-	-
Magnesium	0.16	-	-
Copper(ppm)	4.9	5	0.9
Zinc(ppm)	35	38	35

7.

Factor	Units	Mean	Range	Number
Alkaloids	%	0.02	<0.1 - 0.04	1,316
Oligosaccharide	%	4.07	2.90 - 5.20	202
Phytate	%	0.50	0.32 - 0.84	254
Saponins	mg/kg	573	442 - 740	11
Tannins(Total)	%	0.29	0.19 - 0.51	208
Tannins(Cond)	%	0.01	n.d - 0.11	236
TIA	mg/g	0.12	0.05 - 0.24	148
CTIA	mg/g	0.08	n.d - 0.59	8
Lectins	dilut	n.d		28

가

가 가  
가

(Sweet lupin)

. Codes

3.

가

Alimentation  
0.1mg/kg

2.0mg/kg,

가.

가

가

가

가

가

가

가

가

가 0.12mg/g

가

가

10%

가

가

가

15%

8, 9

free 0.02%

8.

가

kg/t	Starter		Grower	
	Control	Lupins	Control	Lupins
Wheat	428	354	504	32
Sorghum	150	150	150	150
Lupin kernels	0	250	-	250
Mbm 50	70	70	70	70
Tallow	61	66	59	63
Vits/mins/a	19.6	23.2	17.2	21
Enzyme	-	0/1	-	0/1
ME(kcal/kg)	3,100	3,100	3,200	3,200
Protein(%)	22.5	22.5	20.0	20.0
Lysine(%)	1.25	1.25	1.10	1.10

(25%)

가

10%, 15%

가

가

10 ~ 35%

가

2,350kcal/kg

3,350kcal/kg

가

9.

	Control	Lupins	Lupin + Enzyme
Weight gain, g	1,84 <sup>b</sup>	1,88 <sup>b</sup>	1,94 <sup>a</sup>
Feed intake, kg	3.50 <sup>a</sup>	3.70 <sup>b</sup>	3.74 <sup>b</sup>
FCR	1.85	1.92	1.87
Litter score	1.13 <sup>a</sup>	3.13 <sup>b</sup>	1.25 <sup>a</sup>
Litter moisture, %	20.7 <sup>a</sup>	25.5 <sup>b</sup>	21.4 <sup>a</sup>

ab P < 0.05

10.

Starter	10-15%
Grower	20-25%
Finisher	30-35%
Sow/boar	20%

:" Feeding standards for Australian Livestock pigs "1987.  
Standing Committee on Agriculture ISBN

( )

1998

0%, 10%, 20%

0%, 15%, 30%

가

25kg 108 , 63kg 90

35 , 63

(ADG),

(ADFI),

(F/G),

20%

가

30%

15%

15%, 30%

가

11.

	Control	LK10	LK20	Control	LK15	LK30
Corn	30.00	30.00	30.00	30.00	30.00	33.41
Wheat	31.21	32.42	30.00	37.71	38.16	26.77
Lupin Kernel	-	10.00	20.00	-	15.00	30.00
Copra meal	5.00	-	-	4.24	-	-
Soybean meal	24.06	17.44	10.84	18.61	7.88	-
Animal fat	2.83	2.12	2.00	3.00	2.27	2.62
Molasses	3.00	3.00	3.00	3.00	3.00	3.00
Vit. min & amino Acids	3.90	4.02	4.16	3.44	3.69	4.20
Crude Protein(%)	18.50	18.50	18.90	16.50	16.50	17.50
Ava. Lys(%)	1.00	1.00	1.00	0.82	0.82	0.82
Ava. Met+Cys(%)	0.52	0.52	0.52	0.48	0.45	0.44
NE(kal/kg)	2,450	2,450	2,450	2,500	2,500	2,500

control : No lupin kernel, LK 10 ; 10%, LK20 ; 20%, LK 15 ; 15%, LK30 ; 30% of lupin kernel in diet

12.

	Initial BW(Kg)	Final BW(Kg)	ADFI (Kg)	ADG (Kg)	Feed : Gain (Kg/Kg)
Treatment <sup>1</sup> (Growing pig)					
Control	24.68	51.23	1.84	0.761	2.42
LK 10	24.70	51.34	1.89	0.761	2.48
LK 20	24.77	51.42	1.90	0.764	2.49
SEM <sup>2</sup>	0.38	0.46	0.02	0.01	0.05
Contrast <sup>3</sup>	-	-	-	-	-
Treatment <sup>1</sup> (Finsihing pig)					
Control	62.76	107.26 <sup>a</sup>	2.52 <sup>a</sup>	0.706 <sup>a</sup>	3.56
LK 15	63.28	106.14 <sup>a</sup>	2.44 <sup>a</sup>	0.680 <sup>ab</sup>	3.59
LK 30	63.06	103.65 <sup>b</sup>	2.24 <sup>b</sup>	0.644 <sup>b</sup>	3.48
SEM <sup>2</sup>	0.55	0.86	0.05	0.094	0.04
Contrast <sup>3</sup>	-	*	*	*	-

1. Control : No lupin kernel, LK 10 ; 10%, LK20 ; 20%, LK15 ; 15%, LK30 ; 30% of lupin kernel in diet

2. SEM : Standard error of mean

3. Control vs LK 10, LK20 ; Control vs LK15, LK30 ;

GLM and orthogonal contrast ; - Not significant, \*P < 0.05, \*\*P < 0.01

<sup>ab</sup> means in the same row with different superscripts differ(P < 0.05)

가

15%

30%

가

1%

가

starch

13.

	Treatment			SEM	Contrast
	Control	LK 15	LK 30		
Live wt.(kg)	106.7	106.2	103.7	0.85	-
Chilled carcass wt.(kg)	83.9 <sup>a</sup>	82.9 <sup>a</sup>	79.9 <sup>b</sup>	0.66	*
Backfat thickness(mm)	18.6 <sup>b</sup>	22.0 <sup>a</sup>	21.0 <sup>a</sup>	0.55	**
Dressing percentage	78.3 <sup>a</sup>	78.1 <sup>a</sup>	77.1 <sup>b</sup>	0.23	*
Carcass grade(%)					
A	46.7	58.6	56.7		
B	33.3	37.9	36.7		
C	6.7	3.4	3.3		
D	13.3	-	3.3		

14.

Item	Treatment		
	Control	LS15	LS30
<b>Ingredient Composition(%)</b>			
Flaked corn	25.00	25.00	25.00
Rye	28.00	18.65	9.80
Flaked lupin seed	-	15.00	30.00
Wheat bran	12.30	16.00	19.20
Wild oat	10.00	10.00	10.00
Soybean meal	19.00	9.50	-
Molasses	2.00	2.00	2.00
Lime stone	1.80	1.95	2.10
Salt	0.40	0.40	0.40
Sodium bicarbonate	1.00	1.00	1.00
Premix	0.50	0.50	0.50
<b>Chemical Analysis(%)</b>			
Moisture	11.42	11.39	11.34
Crude protein	16.00	16.00	16.00
Crude fat	2.43	3.14	3.84
Crude fiber	4.20	6.10	7.95
Crude ash	6.62	6.39	6.21
Net energy for beef(Mcal/kg)	1.78	1.78	1.78
Calcium	0.88	0.88	0.88
Phosphorus	0.44	0.44	0.44

Control = 0% of flaked lupin seed, LS 15 = 15% of flaked lupin seed, LS30 = 30% of flaked lupin seed.

가 2 ~ 3 가 . 가 . 가 .

(3,035kcal/kg) .

15.

Item	Treatment			SEM	Contrast
	Control	LK 15	LK 30		
Initial BW, kg	249.5	246.4	245.7	2.34	-
Final BW, kg	427.8	423.0	431.3	3.20	-
ADG, kg/d	1.19	1.18	1.24	0.02	-
Feed Intake					
Concentrate, kg/d	7.8 <sup>b</sup>	7.7 <sup>b</sup>	8.0 <sup>a</sup>	0.03	**
Rice straw, kg/d	1.0 <sup>a</sup>	1.0 <sup>a</sup>	1.0 <sup>b</sup>	0.01	*
Total, kg/d	8.9 <sup>a</sup>	8.7 <sup>b</sup>	9.0 <sup>a</sup>	0.03	**
Feed : gain, kg/kg	7.48	7.45	7.35	0.07	-

16.

Item	Treatment <sup>1</sup>		
	Control	LS15	LS30
ADG, kg/d	1.19	1.18	1.24
Average daily total lfeed cost, won/head	2,368.34	2,311.09	2,383.69
Average daily concentrate, won/head <sup>2</sup>	2,188.14	2,132.59	2,211.99
Average daily rice straw, won/head <sup>3</sup>	180.20	178.50	171.70
Average daily total feed cost/ADG, won/kg	1,990.20	1,958.55	1,922.33

1. Control=0% of flaked lupin seed, LS15=15% of flaked lupin seed, LS30=30% of flaked lupin seed.

2. Rawcost of experimental diets were calculated with 244 won/kg of soybean meal, 170 won/kg of raw lupin seed and additional manufacturing cost of lupin flaking by 3.3 won/kg compared with pelleting process as follows ; Control = 279.1 won/kg, LS15=276.6won/kg, LS30=274.1 won/kg

3. Calculated by 170 won/kg of rice straw.

2001

247kg      72

0%, 15%, 30%

150

30%

가

245kg

431kg

TMR      가      가

12%      47%

가가 2,818kcal/kg

15%, 30%

3.4%

kg  
가

가

1.6%,  
.

,  
가

가

가

가

가

4.

20

7,500

(Sweet Lupin)

Non-GMO

( 20 ~ 30 ).

가

가