

THE PET HEALTH LIBRARY

By Wendy C. Brooks, DVM, DipABVP

Educational Director, VeterinaryPartner.com

Monitoring Glucose Regulation

Monitoring is crucial to determining your pet's proper insulin dose. Much monitoring can be done at home and it is possible to save a great deal of money by doing so; however, some tests simply must be done at the veterinarian's office. We will now review important parameters that you must keep an eye on if diabetic regulation is to be achieved long term. Consider keeping a notebook or spreadsheet with weekly, if not daily, notations regarding some of these parameters; the more information you have when it is time to see the vet, the better.

Download a printable PDF file of a [monitoring diary](#).

Clinical Improvement

The hallmark signs of diabetes mellitus are excessive water consumption, excessive urination, excessive hunger and weight loss. It is not necessary to measure your pet's water consumption as the fluid requirement will change with exercise level, environmental temperature, and other factors. Still, make a mental note about whether your pet's appetite, thirst, and urine production are "normal," increased or decreased. If you are keeping a notebook, consider making a daily notation in this regard. It is subjective somewhat but good to note.

Your pet's body weight is less subjective. If your pet is small enough, consider weighing your pet every couple of weeks. As your pet comes into regulation, weight will be gained. A well-regulated pet will maintain body weight. Keep body weights recorded in your notebook.

Ketones

Food provides our bodies with fuel. Most of our tissues can burn stored fat, though our brains require glucose. In normal life, there is plenty of fat and plenty of glucose to run our metabolism but in times of starvation problems start: we deplete stored glucose and must make it and we burn fat more desperately.

Ketones are a by-product of intense fat burning. The brain is able to use ketones as an alternative to glucose which is a good thing. The problem is that intense ketone production leads to metabolic pH changes leading to acidic blood and dangerous electrolyte imbalances.

When diabetes mellitus is complicated by infection or other problem, ketoacidosis can result. This is a serious complication that can lead to expensive hospitalization and even death. It is helpful to monitor your pet's urine for the presence of ketones.

Ketostix are urine dipsticks when indicate the presence of ketones in urine. Only a drop of urine is needed. Dip the dipstick in the urine and look for a color change. A color guide is on the dipstick bottle. This need not be done every day if the pet seems to be doing well but when it is done record the results in the monitoring notebook if you have one.

Occasional ketones are not an alarming finding in a diabetic pet but if ketones are found in urine three days in a row or if the patient showing ketones seems ill (poor appetite, vomiting etc.) then the pet

should see the vet right away. In such a situation, diabetic ketoacidosis is likely occurring and serious treatment is likely needed.

Ketostix can be purchased at any drugstore.

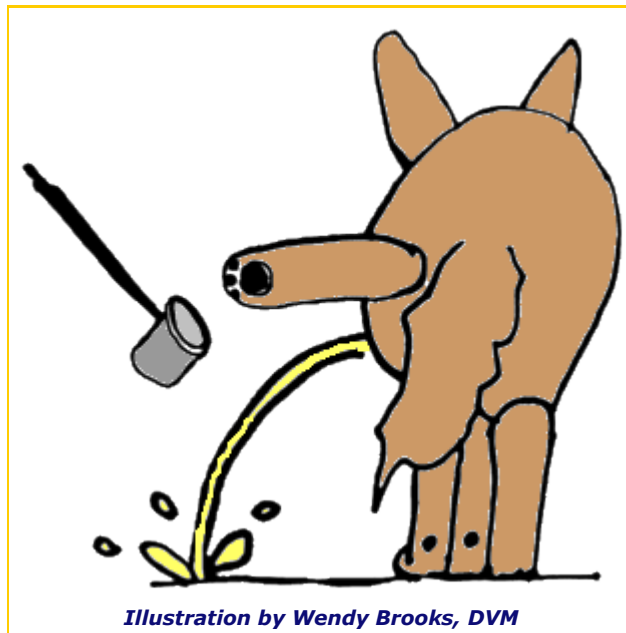
(For more information on diabetic ketoacidosis [click here](#))

Collecting your Pet's Urine

Using a Ketostix is simple enough but you will need a sample of the pet's urine. For dogs, this is best done as a two-person job.

Male Dog

A male dog's urine can be collected on a walk using a cup. The male dog is walked and when he lifts his leg to urinate, the second person simply catches the urine in the cup. This can be done with one person with some practice. It may be helpful to bend a metal coat hanger so that it can hold a paper cup on one end and have a long handle on the other end, or invest in a "grabber reacher" as shown below to hold the cup.



Female Dog

A female dog is a bit trickier and you may need a second person to slip a small paper plate under the dog as she urinates. Again, it is helpful if a second person manipulates the plate and uses the Ketostix so that the person holding the leash does not have to manage all these tasks at once. If only one person is available, the "grabber reacher" shown above may be helpful.

Cats

For cats, a piece of cellophane can be placed over the litter box and some urine will be caught there even if the cat digs. Only a drop of urine is needed for the test so even if the cellophane is wrinkled up, hopefully a drop can still be obtained. Alternatively a very small amount of litter can be placed in

the box. The cat will still understand what she is supposed to do but not all the urine will be absorbed by the litter.

It is not necessary or particularly even desirable to monitor urine glucose with dipsticks. The contents of the urinary bladder represent several hours of urine production, thus making interpretation of urine glucose challenging. In the past urine glucose monitoring has been recommended and certainly there is nothing wrong with collecting more information but it can be confusing to decipher and should be considered optional.

Glucose Monitoring

In a perfect world, glucose monitoring is performed at home. The pet is most comfortable at home and blood glucose measures are not altered by stress. Furthermore, by doing glucose curves at home the owner is spared the expense of the vet visit. Still, not everyone is ready to collect blood from their cat. If you do not wish to get involved in home monitoring, simply be prepared to bring your cat to the hospital for glucose curves as recommended by your veterinarian.

The glucose curve indicates how long the dose of insulin is lasting (which in turn indicates whether the type of insulin being used is correct) and how high and low the glucose levels go (which in turn indicates if the dose is correct). Initially, curves are performed every 1-2 weeks until regulation is achieved. It takes 1-2 weeks for a pet to adapt to a dose of insulin and that dose cannot be evaluated before then.

Glucose curves can be performed at home or in the hospital. If glucose monitoring is being performed at home, it is best to check glucoses prior to giving an insulin dose.

Find out from your veterinarian how low a glucose level should be for you to skip the insulin.

The Glucometer and Lancets

Historically, human glucometers were used to monitor dog and cat blood sugars. The problem with doing this is that accuracy at lower values was not reliable. Trends were easy to see but more precise measurements were not possible to obtain. Today, there are several veterinary glucometers on the market and we recommend buying one of these for best results.

The Alphasat Meter by Abbott



This glucose meter is the most commonly used and recommended by veterinarians. There are many similar veterinary meters and if your veterinarian prefers a different model, it is best to go with that recommendation.

Most glucometers come in a kit that includes instructions, the meter, a control solution or similar calibration method, lancets to take your pet's blood, and glucose sticks for the meter to read. In short, you assemble a dipstick in the meter and turn it on, puncture the pet's ear or other area, and touch the dipstick to the drop of blood that wells up. The meter does the rest.

Taking Blood: Watch it Done

See a video of a cat having a suitable [blood sample drawn](#) (provided by Dr. Margie Scherk).

Watch a [blood collection and reading glucose video](#) (provided by Alphasat).

To do a Curve at Home

- Be sure to check glucose before feeding and before insulin is given. This is probably the most important glucose reading of the curve.
- Note the time of each glucose level, note the time of each feeding and the time the insulin is given.
- Check blood glucose levels every 2 hours until it is time for the next insulin level.
- At the end of the curve, provide the information to your veterinarian so that insulin dosing adjustments can be made.

To do a Curve in the Animal Hospital

- Ideally you will bring your pet in with an empty stomach, his regular food, and his insulin and syringes.
- The veterinary staff will run a pre-insulin glucose level.
- After this is drawn, they will observe how you draw up and administer the insulin confirming that you are doing it correctly.
- The pet is then left with the food for the day and the veterinary staff will check blood glucose levels every 2 hours.
- Pick up your pet and receive new dosing instructions at the end of the day.

Continuous Glucose Monitoring Systems

There is another system for monitoring blood glucose but it is not for everyone. On one hand, it allows for continuous monitoring of the pet's blood glucose but on the other hand it involves permanent implantation of a sensor under the skin. Glucoses can be monitored at home without the stress of transport to the veterinarian's office or the stress of needle sticks. The Medtronic's Guardian RT is probably the unit to use. A glucose is displayed every 5 minutes on a monitor connected wirelessly to the sensor implanted under the skin as long as the two devices are within 6 feet of each other. (The monitor can be attached to the pet's collar.) Results can also be downloaded into a software program to generate a printable glucose curve. The external portion of the sensor is a couple of inches in diameter and the pet must be able to tolerate it without attempting to remove it. The device is typically worn on the pet's back or between the shoulders. This unit costs over \$1,000, though; substantially more than a conventional glucose meter.

Other Tests

Your pet will still need regular veterinary checkups, typically every six months after regulation has been achieved. Obviously, if he seems sick or if the symptoms of diabetes seem to return, then he needs to be checked right away.

Urine Culture

It is largely inevitable that sugar will spill into your pet's urine, possibly even for a short time daily. Sugar in urine is highly encouraging to bacteria, and urinary tract infections are common in diabetic pets. Often symptoms are difficult to discern at home so periodically performing urine cultures is a good practice in ruling out latent infection.

See more information on [urinary tract infection](#).

Fructosamine Level

Measuring fructosamine is a helpful way to help monitor glucose control and, if for whatever reason, it is not possible to run glucose curves this would be the next best thing. Blood glucose fluctuations leave a metabolic mark that lasts a week or two. Measuring fructosamine gives a sense of the average blood glucose over the previous couple of weeks. Control is designated excellent, good, fair, poor, or prolonged hypoglycemia. Because the fructosamine is looking at averages, it will not distinguish excellent control from wide swings of high to low glucose readings. Still, even with this limitation, fructosamine is good to include in periodic monitoring tests.

A basic blood panel and urinalysis should also be expected when the pet returns for regular check up and evaluation.

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