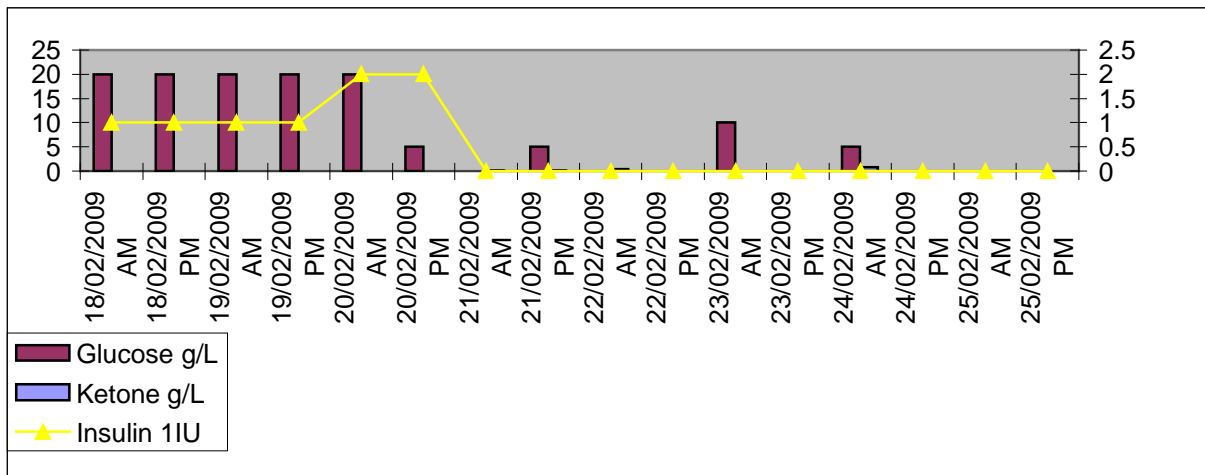


Daily account of a diabetic Agouti Degu called ‘Firball’ over a 3-month period

We obtained Firball, Gonzalez and Psycho from Raysted Rescue Centre in Uckfield, East Sussex on 31st August 2008. We were informed that they were all brothers and approximately 16 months old. Psycho appeared to be in perfect condition but Firball and Gonzalez had Cataracts in both eyes, Firball’s appeared larger and more advanced, he was also heavier looking than the other two. At Raysted they were fed on the centre’s own version of Chinchilla pellets scattered around their cage, so we continued to feed them in the same way but with ‘Pets at Home’ Chinchilla pellets. A couple of days later we discovered on Degutopia that some Chinchilla pellets contain molasses, so to be on the safe side introduced Burgess Supa Guinea Excel nuggets with a light scattering of Beaphar Xtra Vital Degus food (Intermediate version) instead. The Degus appeared to enjoy the new feed, but Firball was gradually gaining weight. As he was generally less active than the other two, we tried different ways to restrict his food intake, but by the end of January 2009 his weight had increased from 250g to 300g. He became increasingly sluggish and appeared fluffed up and sleepy most of the time. On the 8th February we discovered Firball’s left eye had become full of blood overnight, so we decided to contact Degutopia for advice and they said it maybe a ruptured retina and to contact a vet. His eye appeared to look much better the next day and he was eating well, exercising as normal and didn't seem bothered by his eye at all. So we decided not to contact the vet. In the meantime noticed that both Gonzalez and Psycho were following Firball around the cage licking his pee. Degutopia suggested we test Firball’s urine for signs of glucose, so we bought some Bayer keto-diastix strips and dipped one into Firball’s urine, this confirmed his glucose levels were off scale and should be reading zero. Also his other eye was now full of blood. We tested both Gonzalez and Psycho for glucose in their urine but found them both to be clear.

We visited the vet for the first time on the 17th February. Firstly, he weighed all the Degus. Firball’s weight had dropped back down to 250g and both Gonzalez and Psycho weighed in at 280g. He then checked Firball’s eyes and confirmed he was suffering from Uveitis and also mentioned that Firball could be older than the other two. We advised him that we’d already taken a urine sample from Firball and that it read off scale. He confirmed that Firball was indeed suffering from hyperglycaemia and it was critical that he starts to receive Insulin via injections and his condition may of caused his eyes to fill with blood, probably caused by high blood pressure or diabetes. As Firball’s Ketone levels were normal, he instructed us to inject 1IU of Porcine Insulin twice a day for 4 days starting from 18th February AM and then return the following week. It is clear from the chart below that there are no significant changes in Firball’s glucose levels within the first 2 days, so we decided to increase the Insulin from 1IU to 2IU as shown on 20/02/2009 PM.



We were only given 6 syringes, so Firball's last injection of Insulin was 20/02/2009/ PM. We kept a diary for that week in order to update the vet on Firball's progress in time for our next visit.

18/02/2009/ AM - Firball was quiet and fluffed up most of the time in the cage and was drinking less water after his first injection of Insulin.

18/02/2009/ PM - His glucose level was off scale and was given another injection but active when out of the cage and is still drinking less water.

19/02/2009/ AM - Glucose level was still off scale and was given another injection. He was quiet and fluffed up all day. His right eye was starting to clear of blood but his other eye was still full of blood.

19/02/2009/ PM - Glucose level was still off scale and was given another injection. He was active when out of the cage but climbed back in and went to sleep before the other two.

20/02/2009/ AM - Glucose level was still off scale and was given another injection, this time increasing the dosage from 1IU to 2IU. He was quiet and fluffed up but still foraging for food. He was active on the wheel when let out for 3 hours and wanted to stay out. His right eye was looking more normal but his right was still full of blood. Both Gonzalez and Psycho were licking Firball's pee and so was Firball.

20/02/2009/ PM - Glucose levels had decreased, reading Moyen 5g/L. He was given another injection of 2IU. We were not around in the evening to monitor his condition.

21/02/2009/ AM - Glucose level was completely normal, Ketone level was raised to Faible 0.15g/L. He seemed more active in the cage and his right eye looked almost black and you could hardly see the cataract. The other was still almost cerise pink all over, more pink than red.

21/02/2009/ PM - Glucose level was up again to Moyen 5g/L, Ketone level was still Faible 0.15g/L. He was active when out of the cage, drinking less water but still having his pee licked by the other two. Fluffed up in the cage most of the evening.

22/02/2009/ AM - Glucose level was normal. Ketone read Moyen 0.4g/L. He was eating normally. We went out all day so could not comment on his condition.

22/02/2009/ PM - We did not take a glucose test but noticed he was drinking lots of water, active when out of the cage and eating normally. The other Degus were still licking his pee.

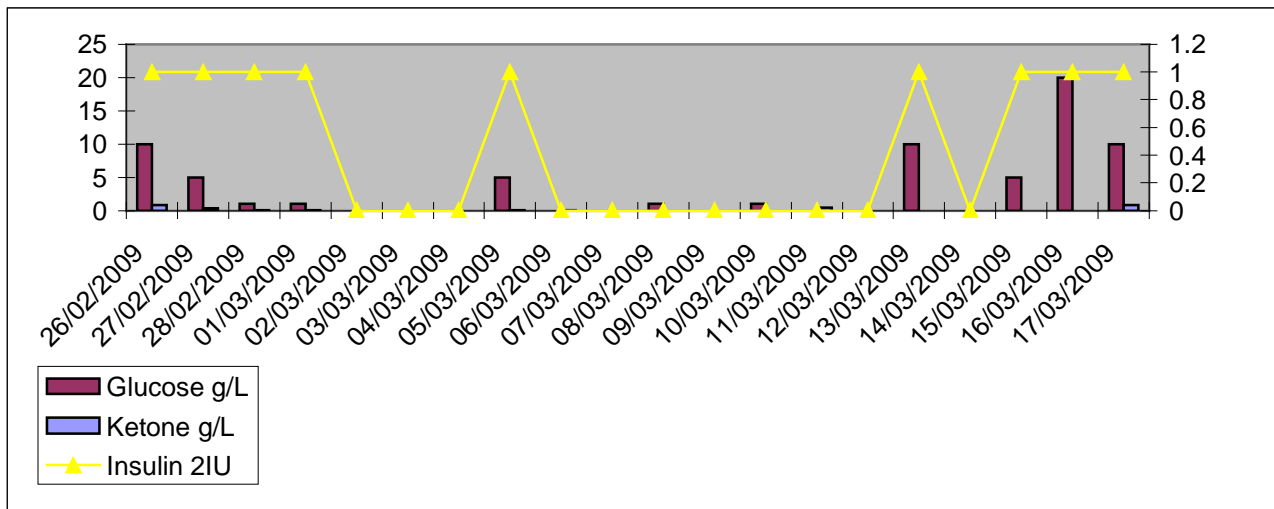
23/02/2009/ AM - We did not take a glucose test first thing, one was taken an hour later, which read Fort 10g/L, Ketone level, normal. It may be high due to his food intake prior to having his injection. Firball's right eye now looks normal and his left is less pink and a darker shade of red. He is eating ok but fluffed up and sitting still or just foraging slowly and quietly.

23/02/2009/ PM - We did not take a glucose test. Firball seemed tired and quiet and was peeing quite a lot.

On the 24th February we had our second visit to see the vet. He was pleased with Firball's progress and mentioned that his eyes were clearing nicely and that he looked less depressed and seemed livelier. Another weigh-in confirmed Firball to be 320g, for which he was delighted and said that Firball's body was now responding to the insulin and not spending its energy on removing the glucose. As Firball still had glucose in his system, he suggested we continue with the Porcine insulin, but to give Firball 2IU in the morning, but only if his glucose levels were abnormal and would like us to continue monitoring Firball for at least 3 weeks and then return to the surgery for another update.

As we have not yet managed to balance Firball's glucose levels Degutopia suggested that we remove all corn, maize and oats from his diet as they contain carbohydrate that are broken down slowly into sugars. He is now only getting a few Burgess Supa Guinea Excel nuggets and a couple of dried carrot, wheat pieces and alfalfa of Beaphar Xtra Vital Degus food (Intermediate version) along with plenty of Timothy Hay. Both Gonzalez and Psycho are continuing to have the same food as Firball but with corn, maize and oats included.

On the next page you can view the chart we prepared over the last 3 weeks.



As you can see in the above chart, Firball’s glucose levels remained normal over a period of two weeks. By the end of the first week Firball’s eyes returned to almost normal apart from his cataracts. He appeared more alert and lively, back to his normal self.

On the 12th March we decided to include a small amount of Gerty Guinea pig feed into his diet to boost Vitamin C intake but were astonished to see Firball’s glucose levels increase significantly, after 3 days we removed Gerty Guinea pig feed from his diet and returned to his usual feed.

On the 17th March we returned to see the vet for Firball’s final visit. The vet said Firball’s eye issues appear to have reversed and that he may even be able to see a little out of them (amazing after how bad they looked a few weeks ago) and said that although Firball had put on a fair bit of weight 320g, it was better than losing it as his body needs the extra weight to enable him to fight his recent condition. Both Gonzalez and Psycho weighed in at 290g, but their physique is very muscular and trim. Unless something else happens there is no need to return to the vets for at least 3 months unless we require extra syringes or Insulin.

Also on the 17th March we introduced another new feed to reduce the amount of protein intake they were getting, ‘Pets at home’ Degu pellets. They are low in protein (16%) and Fats (3%) and high in Vitamin C (800mg/kg) compared to Burgess Supa Guinea Excel that has 17% protein and 4% fats. Interestingly, Firball’s glucose levels have struggled to return to normal so we have also stopped that feed for the time being. He was also drinking lots more water than normal.

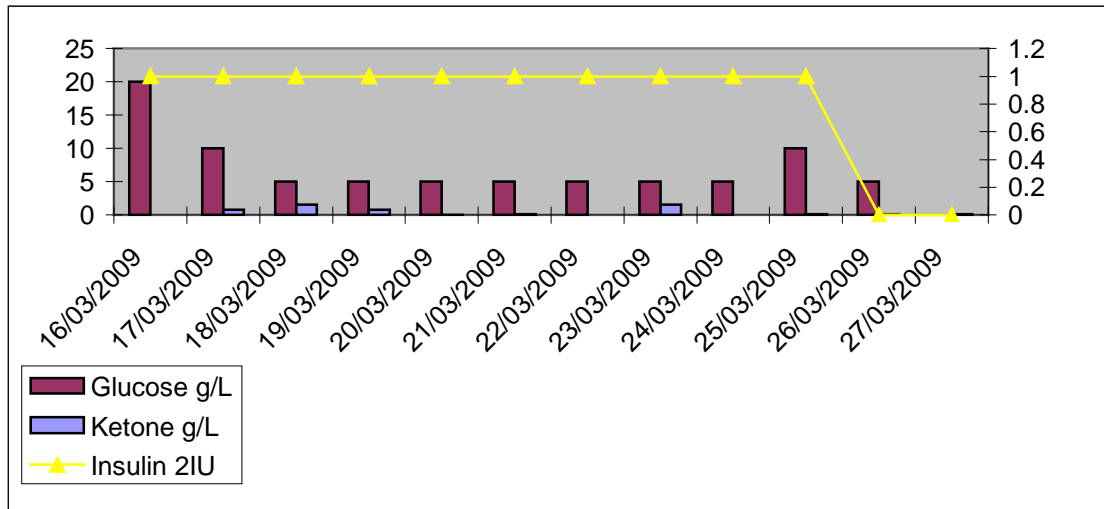
On the 22nd March AM, we decided to hand fed 8 Burgess Supa Guinea Excel nuggets to Firball which roughly amounts to 1/2 of a 25ml shot glass and no other feed apart from Timothy hay. Gonzalez and Psycho were also hand fed the same nuggets but were only interested in eating 4 each, they were also given a few pieces of Beaphar Xtra Vital Degus food (Intermediate version). On the 25th March we stopped feeding Firball the Supa Guinea Excel nuggets as his glucose levels had not changed and decided to feed him 8 of the ‘Pets at Home’ own brand nuggets instead. We also introduced another new feed which is called Natural Herbs Plus Treat from ‘Pets at Home’, you can see the details of this feed by clicking [Here](#) and they appear to really like it, especially the little pieces of dried beetroot, popped corn and carrot, but will scoff the lot, nothing is left. After researching the contents, we thought it would be a good addition to Firball’s rather bland diet.

As we have stopped scattering their feed around the cage, they now all eat masses of Timothy hay. So we will continue this controlled feeding pattern for the next few days. Also, Firball seems to be drinking less water and being more active in the cage, he is also frequenting the wheel. I haven’t seen the others licking his pee for a few days.

On the 26th March we decided against giving Firball his Insulin injection to see if his body could balance itself and to give him a rest from the needle. Also, they were all given a treat today, as every month they

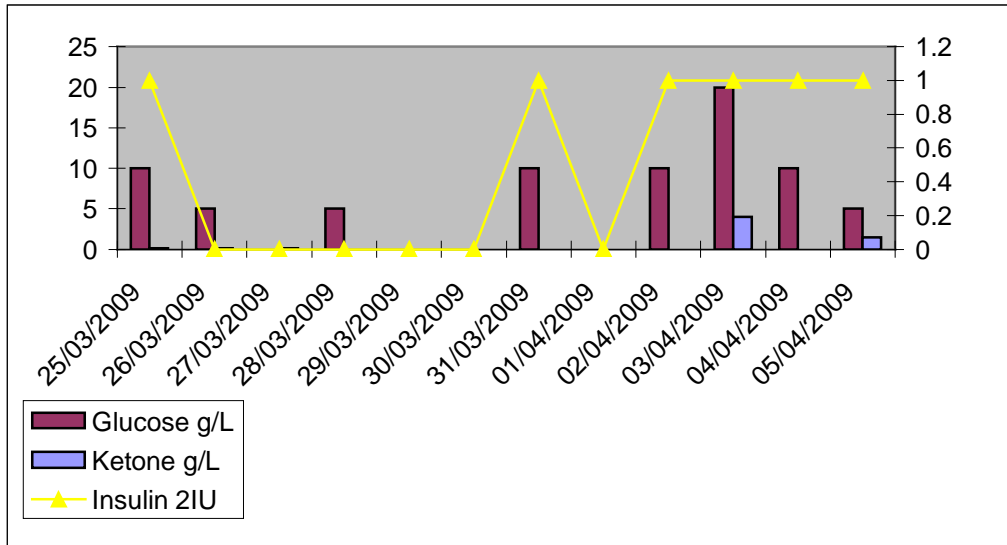
each get one whole de-shelled hazelnut that is completely coated in Evening Primrose oil for a healthy shiny coat.

March 27th, to our surprise and delight Firball's glucose level was zero. As is shown in the chart below.



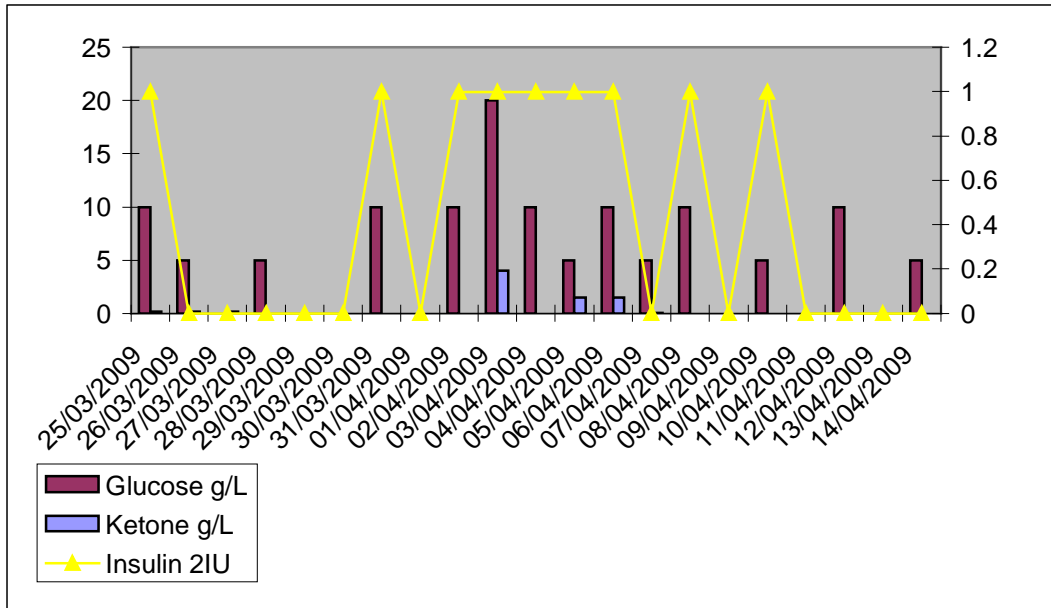
On March 28th Firball's right eye was looking slightly red again and his glucose level rose to 5g/L. We decided against giving him an Insulin injection as his body managed to balance itself out a couple of days ago without the need for it. We have also stopped testing his urine for a few days as Firball was becoming more difficult to remove from the cage each morning and we didn't want to stress him out too much. March 30th, his eye appeared to look normal again and unless he starts to drink lots of water, he will not be given another injection. We decided to test his urine in the evening time on March 31st and found it to be 10g/L, but were aware that it could be high due to the fact he'd eaten throughout the day, we gave Firball an Insulin injection to be on the safe side. He also appeared to be sluggish and quietly whimpering, which was a real worry, as we hadn't heard him making those noises before. By the morning he was fine and his glucose and ketone levels were completely normal and he was no longer whimpering. His eye was completely clear of blood and he was eating normally.

Firball was fed 'Pets at home' nuggets and 'Pets at home' Natural Herbs Plus Treats from the 1st – 5th April, he was also given a couple of pea flakes in the evenings. You can see in the chart below that his glucose levels appear erratic, even though his eyes are completely clear of blood and you can hardly see his cataracts, he has been quite active and appears to have lost some body fat. However, when we originally fed him the Burgess Supa Excel nuggets his glucose levels appeared to be less erratic and we only stopped feeding him the nuggets as he started to put weight on. So, for the next few days he will only get nuggets again to see if they lower his glucose levels.



On the 6th April we tested Firball's glucose level in the evening and it was 10g/L Fort and his ketone level was normal, he was given an Insulin injection. The next day he was tested at midday, 3 hours after he was fed around 6 nuggets and his glucose level was 5g/L Moyen and his ketone was 0.05g/L Traces. On the 8th April his glucose was tested at 7.30pm after 6 nuggets and 3 more around 5.30pm, it was 10g/L Fort and his ketone was normal. Firball's glucose and ketone levels were tested at 5.15pm on 9th April and were completely normal. He had only been given around 8 nuggets in the morning and could eat as much Timothy hay throughout the day as he wanted and we did notice that both haystacks were nearly empty. Also the water bottles were almost as full as I had left them. Firball appears to have much more energy than a few weeks ago. We are going to continue feeding him with just Burgess Supa Excel nuggets and hay until after Easter. On the 10th April we tested Firball's glucose level before he was fed and it was 5g/L Moyen. We decided to give him an injection as we were going away for a couple of days and gave instructions to feed all the Degus 15 nuggets each for the whole day as well as hay. When we returned late afternoon of the 12th April we fed them all a few extra nuggets and tested Firball's glucose level to find it was raised to 10g/L Fort, we decided not to give him an injection, but to see if his own body can balance itself out again. On the 13th April we tested Firball's glucose and ketone levels first thing in the morning and they were completely normal, he was not given an injection. During the day he was given a few pieces of 'Pets at Home' natural salad, a couple of dried carrot pieces and 2 pea flakes. Last thing at night the haystacks were filled with the usual Timothy hay and their water bottles topped up. The next morning we noted that none of the hay had been eaten and very little water had been drunk, so we tested his glucose level first thing again which read 5g/L Moyen.

On the afternoon of the 14th April we took Firball, Gonzalez and Psycho to see the vet for a weight check and for some more Porcine Insulin and needles. The vet commented on how well Firball looked and that his cataracts were far less visible. We took a couple of charts with us from this case study to show him how erratic Firball's glucose patterns were. He explained to us how diabetes in human's works and that they have to manage their own diets each day, by carefully weighing out their food each time which in turn controls the body's glucose levels naturally, by doing so lessens the need for Insulin injections. This made complete sense to us, because each time we have carefully counted out the number of pellets given to Firball he has maintained low glucose levels or been completely normal. The vet also mentioned the condition Ketoacidosis, where the ketone levels have risen dramatically, and the body would be struggling to rid itself of the excess glucose, this may also be the reason for Firball's red eyes in the past. Also, he said high ketone levels on a regular basis cause cataracts. Next we weighed all three, Firball was 300g, 20g less than the last weigh in, Gonzalez stayed the same at 290g and Psycho weighed in 260g, a loss of 30g. The vet advised us to continue giving Firball 25-30g of food per day, but to reduce it gradually until he reaches around 250g and then maintain 20g of food per day. He stressed how important it was to continue controlling the amount of food Firball is getting each day, as his body will naturally be able to control its own glucose levels, therefore keeping the ketone levels normal.



Conclusion

We have come to the conclusion that in order to keep Firball healthy and happy, we need to continue feeding him controlled measures of food throughout the day, that contain absolutely no sugars or molasses, feed him plenty of good quality hay such as Timothy hay, make sure he has access to plenty of water and give him lots of exercise. He was noticeably brighter and more energetic after our first injections of Insulin back in February and has continued to stay that way ever since.

We also noticed that Firball could balance out his own glucose levels without the need for Insulin if he was not overfed during the day or night and his cataracts strangely improved after suffering from severe Uveitis. We will continue feeding our degus the Burgess Supa Guinea Excel nuggets by hand each morning and monitor Firball's glucose levels long term.