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Appendices

Appendix 1. Laboratory analyses of raw materials and feeds.

Experiment I

			DM-70°C (%)	GE (MJ/kg)	AME (MJ/kg)	CP (%)
Sorghum		ground				7.10
Soybean meal		ground				46.70
Peanut meal		ground				43.30
Meat and bone meal		ground				49.60
Feed A	0% peanut meal	ground		15.303	12.302	19.31
		crumble	87.24			
		standard	89.09		12.360	20.71
Feed B	2.5% peanut meal	ground		15.317	12.426	19.38
		crumble	87.94			
		standard	89.14		12.360	20.71
Feed C	5.0% peanut meal	ground		15.396	12.525	19.25
		crumble	87.24			
		standard	89.19		12.360	20.71
Feed D	7.5% peanut meal	ground		15.609	12.787	19.50
		crumble	87.69			
		standard	89.24		12.360	20.71
Feed E	15% peanut meal	ground		15.240	12.704	19.31
		crumble	88.00			
		standard	89.39		12.360	20.71

Note: DM = dry matter; GE = gross energy; AME = apparent metabolisable energy; CP = crude protein

Experiment II

			DM (%)	GE (MJ/kg)	AME (MJ/kg)	CP (%)	Crude fibre (%)
Peanut shell		ground	92.87	18.304	3.594	8.02	59.78
		as is	91.79				
		standard	90.86		-	7.74	57.72
Feed A	0% peanut shell	ground	88.53	16.215	12.929	21.87	2.51
		crumble	86.75				
		standard	87.16		12.500	21.50	2.08
Feed B	1.13% peanut shell	ground	87.89	16.257	12.940	21.36	3.26
		crumble	86.35				
		standard	87.32		12.500	21.50	2.73
Feed C	2.25% peanut shell	ground	88.03	16.517	13.107	21.12	3.86
		crumble	86.53				
		standard	87.47		12.500	21.50	3.37
Feed D	4.5% peanut shell	ground	88.41	16.875	13.033	20.79	5.63
		crumble	87.19				
		standard	87.79		12.500	21.50	4.67
Feed E	9.0% peanut shell	ground	88.03	17.571	13.138	20.54	7.36
		crumble	87.14				
		standard	88.41		12.500	21.50	7.26

Appendix 1. (continued)

Experiment III

			DM (%)	GE (MJ/kg)	AME (MJ/kg)	CP (%)
Sorghum		ground	87.65			9.25
Barley		ground	89.40			9.32
Maize		ground	88.96			7.03
Wheat		ground	90.45			11.17
Feed A	SBM/sorghum	ground	90.75	16.538	13.548	22.19
		mash	89.32			
		standard	85.20		12.500	20.50
Feed B	PM/sorghum	ground	91.48	16.803	13.726	23.66
		mash	89.68			
		standard	85.63		12.500	20.50
Feed C	PM/barley	ground	94.56	19.339	14.332	21.77
		mash	91.20			
		standard	88.96		12.500	20.50
Feed D	PM/maize	ground	92.20	17.291	13.953	23.31
		mash	90.58			
		standard	86.42		12.500	20.50
Feed E	PM/wheat	ground	93.12	17.759	14.029	21.96
		mash	91.24			
		standard	87.37		12.500	20.50

Note: SBM = soybean meal; PM = peanut meal

Appendix 2. Nutrient contents of peanut meal, soybean meal and peanut shell.

	Processing	Source	ME chick MJ/kg	ME chick Kcal/kg	DM %	CP %	Dig. CP %	Fat %	Lin. ac. %	CF %	ADF %	Ash %
Peanut meal	expeller	d	11.00	2630	92.30	47.80		5.30	3.40	8.70		4.70
	expeller	f	13.20	3155	91.20	45.40	40.80	5.10				6.40
seeds, no coats	mech. ext.	b	10.24	2447	90.00	42.40		7.10		5.30	5.00	7.20
			cell walls 13%, cellulose 4%									
kernels	mech. ext.	a	10.42	2491	92.00	45.80		5.90		11.00		5.70
pods + seeds	mech. ext.	b	10.38	2482	91.00	31.10		8.70		16.00		9.00
seeds, no coats	mech. ext. caked	b			92.00	44.90		8.30		4.90		6.30
pods + seeds	mech. ext. caked	b			90.00	34.50		8.90		14.90		6.90
seeds, no coats	solv. ext.	b	11.42	2729	93.00	39.20		0.90		7.30		4.50
kernels	solv. ext.	a	9.23	2205	92.00	47.40		1.20		13.00		4.50
seeds + some pods	solv. ext.	b	8.17	1952	91.00	43.70		1.40		11.40		5.50
pods + seeds	solv. ext.	b	9.50	2271	91.00	39.10		1.30		14.20		5.40
Soybean meal	expeller	d	12.05	2880	89.70	48.00		3.40	0.40	5.80		6.20
seeds	mech. ext.	b	9.87	2360	87.00	40.70		5.80		5.00		5.80
seeds	mech. ext. caked	b			85.00	37.50		8.80		4.70		5.70
	solv. ext.	d	10.67	2550	94.50	47.10		0.70	0.15	5.00		6.70
	solv. ext.	c			90.66	48.15		1.90		6.09	8.01	8.04
	solv. ext.	f	10.70	2557	87.30	49.90	42.80	1.50				4.70
seeds, no hulls	solv. ext.	b	10.51	2511	91.00	54.20		1.00		2.10	6.00	6.50
			cell walls 7%, cellulose 4%									
seeds	solv. ext.	b	10.44	2494	90.00	46.80		1.70		6.10		6.30
Peanut - pods		b			90.00	7.70		1.30		41.80	60.00	3.70
			cell walls 68%, cellulose 36%, lignin 21.5%									
		e			89.77	8.72		1.78		70.96		4.83
peanut shells		a			92.30	6.80		1.10		60.40		4.30
			cellulose 44.8%, lignin 26.5%									

Note: ME = metabolisable energy; DM = dry matter; CP = crude protein; Dig. CP = digestible CP; Lin. ac. = linoleic acid; CF = crude fibre; ADF = acid detergent fibre
mech. = mechanical; ext. = extracted; solv. = solvent

Source: a) Crampton & Harris (1969); b) Harris *et al.* (1982); c) Dept. of Agriculture and Rural Affairs (1985); d) Evans (1985); e) Ostrowski-Meissner (1987); f) McDonald *et al.* (1988)

Appendix 3. Amino acid contents of peanut meal, soybean meal and peanut shell.

	Processing	Source	CP %	Meth %	Meth+Cys %	Lys %	Av-lys %	Gly %	Tryp %	Arg %	Thre %	Ileu %	Leu %	His %	Val %	Phe %	Phe+Tyr %	Ser %
Peanut meal	expeller	d	47.80	0.39	1.04	1.42	1.26	2.52	0.30	5.32	1.24	1.50	2.89	1.01	1.89	2.27	4.05	2.18
	expeller	f	47.20	0.56	1.68	1.64		2.64	0.30	5.70	1.35	1.57	2.99	1.13	2.07	2.51	4.50	2.31
seeds, no coats	mech. ext.	b	42.40	0.36	0.61	1.13		1.14	0.32	3.89	0.81	0.72	1.30	0.50	0.88	1.01	1.85	1.39
kernels	mech. ext.	a		0.60		1.30			0.50	4.69	1.40	2.00	3.10	1.00	2.20	2.30		
pods + seeds	mech. ext.	b	31.10	0.45	1.19	1.46		2.50	0.47	4.84	1.40	1.90	3.13	1.05	2.39	2.44		
seeds, no coats	mech. ext. caked	b	44.90	0.40	1.04	1.19			0.39	3.48								
seeds, no coats	solv. ext.	b	39.20	0.42	1.16	1.79		2.38	0.49	4.61	1.17	1.78	2.74	0.96	1.91	2.07	3.60	3.14
kernels	solv. ext.	a		0.40		2.30			0.50	5.90	1.50	2.00	3.70	1.20	2.80	2.70	4.50	
seeds + some pods	solv. ext.	b	43.70	0.42		1.48			0.47	5.01	1.02							
pods + seeds	solv. ext.	b	39.10	0.43	1.12	1.73		2.36	0.48	5.13	1.37	1.90	3.17	1.08	2.45	2.46	4.12	3.01
Soybean meal	expeller	d	48.00	0.64	1.30	2.76	2.61	1.91	0.73	3.45	1.72	2.09	3.53	1.21	2.15	2.36	4.09	2.30
seeds	mech. ext.	b	40.70	1.05	1.72	1.60		1.62	0.67	2.87	1.15	1.75	2.29	0.93	1.95	0.88	1.54	1.95
	solv. ext.	d	47.10	0.64	1.34	2.95	2.79	1.95	0.43	3.52	1.84	2.05	3.52	1.24	2.21	2.33	4.05	2.40
	solv. ext.	c	48.15	0.53	1.27	2.96		2.00	0.67	3.43	1.92	2.34	3.63	1.23	2.38	2.33	3.93	2.54
	solv. ext.	f	44.30	0.79	1.99	2.85		1.95	0.55	3.53	1.79	2.03	3.50	1.26	2.22	2.30	4.07	2.35
seeds, no hulls	solv. ext.	b	54.20	0.72	1.43	3.16		2.29	0.70	3.72	1.93	2.16	3.68	1.21	2.50	2.39	4.12	2.52
seeds	solv. ext.	b	46.80	0.64	1.28	2.89		1.75	0.66	3.19	1.70	1.89	3.23	1.08	1.86	1.99	3.40	2.16
Peanut - pods		b	7.70	0.03	0.05	0.34		0.36		0.37	0.27	0.18	0.42	0.15	0.25	0.30	0.43	0.43

Note: CP = crude protein; Av-lys = available lysine
mech. = mechanical; ext. = extracted; solv. = solvent

Source: a) Crampton & Harris (1969); b) Harris *et al.* (1982); c) Dept. of Agriculture and Rural Affairs (1985); d) Evans (1985); f) McDonald *et al.* (1988)

Appendix 4. Mineral contents of peanut meal, soybean meal and peanut shell.

	Processing	Source	Ca %	P %	Av-P %	Na %	K %	Mg %	S %	Cl %	Mn mg/kg	Zn mg/kg	Fe mg/kg	Cu mg/kg	Se mg/kg	Co mg/kg	I mg/kg
Peanut meal	expeller	d	0.11	0.68	0.20	0.02	1.13	0.36	0.28	0.03	54.0	60.7	2780.0	22.5			
	expeller	f	0.29	0.68		0.08		0.17			29.0	22.0		17.0		0.12	
seeds, no coats	mech. ext.	b	0.19	0.61		0.20	1.12	0.28	0.26	0.03	25.0	32.0	151.0	15.0		0.11	0.06
kernels	mech. ext.	a	0.17	0.57			1.15	0.33			25.5						
pods + seeds	mech. ext.	b	0.31	1.31		0.03	1.21	0.33	0.28		25.0						
seeds, no coats	mech. ext. caked	b	0.23	0.57							25.0	32.0	981.0	15.0		0.28	
pods + seeds	mech. ext. caked	b	0.67	0.44				0.39									
seeds, no coats	solv. ext.	b	0.20	0.82		0.05	1.55	1.79	0.30	0.03	30.0	119.0	62.0	15.0		0.11	0.07
kernels	solv. ext.	a	0.20	0.65				0.04			29.0						
seeds + some pods	solv. ext.	b	0.28	0.57													
pods + seeds	solv. ext.	b	0.20	0.68		0.07	1.22	0.04			30.0	20.0					
Soybean meal	expeller	d	0.26	0.64	0.19	0.04	1.99	0.27	0.33	0.05	38.7	52.7	220.0	18.3	0.55		
seeds	mech. ext.	b	0.48	0.58		0.02	1.87	0.22	0.32	0.07	30.0	56.0	158.0	21.0	0.10	0.17	
	solv. ext.	d	0.24	0.81	0.24	0.18	2.01	0.28			44.8	54.8	330.0	17.6			
	solv. ext.	f	0.35	0.68		0.04		0.30			32.0	61.0		25.0	0.55	0.20	
seeds, no hulls	solv. ext.	b	0.31	0.59		0.03	2.15	0.30	0.44	0.04	38.0	58.0	132.0	21.0	0.10	0.07	0.11
seeds	solv. ext.	b	0.25	0.63		0.04	1.99	0.25	0.43	0.04	29.0	58.0	120.0	21.0	0.46	0.09	0.13
Peanut - pods		b	0.28	0.05		0.05	0.27	0.25	0.09		6.0	22.0	8.0	16.0		0.11	
		e	0.45	0.14													
peanut shells		a	0.23	0.06			0.94	0.15			62.7		300.0	16.2		0.10	

Note: Av-P = available P
mech. = mechanical; ext. = extracted; solv. = solvent

Source: a) Crampton & Harris (1969); b) Harris *et al.* (1982); d) Evans (1985); e) Ostrowski-Meissner (1987); f) McDonald *et al.* (1988)

Appendix 5. Vitamin contents of peanut meal, soybean meal and peanut shell.

	Processing	Source	A	E	B1	B2	Niacin	B6	Pan. ac.	Biotin	Folic ac.	B12	Choline
			IU/g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/kg	mg/kg
Peanut meal	expeller	d	0.4	3.0	7.2	7.2	170.0	6.2	50.6	0.39	0.36		2525.0
	expeller	f	0.3	3.0 *	7.1	5.2	166.0	10.0	47.0				1655.0
seeds, no coats	mech. ext.	b		2.0	6.3	6.9	167.0	7.1	44.5	0.32	0.63		1570.0
kernels	mech. ext.	a			7.3	5.3	169.0		48.2				1683.0
pods + seeds	mech. ext.	b	0.3	3.0	7.1	5.2	168.0		52.5	0.39			1726.0
seeds, no coats	solv. ext.	b		3.0	5.7	9.2	175.0	5.7	47.2	0.33	0.66		1976.0
kernels	solv. ext.	a			7.3	11.0	170.1		53.0				2000.0
seeds + some pods	solv. ext.	b											1404.0
pods + seeds	solv. ext.	b		3.0	7.2	8.1	168.0		52.5	0.39			1797.0
Soybean meal	expeller	d	0.4	1.4	4.4	3.2	23.5	10.6	14.6	0.32	0.50		3360.0
seeds	mech. ext.	b		6.0	3.8	1.3	12.0	6.3	7.1	0.32	6.21	1.00	1150.0
	solv. ext.	d	0.4	3.8	4.2	3.1	36.2	6.4	14.5	0.32	1.55		3360.0
	solv. ext.	f		2.0 *	4.5	2.9	29.0	6.0	16.0				2794.0
seeds, no hulls	solv. ext.	b		2.0	3.1	3.0	22.0	5.0	15.0	0.33	0.75		2788.0
seeds	solv. ext.	b		2.0	5.9	2.9	28.0	5.9	16.5	0.33	0.66		2667.0
Peanut - pods		b	Carotene (provitamin A) 1 mg/kg										
peanut shells		a	Carotene 0.8 mg/kg, vitamin A equivalent 1.3 IU/g										

Note: Pan. ac. = pantothenic acid; Folic ac. = folic acid; * = IU/kg
mech. = mechanical; ext. = extracted; solv. = solvent

Source: a) Crampton & Harris (1969); b) Harris *et al.* (1982); d) Evans (1985); f) McDonald *et al.* (1988)