Long, C. November 2005

Degutopia Feed Trial

Abstract:
Degutopia conducted a feed trial to assess the suitability of a new feed for degu (*Octodon degus*) consumption and placement of the product on the market. Over a 30 day trial, it was found that the feed was highly palatable, however trial degus were found to put on weight and all degus, excepting the control, had exceeded the weight range for a healthy adult degu by the end of the trial. This change was found not to be significant compared to the control degu, despite demonstrating a strong trend, and reasons for this are discussed. In order for this feed to be considered suitable for the degu market, it is concluded slight alterations are needed.

Introduction:
Degus are becoming an increasingly popular pet in many parts of the world and interest in recent years in the UK has rapidly developed (Degutopia, 2005). Due to the specific dietary requirements of the degu, the UK is now faced with the problem posed by lack of a suitable degu-specific feed on the market. Many degu owners currently use a diet of guinea pig mix, guinea pig pellets or chinchilla pellets, or a mixture of these (Degutopia, 2005), with the most common suitable feeds being Burgess Supa Guinea Excel pellets and Supreme Gerty Guinea Pig mix (Degutopia, 2005). However, in the majority of cases such feeds are not ideally suited to the degus digestion, and in some cases this can have negative health consequences for the degu.

The primary problem in finding a suitable degu feed is the degus' lack of tolerance to dietary glucose (Brown and Donnelly, 2001; Nishi and Steiner, 2003; Opazo *et al.*, 2003). Much research in this area has shown that degus very easily develop diabetes mellitus when regularly fed on a sugar-containing diet (Nishi and Steiner, 2003; Brown and Donnelly, 2001), therefore any degu feed produced needs to have a minimal sugar content. Research suggests that dietary protein should also be low in degu feeds, since they have only an 85% dietary capacity for protein, of which large amounts can lead to a significant increase in water consumption/drinking behaviour (Ebensperger, 2001). Conversely, the fibre content should be maximised as this makes up a significant proportion of the wild degu diet (Bozinovic *et al.* 2004; Ebensperger and Wallern, 2002), with degus being specially adapted to break down cellulose by alloenzymatic action (Langer, 2002). Bauck (2004) has suggested that caviomorphs need a minimum of 18% dietary fibre in order to maintain healthy digestion, but research by Langer (2002) suggests that it may need to be as high as 21% in the degu. However, any feed produced should take into account that it is advisable to give natural hay *ad lib.* to degus in order to encourage them to forage throughout the day, aid peristalsis and maintain intestinal bacterial health (Bozinovic *et al.*, 2004).

It is the popular belief that degus, like their close relative the guinea pig, are not able to produce their own vitamin C, although the lack of research in this area promotes this as hypothesis only. Until further research can be done, it is important that any degu feed contains added vitamin C in order to avoid potential health problems (Sapra *et al.*, 1987).

In light of this information, the proposed new degu feed consists of the following nutritional breakdown (for a full list of ingredients please see appendix):

Fibre-	12%
Protein-	14%
Oil-	5%
Ash-	8%
Carbohydrate-	45%
(of which sugars)-	<1%
Vitamin C-	500 mg kg^{-1}
Vitamin E-	100 iu kg^{-1}
Vitamin A-	15,000 iu kg^{-1}
Vitamin D_3-	1,500 iu kg^{-1}
Calcium-	0.85%
Phosphorus-	0.5%
Copper-	14 mg kg^{-1}
Selenium-	0.35 mg kg^{-1} (0.35 ppm)
Yucca extract	0.02%

(Source: Harlequin Nutrition, 2005)

The proposed feed is 100% extruded in such a way as to prevent selective feeding (each pellet contains identical nutrition) and minimise dust (particularly useful for degus with dust allergies) (Hammond, 2005). The pellets come in a variety of shapes and colours, which it is thought helps to prevent animals becoming ‘bored’ with the feed (provides variation), as well being attractive to the customer (Hammond, 2005).

Methodology:
Four degus of both sexes were selected for the trial. Trial degus were chosen for their previous weight stability and were healthy, fully adult and not pregnant. A similarly selected control degu was also chosen to take part in the trial but receive no trial diet. All degus were subject to the same environmental conditions and feeding regimes. Initially all degus were weighed on walk-on scales accurate to 1g and the weights recorded. There followed seven days of gradual trial feed introduction, whereby trial degus were exposed to the trial diet daily, in increasing increments, with their normal feed until daily feeds consisted of 100% trial diet. The purpose of this was to allow the trial degus’ digestive systems time to adjust to the trial diet and minimise the chance of digestive related anomalies during the trial. Over the initial seven day period, all trial degus were introduced to the trial diet at an equal rate. The control degu was fed the habituated standard diet (see appendix) as normal over this time. At the end of the seven day period, all degus were weighed again and the weights recorded as the start trial weights. The trial then commenced over the next 30 days with each trial degu being fed a fixed amount of trial feed once per day. The amount given was fixed at 10g. The control degu was given an identical 10g fixed amount of standard feed once per day. Trial and control degus were weighed using the walk-on scales at the same time every day, and the weights recorded. This continued until day 30 of the trial, when a final weight reading was taken for all degus taking part.

In order to monitor water consumption, the fresh water consumption for each degu was calculated over the course of the trial. This was done by regularly noting the amount of water consumed by each degu throughout. The reading obtained was compared to a pre-trial 30 day water consumption value for each degu.

Droppings were also studied at the start and end of the trial for each degu. Fresh droppings were scored according to their moistness, consistency, fibrosity and colour. The results obtained were compared when the droppings were scored again at the end of the trial.

Statistical analysis was performed by way of an unpaired T-test, assuming unequal variances. This was run on the weight data and weight change data of all trial degus, comparing to the respective control degu data.

Results:

Nutrient	Standard feed (mg)	Trial feed (mg)	% change in trial feed
Fibre	1200	1200	0%
Protein	1640	1400	-14.6%
Oil	340	500	+32%
Ash	560	800	+30%
Vitamin A	0.067	0.045	-32.8%
Vitamin C	4.7	5	+6%
Vitamin E	0.74	1.1	+32.7%
Vitamin D_3	0.00027	0.00038	+28.9%
Copper	0.12	0.14	+14.3%
Calcium	32	85	+62.4%
Phosphorus	20	50	+60%
Selenium	0	0.0035	+100%

Table 1: Daily nutrition intake per degu, comparison of standard and trial feeds (per 10g)

Degu	Start Weight (g)	End weight (g)	Change (g)
Trial Degu 1	255	275	+20
Trial Degu 2	254	272	+18
Trial Degu 3	240	252	+12
Trial Degu 4	238	263	+21
Control Degu 1	*238*	*243*	*+5*

Table 2: Weight changes in all degus over the 30 day trial

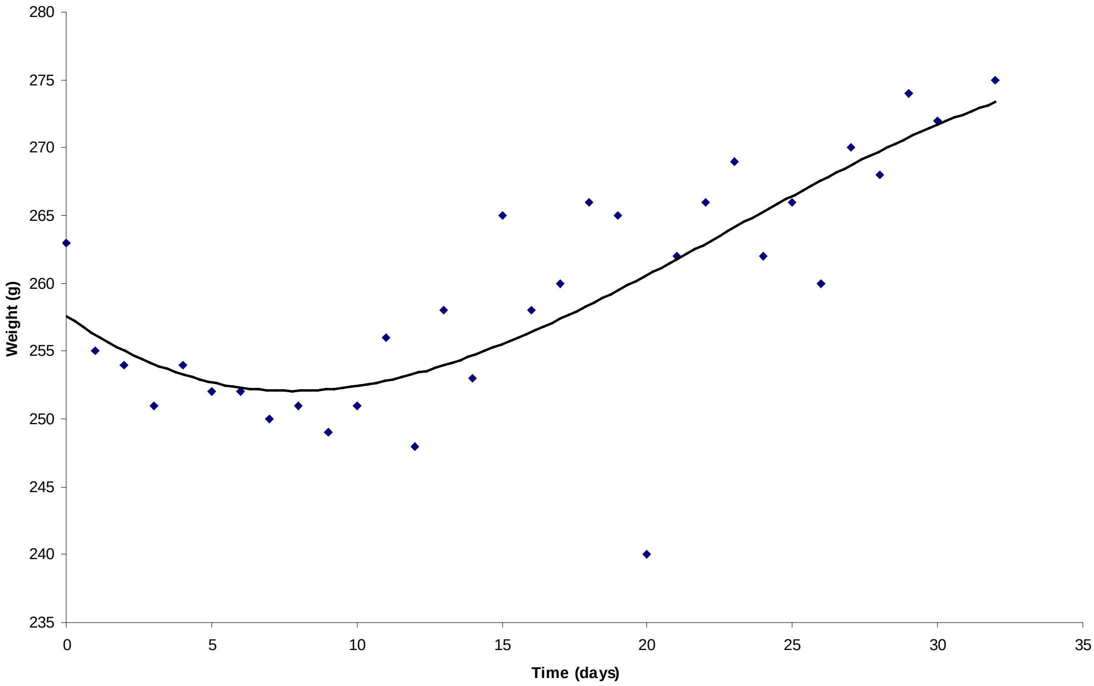

Figure 1: Trial degu 1 weight during trial

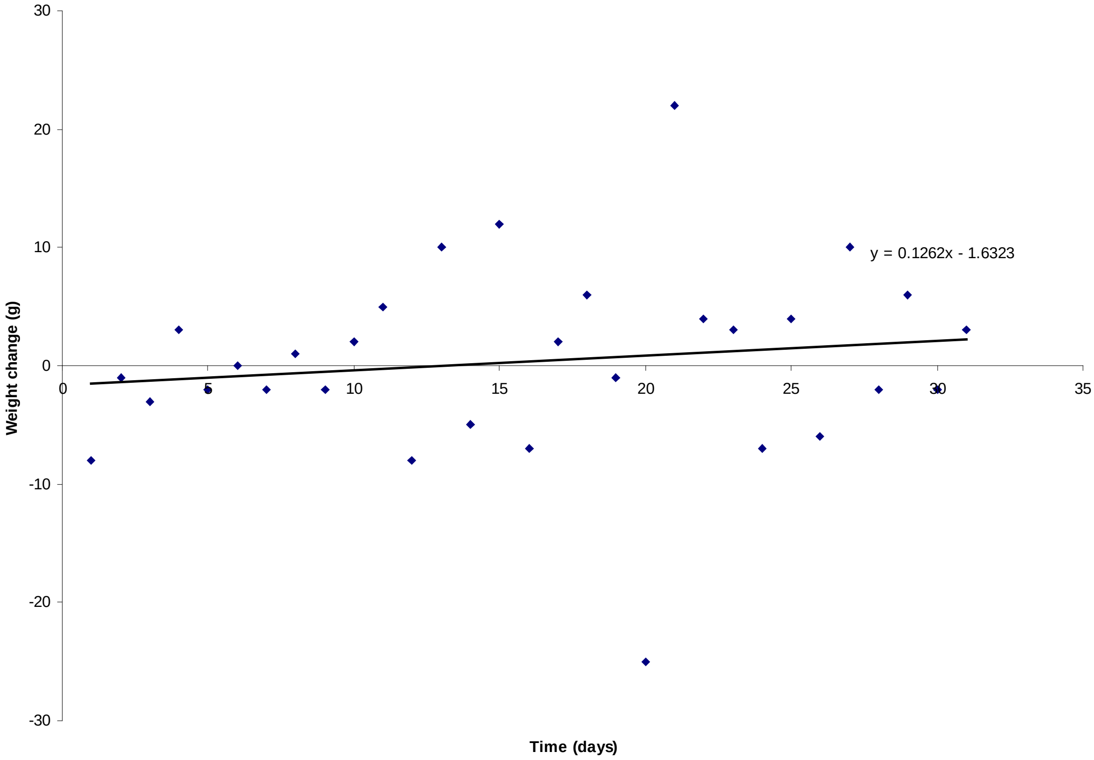

Figure 2: Trial degu 1 weight change during trial

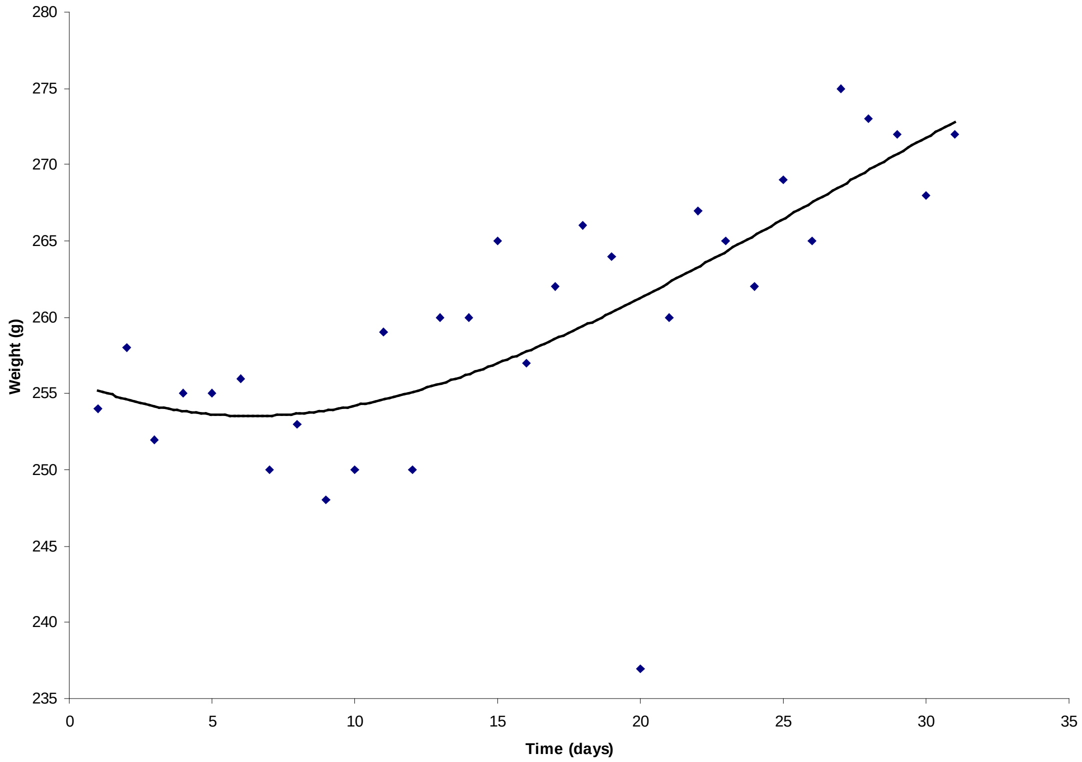

Figure 3: Trial degu 2 weight during trial

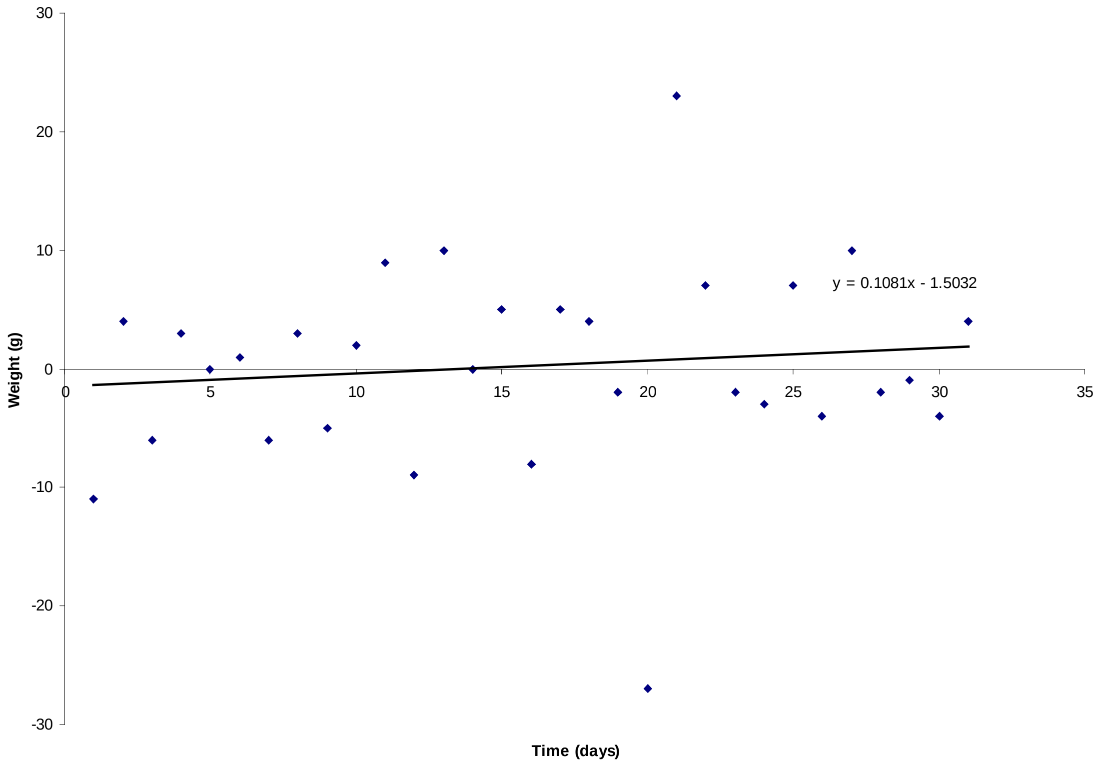

Figure 4: Trial degu 2 weight change during trial

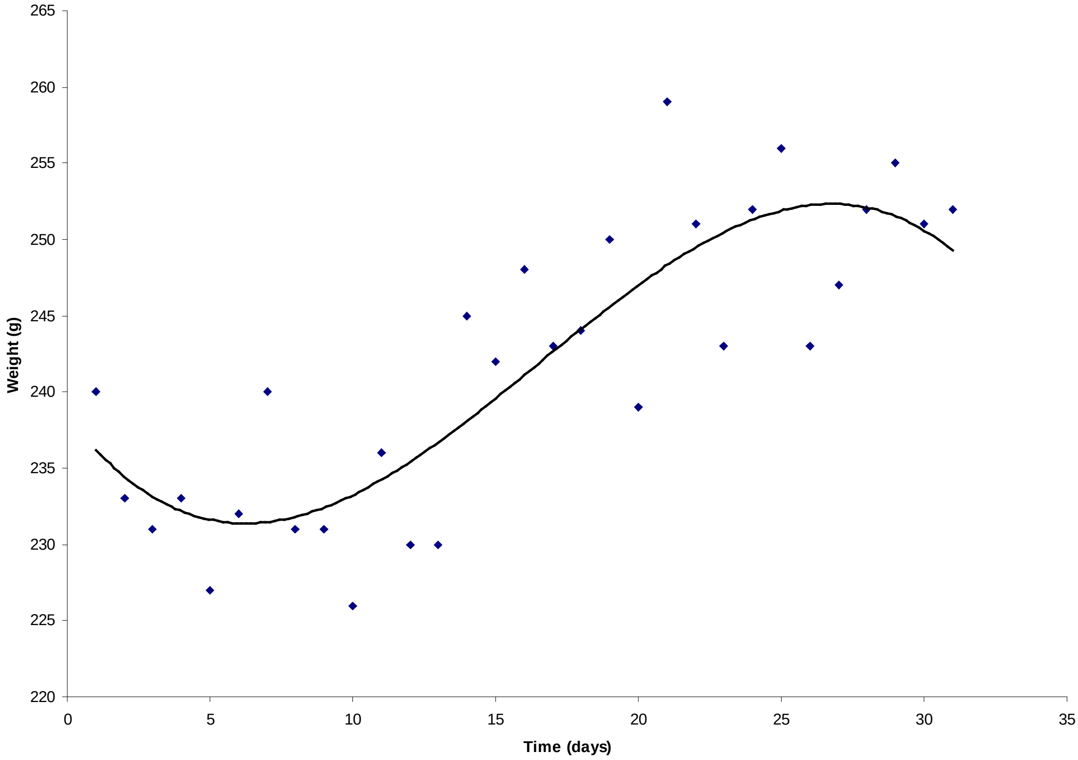

Figure 5: Trial degu 3 weight during trial

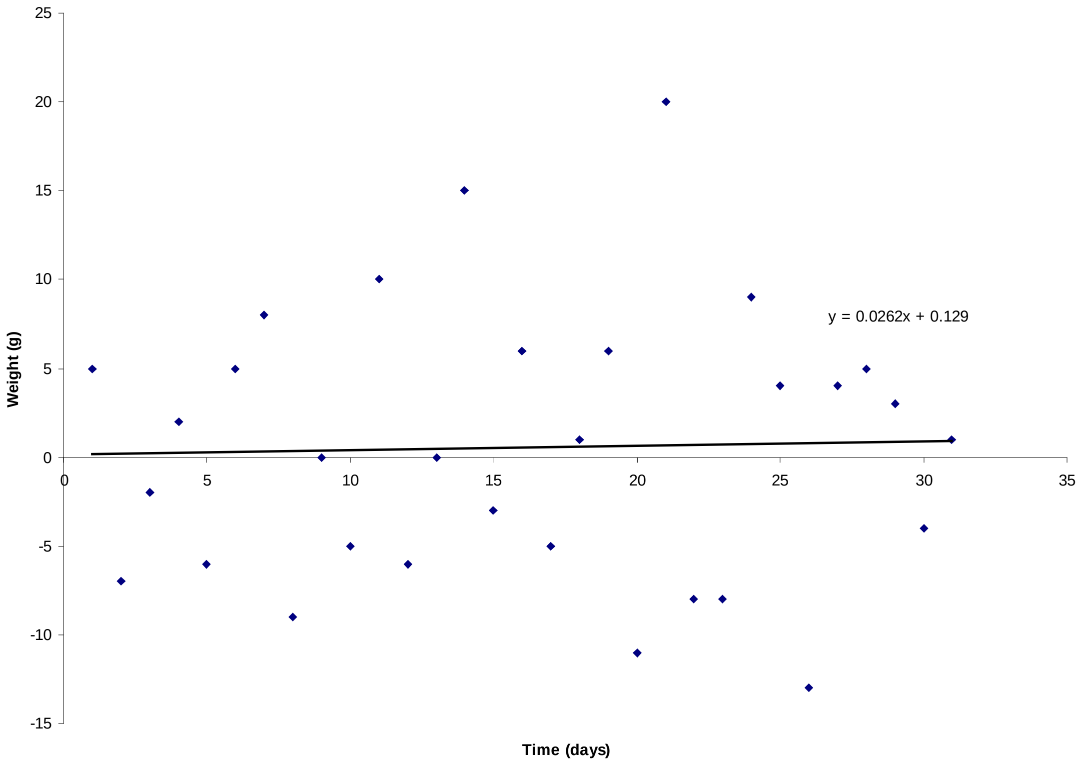

Figure 6: Trial degu 3 weight change during trial

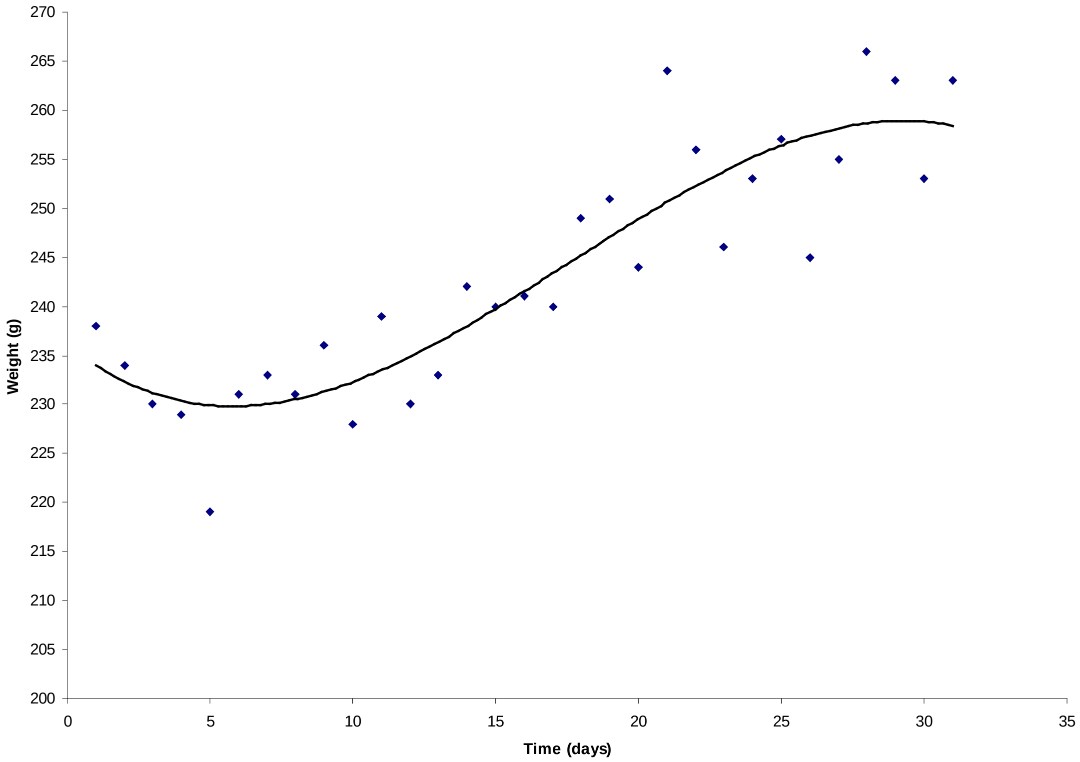

Figure 7: Trial degu 4 weight during trial

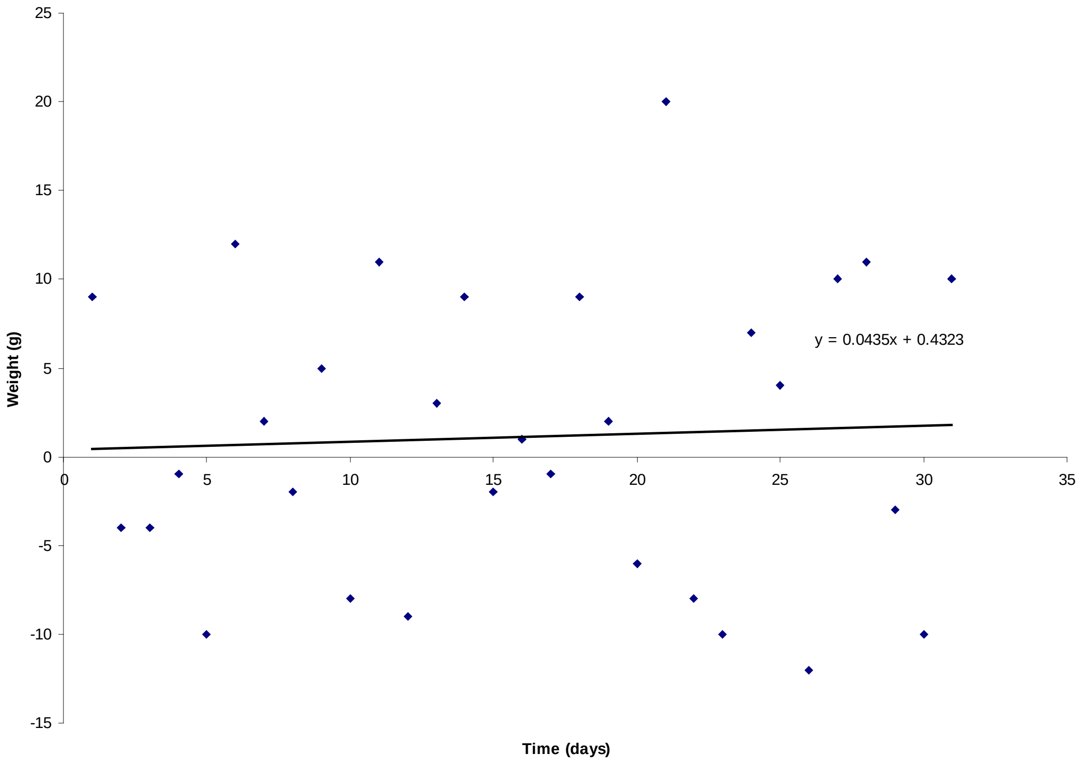

Figure 8: Trial degu 4 weight change during trial

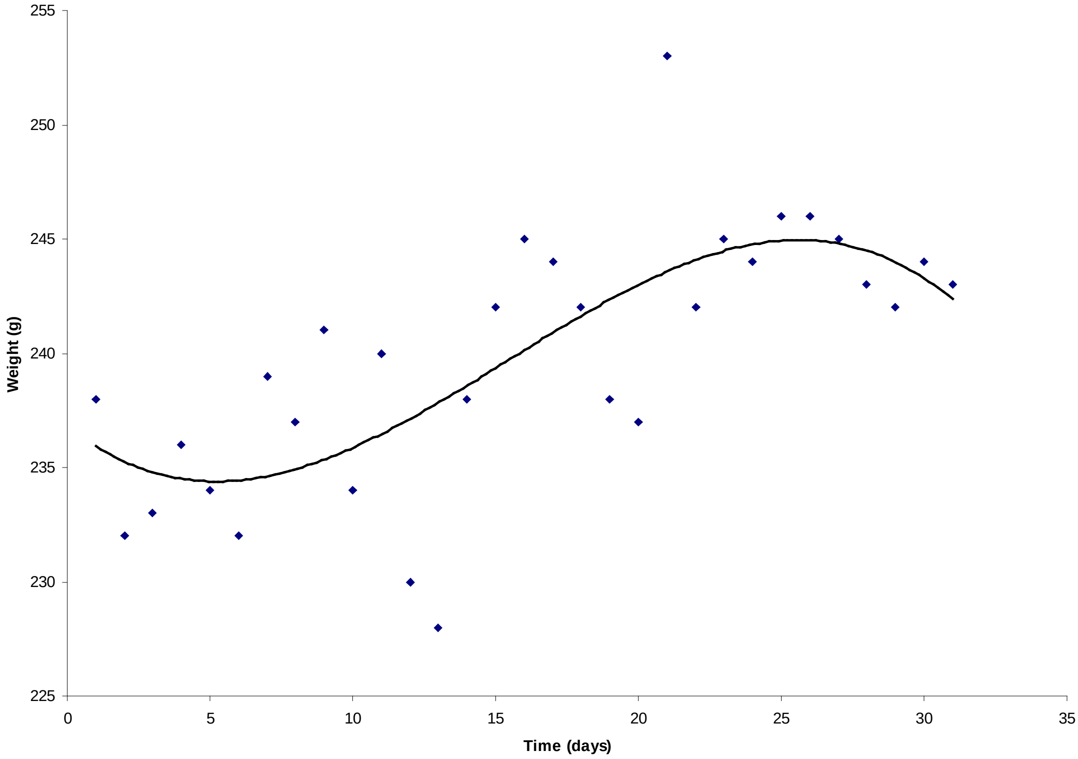

Figure 9: Control degu 1 weight during trial

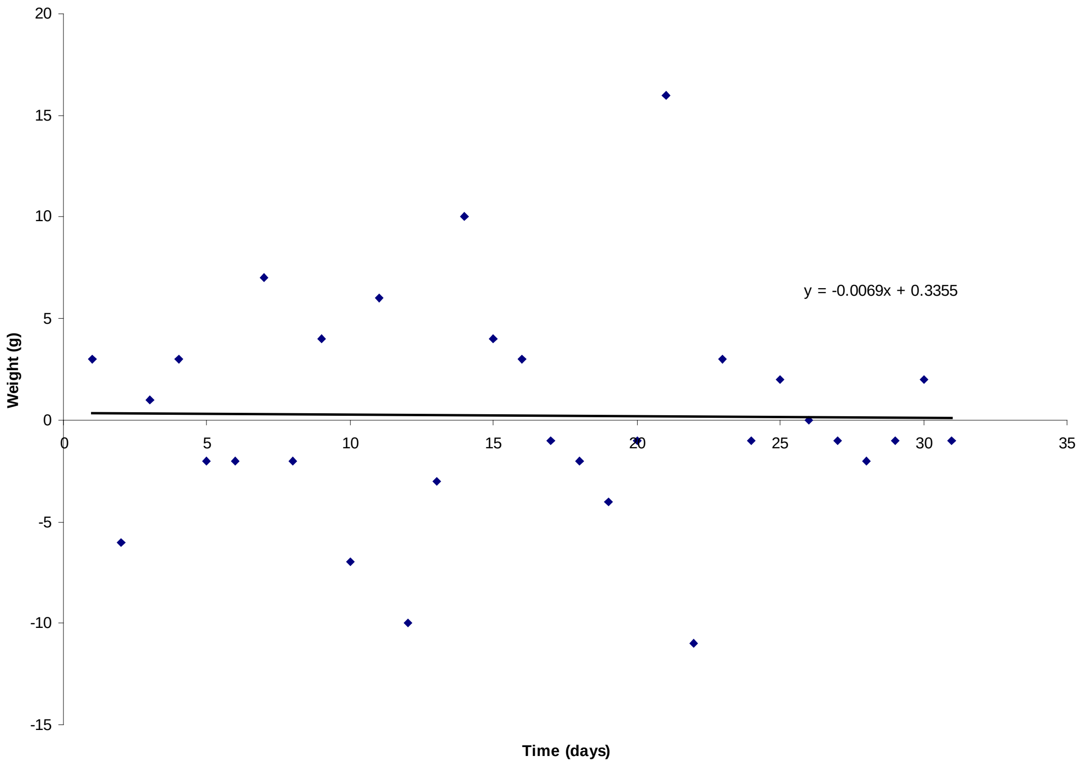

Figure 10: Control degu 1 weight change during trial

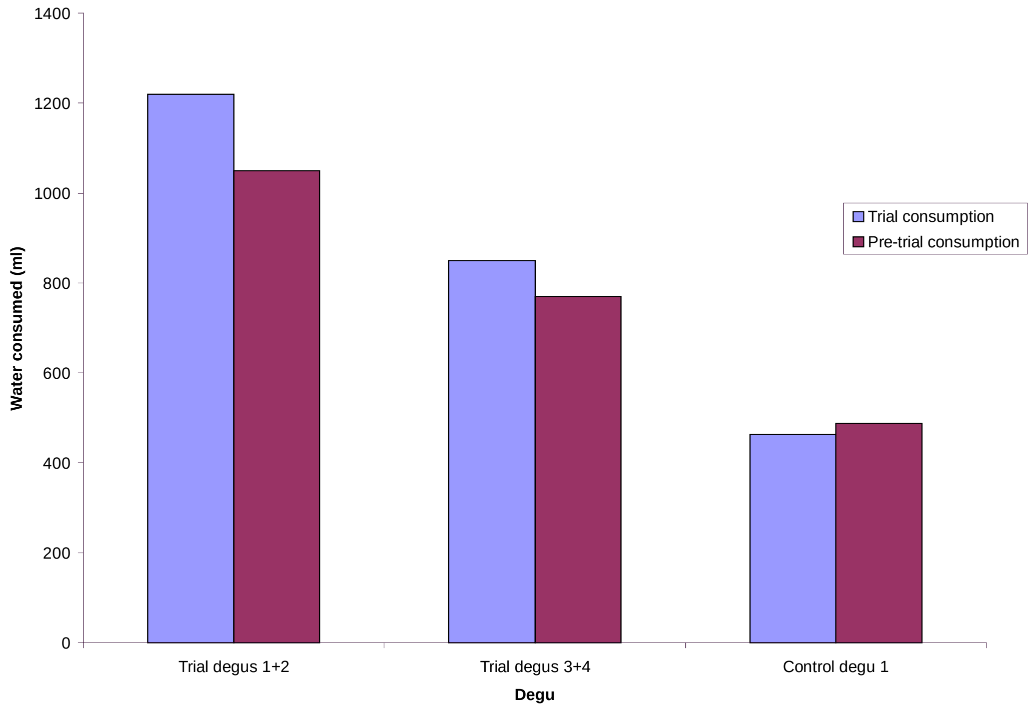

Figure 11: Water consumption of all degus before and after trial (note that the data for trial degus 1/2 and 3/4 are grouped together due to shared living space)

Dropping scoring using following system:
Moistness 1-5 (where 1=dryest and 5=wettest)
Consistency 1-5 (where 1=softest and 5=hardest)
Fibrosity 1-5 (where 1=least fibrous and 5=most fibrous)
Colour 1-5 (where 1=lightest brown and 5=darkest brown)

Degu	**Moistness**	**Consistency**	**Fibrosity**	**Colour**
Trial degu 1	3	2	3	5
Trial degu 2	3	2	3	5
Trial degu 3	3	3	4	4
Trial degu 4	3	3	4	4
Control degu 1	*2*	*4*	*5*	*5*

Table 3: Dropping scoring pre-trial

Degu	**Moistness**	**Consistency**	**Fibrosity**	**Colour**
Trial degu 1	2	3	5	2
Trial degu 2	2	3	5	3
Trial degu 3	2	2	5	4
Trial degu 4	2	2	5	4
Control degu 1	*3*	*3*	*5*	*5*

Table 4: Dropping scoring post-trial

Weight		
	TD4	*CD1*
Mean	243.1935	239.7742
Variance	153.628	31.24731
Observations	31	31
Hypothesised Mean Difference	0	
df	42	
t Stat	**1.400186**	
P(T<=t) one-tail	0.084401	
t Critical one-tail	1.681952	
P(T<=t) two-tail	0.168802	
t Critical two-tail	**2.018082**	

Weight		
	TD2	*CD1*
Mean	259.9677419	239.7742
Variance	73.7655914	31.24731
Observations	31	31
Hypothesised Mean Difference	0	
df	52	
t Stat	**10.97165527**	
P(T<=t) one-tail	1.91862E-15	
t Critical one-tail	1.674689154	
P(T<=t) two-tail	3.83724E-15	
t Critical two-tail	**2.006646761**	

Weight		
	TD3	*CD1*
Mean	241.6774	239.7742
Variance	90.02581	31.24731
Observations	31	31
Hypothesised Mean Difference	0	
df	49	
t Stat	**0.962252**	
P(T<=t) one-tail	0.170324	
t Critical one-tail	1.676551	
P(T<=t) two-tail	0.340648	
t Critical two-tail	**2.009575**	

Weight		
	TD1	*CD1*
Mean	259.0967742	239.7742
Variance	75.22365591	31.24731
Observations	31	31
Hypothesised Mean Difference	0	
df	51	
t Stat	**10.42630379**	
P(T<=t) one-tail	1.524E-14	
t Critical one-tail	1.675284951	
P(T<=t) two-tail	3.048E-14	
t Critical two-tail	**2.007583728**	

Table 5: Statistical analysis summary of the weights of all degus during trial

Weight Change	*TD4*	*CD1*
Mean	1.129032	0.225806
Variance	67.91613	29.11398
Observations	31	31
Hypothesised Mean Difference	0	
df	52	
t Stat	**0.510533**	
P(T<=t) one-tail	0.305919	
t Critical one-tail	1.674689	
P(T<=t) two-tail	0.611839	
t Critical two-tail	**2.006647**	

Weight Change	*TD2*	*CD1*
Mean	0.225806452	0.225806
Variance	72.44731183	29.11398
Observations	31	31
Hypothesised Mean Difference	0	
df	51	
t Stat	**0**	
P(T<=t) one-tail	0.5	
t Critical one-tail	1.675284951	
P(T<=t) two-tail	1	
t Critical two-tail	**2.007583728**	

Weight Change	*TD3*	*CD1*
Mean	0.548387	0.225806
Variance	58.45591	29.11398
Observations	31	31
Hypothesised Mean Difference	0	
df	54	
t Stat	**0.19193**	
P(T<=t) one-tail	0.424259	
t Critical one-tail	1.673565	
P(T<=t) two-tail	0.848517	
t Critical two-tail	**2.004879**	

Weight Change	*TD1*	*CD1*
Mean	0.387096774	0.225806
Variance	64.37849462	29.11398
Observations	31	31
Hypothesised Mean Difference	0	
df	53	
t Stat	**0.092875429**	
P(T<=t) one-tail	0.463176359	
t Critical one-tail	1.674116237	
P(T<=t) two-tail	0.926352718	
t Critical two-tail	**2.005745949**	

Table 6: Statistical analysis summary of the weight changes of all degus during trial

The palatability of the feed was found to be excellent; all pieces given were eaten immediately with no wastage or visible preference for any given ‘shape’.

The complete weight record for the trial can be found in the appendix.

Discussion:
Findings indicate that the weight changes over the course of the trial for all trial degus were not statistically significant from those of the control degu. They did, however, exhibit a strongly positive trend, which if allowed to continue, would lead to all degus on the trial diet putting on weight steadily. It is thought the reason of lack of significance was due to high degree of scatter demonstrated by the data points (see figures 2, 4, 6 and 8) affecting statistical confidence. Compared to the control weight change trend, which was slightly negative, this demonstrates that the trial degus were gaining weight at a rate which the control degu was not. This hypothesis is supported by the fact that the trial degus gained an average of 18 ±4g, while the control degu gained just 5g over the course of the trial.

Similarly, the weights of trial degus 3 and 4 were not found to differ significantly from the control. However, the weights for trial degus 1 and 2 *did* prove to be significant ($P<0.005$), demonstrating weights higher than those of the control degu (see figures 1, 3 and 9). This is to be expected, since degu weight varies on an individual level, however it should fall within a healthy, adult degu weight range of 220-250g (Degutopia, 2005; Vasquez *et al.*, 2001; Kenagy *et al.*, 2002). The start weights indicate that trial degus 3 and 4, and the control degu, all fell within this range, however trial degus 1 and 2 were both slightly overweight at 255g and 254g respectively (although previously this weight had been stable). At the end of the trial, only the control degu had a weight still within this ideal range, and all trial degus were overweight, with a mean weight of 266 ±10g.

It was shown that all degus in the trial, including the control, exhibited a weight increase of sorts over the course of the trial. Possible reasons for such weight changes in the control degu include time of year and a new bale of hay. Time of year could affect weight as the trial was conducted in mid autumn as daylight hours were starting to shorten. Although no studies have yet been done on the affect of time of year on degu weight, it has been demonstrated that wild degus stockpile food in their burrows for the coming winter (Novak, 1999; Cloyd, 2003; Woods and Boraker, 1975) (although they do not hibernate). This may be linked to an increase in body fat storage in anticipation of low winter food reserves and to raise their thermal body index, as Chilean winters often subject degus to temperatures of <5°C (Kenagy *et al.*, 2002; Bozinovic *et al.*, 2004). It seems unlikely, however, that this factor alone could cause the weight increases seen in the trial degus since the control degu would have displayed a similar increase. The new bale of hay introduced (by necessity) on day 13 of the trial may have had some effect on the weights of the degus, perhaps due to a slight difference in nutritional composition between the two bales. Hay, however, is relatively nutritionally poor (Bozinovic *et al.*, 1997), so it seems unlikely that these changes would be long-term or affect the degus' weight significantly, but it cannot be ruled out. The only anomalous data point, occurring between days 19-20 for all degus (both in weights and weight changes) was caused by a malfunction of the weighing scales and was quickly identified and corrected once the scales were re-calibrated. The scales were regularly calibrated after this error occurred to avoid further erroneous readings. Possible reasons for the weight changes seen in the trial degus, other than those mentioned previously, include changes in the fat (oil) content of the trial feed compared to the standard feed. As shown in table 1, the trial feed contained 32% more oil *per daily serving* than the standard feed. Since this figure is so much higher than the trial degus were previously used to, it is likely that the excess fat intake would be less easily metabolised and so stored as fat reserves. This ties in with the 'storage for winter' theory as fat was more readily available to the trial degus and hence more readily stored.

By comparing the water consumption over the course of the trial, it was found that there was only slight variation between trial consumption and pre-trial consumption. All trial degus were found to have increased their water consumption; 1 and 2 by 14%, 3 and 4 by 9%. The control degu was found to have reduced their water consumption by 5%. Since the fluctuations were small, it is unlikely that the feed played a major role in any differences observed, however it could have been a contributing factor; this remains to be proved as the relative moisture content for standard and trial feeds is unknown.

The results for the dropping scores of each degu are inconclusive. All trial degus went down by one point on the moistness of their droppings post trial, whilst the control degu's moistness score went up by one point. This may be linked with the small changes seen in water consumption. The consistency did not seem to follow any relevant pattern, however the fibrosity of all trial degus' droppings did increase post trial. For trial degus 3 and 4 there was an increase of one point, but for trial degus 1 and 2 it had increased by 2 points by the end of the trial. It is unlikely that this change was directly influenced by the trial feed since the comparative fibre content was identical to that of the standard feed. This difference is more likely to be caused by a change in the amount of hay consumed at the time the droppings were being formed. The control degu showed no change in fibrosity of droppings. With regard to the colour of droppings, the only degus to show any variation were trial degus 1 and 2; both their colour scores dropped by 3 and 2 points respectively as their droppings appeared a much lighter brown post trial. The reason for this is unknown, although it is hypothesised that this may be linked to changes in the amount of fibre consumed (and hence fibrosity). It is important to consider that such a scoring system is, however, relatively subjective in nature and lacks quantitative measurement.

This study did have limitations; the sample size was relatively small and only one degu was available to act as a control, therefore any findings and speculations must take this into account. The short trial window may also be a significant factor, with the study taking place at one specific time of year, therefore the consequence of time and season on the trial diet degus is unknown. It did appear from the weight graphs that the weight curves of trial degus 3 and 4 were beginning to level off toward the end of the trial. For future studies, it may therefore be beneficial to conduct an extended study of perhaps 60 days and at different times of the year. Also not taken into account was the degree of activity of all degus; all had free access to a running wheel and it may be possible, in the future, to quantify the wheel usage/activity of each degu, however such quantification would be time-consuming. With regards to this study, it seems unlikely that degus of previous weight stability would adjust their activity patterns over the course of the trial, however.

One of the outstanding differences of the trial feed was the inclusion of a saponin; yucca (*Yucca schidigera*) extract. The addition of this was designed to reduce the smell of animal waste (Hammond, 2005) by binding with ammonia, thus preventing release into the air (Cheeke, 2003), and also to prolong the life of the feed (Hammond, 2005) by inhibiting yeast growth (Miyakoshi *et al*., 2000). While it is currently assumed that saponins pass through the digestive tract unabsorbed when added to the diet (Cheeke, 2003), it remains to be confirmed whether traces do enter the body via absorption in the small intestine (Francis *et al.*, 2002). The detrimental effects of saponins on the mammalian body have been widely studied, including the links between such compounds and abortion/infertility (Dollahite *et al.*, 1962; Francis *et al.*, 2002) and, more importantly, their interaction with dietary protein that may affect the nutritive value of the diet (Potter *et al.*, 1993; Francis *et al.*, 2002). The benefit of adding saponins to the degu diet needs much further study before it can be proved or disproved, particularly since the research into the apparent benefits of ammonia absorption relate specifically to ruminant digestive systems. Another unusual difference between the trial and standard feeds was the inclusion of a selenium supplement to the trial feed. Selenium is essential to mammals as it is used in immune function and antioxidant defence (Smith *et al.*, 2005), and can safely be supplemented up to 0.1 ppm in the total small animal diet (Salt Institute, 2001). However, selenium is included in the trial diet at 0.35 ppm, three times higher than that recommended. Animals deficient in selenium (or vitamin E) can suffer a wide variety of problems, such as being more susceptible to infection (Smith *et al.*, 2005), however selenium is also toxic at higher doses. One other outstanding point is the fact that the trial feed contained 32% less vitamin A than the standard feed; whether this is relevant to degu health or not is unknown.

The trial feed contained some agreeable differences as compared to the standard. With regard to the ingredients, the addition of herbs and sugar-extracted fruit pulps were likely to increase the palatability of the feed as compared to the standard feed (see appendix for full ingredient lists). Although total sugar content was not included on the nutritional breakdown of the trial feed, it was very low at less than 1% (Hammond, 2005). Unfortunately, the information regarding total sugar content was not available on either of the feeds making up the standard feeds; however it is assumed to be higher than 1% as both these feeds include sugar compounds (listed as ‘various sugars’ and ‘fructo-oligosaccharides’ (fruit sugars)). This can only be beneficial to degus by greatly reducing the chance of developing diabetes mellitus. The fact that the protein content was 15% lower in the trial feed was also beneficial, and the fibre content was similarly agreeable (being identical to the standard feed), although it may be advantageous to the degus’ digestion to increase fibre content further. Other areas to mention are the raised vitamin and mineral levels in the trial feed as compared to the standard, this is particularly notable in the vitamin C content as this is thought to be an essential vitamin to degus for reasons previously discussed.

Conclusion:

In conclusion, whilst this diet format seems initially promising as a degu-suitable feed, modification is needed to address the problems discovered by the trial. I propose altering the oil content to a level more resembling that of the standard feed and, if possible, raising the fibre content. The decision to include yucca extract needs further consideration (possibly removing completely), and the selenium content requires reducing to the recommended level. This aside, the degus in the trial readily consumed the feed and adapted well to the trial diet.

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APPENDIX

Harlequin Nutrition Little Treasures trial feed ingredients:
Wheat, alfalfa, corn, GM-free soya, oat hulls, beet pulp, peas, carrots, minerals, gluten meal, sunflower oil, tomato, brewers yeast, herbs, marigold, dandelion, lettuce, celery, beetroot, spinach, bramble, sugar-extracted blackcurrant and apple pulp, vitamins, yucca extract (Harlequin Nutrition, 2005).

Pre-trial, the degus' standard diet consisted of a 60:40 mix of Supreme petfood's Gerty Guinea Pig mix:Burgess Supa Guinea Excel pellets.

Burgess Supa Guinea Excel ingredients:
Wheat, Lucerne Meal, Cooked Non GMO Soya Beans, Peas, Oat Hulls, Unmolassed Beet Pulp, Brewers Yeast, Soya Oil, Dicalcium Sulphate, Calcium Carbonate, Fructo-oligosaccharides. Contains no added colours or preservatives. Vitamins guaranteed until best before date. Contains no coccidiostat (Burgess, 2005).
Nutrition information:

Fibre-	15%
Protein-	17%
Oil-	4%
Ash-	6.5%
Calcium-	0.8%
Phosphorous-	0.5%
Vitamin A-	22,000 iu kg^{-1}
Vitamin C-	800 mg kg^{-1}
Vitamin E-	100 iu kg^{-1}
Vitamin D3-	1,250 iu kg^{-1}
Copper-	15 mg kg^{-1}

(Source: Burgess, 2005)

Supreme Gerty Guinea pig ingredients:
Cereals, alfalfa, vegetables, derivatives of vegetable origin, seeds, vitamins and minerals, oils and fats, natural flavourings, various sugars, EC permitted colours (Supreme, 2005).
Nutrition information:

Fibre-	10%
Protein-	16%
Oil-	3%
Ash-	5%
Vitamin A-	23,000 iu kg^{-1}
Vitamin C-	250 mg kg^{-1}
Vitamin E-	50 mg kg^{-1}
Vitamin D3-	1,000 iu kg^{-1}
Copper-	10 mg kg^{-1}

(Source: Supreme, 2005)

Complete feed trial weight table:

DEGUTOPIA FEED TRIAL											
	Day	Trial Degu1 Weight/g TERRENCE	Change/g	Trial Degu2 Weight/g PHILIP	Change/g	Trial Degu3 Weight/g PARSLEY	Change/g	Trial Degu4 Weight/g LILLY	Change/g	Control Degu1 Weight/g JEREMY	Change/g
Pre-feed weight	-7	263	(+10)	265	(+15)	235	(-3)	229	(+1)	235	(+6)
START weight	0	255	-8	254	-11	240	5	238	9	238	3
	1	254	-1	258	4	233	-7	234	-4	232	-6
	2	251	-3	252	-6	231	-2	230	-4	233	1
	3	254	3	255	3	233	2	229	-1	236	3
	4	252	-2	255	0	227	-6	219	-10	234	-2
	5	252	0	256	1	232	5	231	12	232	-2
	6	250	-2	250	-6	240	8	233	2	239	7
	7	251	1	253	3	231	-9	231	-2	237	-2
	8	249	-2	248	-5	231	0	236	5	241	4
	9	251	2	250	2	226	-5	228	-8	234	-7
	10	256	5	259	9	236	10	239	11	240	6
	11	248	-8	250	-9	230	-6	230	-9	230	-10
	12	258	10	260	10	230	0	233	3	228	-3
	13	253	-5	260	0	245	15	242	9	238	10
	14	265	12	265	5	242	-3	240	-2	242	4
	15	258	-7	257	-8	248	6	241	1	245	3
	16	260	2	262	5	243	-5	240	-1	244	-1
	17	266	6	266	4	244	1	249	9	242	-2
	18	265	-1	264	-2	250	6	251	2	238	-4
	19	240	-25	237	-27	239	-11	244	-6	237	-1
	20	262	22	260	23	259	20	264	20	253	16
	21	266	4	267	7	251	-8	256	-8	242	-11
	22	269	3	265	-2	243	-8	246	-10	245	3
	23	262	-7	262	-3	252	9	253	7	244	-1
	24	266	4	269	7	256	4	257	4	246	2
	25	260	-6	265	-4	243	-13	245	-12	246	0
	26	270	10	275	10	247	4	255	10	245	-1
	27	268	-2	273	-2	252	5	266	11	243	-2
	28	274	6	272	-1	255	3	263	-3	242	-1
	29	272	-2	268	-4	251	-4	253	-10	244	2
	30	275	3	272	4	252	1	263	10	243	-1
END weight	-	275		272		252		263		243	
DEVIATION/g	-	20		18		12		21		5	

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