

## THE PROBLEM OF OBESITY IN CAPTIVE LEMURS

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### Introduction

It is quite common to see overweight or even obese lemurs in captivity. This is a problem that faces many collections, and we believe it is just down to a lack of knowledge and information rather than people purposefully overfeeding. With more studies being undertaken and new information coming forward, we feel it is something that we can all look to improve.



*A male mongoose lemur at an unnamed zoo, showing extreme obesity in a captive animal. (Photo: James Dartnall)*

### Problems linked to obesity

Obesity in lemurs naturally has health implications, such as coronary heart disease and diabetes. Also, the animals can become inactive and lethargic: as a result they do not burn off their excess energy, which means that they may gain even more weight. Obesity can also cause problems when it comes to breeding. In some species, such as the Sclater's or blue-eyed black lemur (*Eulemur macaco flavifrons*), if the female is obese she may not cycle properly and hence fail to breed. Or the young are sometimes too large, which can lead to the female either miscarrying or having problems when trying to give birth, thus necessitating a

caesarean section. Other species such as the ruffed lemurs (*Varecia* spp.) may produce more offspring, leading to litter sizes averaging three to four youngsters. In the wild, ruffed lemurs usually only produce one or two babies every other year; however, in captivity when animals are well fed they can give birth annually. As a result the captive population can risk being flooded with animals that possibly over-represent a particular genetic line. These individuals are then often difficult to re-home. It is currently a recommendation that breeding of ruffed lemurs should be suspended due to the high numbers of closely-related offspring.

### **Lemur ecology and physiology**

The life of lemurs in the wild is very different from that in captivity; Sclater's lemurs, for example, spend more time foraging and feeding – up to 32% of their 24-hour day compared with just 12–14% in captivity (Schwitzer *et al.*, 2006). Their wild diets are also very different from what they are fed in captivity. In the wild, many of the lemur species commonly exhibited in zoos tend to exist on a diet made up of fruits and leaves, and some species use more than 70 plant species as food resources. The wild fruits taken are in most cases much lower in energy content than cultivated fruits, as well as usually being seasonal rather than being eaten all year round.

One thing we should take into account when dealing with overweight lemurs is the fact that their basal metabolic rate is much lower – by up to 50% or over – than that of other eutherian mammals of equal size (Schwitzer, 2003). Animals with a low metabolic rate require less energy than those with a higher one, which means that they can exist on a low-energy diet. Cultivated fruits and even some of our vegetables are higher in energy than most of lemurs' natural foodstuffs. Lemurs will naturally go for the sweeter, more energy-rich foods such as bananas rather than less calorific foods such as celery. (Who can blame them?) So it is down to us as their personal trainers to remove the temptation!

### **How do we deal with the problem of obesity?**

Sometimes it can be hard work trying to get excess weight off animals, and it may take some time before results are seen. This is how we addressed the problem at Banham Zoo. The diets were re-designed so that the lemurs received a more vegetable-based diet. They were all given a purely vegetable breakfast



*In contrast with the previous photo, this wild female Sclater's lemur shows no sign of excess body weight. (Photo: Felicia Ruperti)*

and then, depending on each individual's weight status, a purely vegetable dinner or a fruit-based one. Initially the overweight animals were only fed a vegetable diet: once they started to lose weight and reach their target, fruit was gradually added. All individuals are weighed once a month to see if any weight is lost or gained. Currently our lemurs are not trained to sit on scales, but a small amount of a 'treat food' is often enough to encourage them on. Diets are also closely monitored and weighed out each day. It is important for all keepers to stick to the agreed diet so that we can monitor whether it is achieving the desired results.

Another point to mention is that if food-based enrichment is used this should be taken into account. Usually food is taken off their daily diet and used for enrichment rather than giving the animals extra food. We also believe that making them work for their treat foods improves their physical fitness and can also help with achieving weight loss. We all know enrichment is good for our animals' physical and psychological welfare, and one of the reasons for giving enrichment is to encourage them to carry out natural behaviours. As mentioned above, lemurs spend more time actively foraging in the wild and they also have to work a lot harder to get their food. If we can replicate this to some extent, then we also help the animals to burn off more energy and tone up physically.

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**Table 1. Diet used for Sclater's lemurs (*Eulemur macaco flavifrons*) at Banham Zoo.**

**AM Feed**

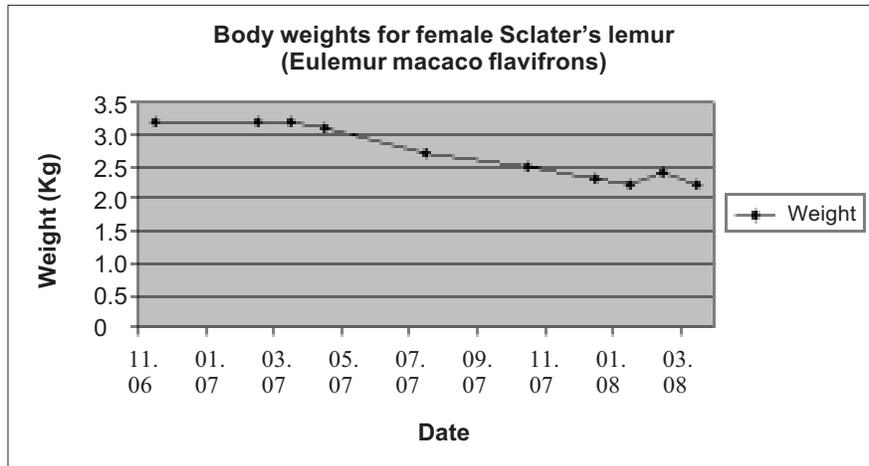
<b>Male</b>		<b>Female</b>	
Carrot	50 g	Carrot	50 g
Cucumber	50 g	Cucumber	50 g
Celery	50 g	Celery	50 g
Lettuce	100 g	Lettuce	100 g
Other veg.	50 g	Other veg.	50 g

**PM Feed**

<b>Male</b>		<b>Female</b>	
Apple	100 g	Apple	50 g
Pear	80 g	Carrot	35 g
Banana	100 g	Cucumber	50 g
Other fruit	80 g	Celery	70 g
		Lettuce	100 g

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Table 1 shows the diet we use for our Sclater's lemurs at Banham Zoo. You can see that although the male and female have the same morning feed, their afternoon feeds are different. The male is at a stable weight and shows no significant weight gain on this diet. The female arrived at the collection in June 2005 and was found to be overweight. Unfortunately when she first arrived regular weights were not recorded, so the first weight we have for her is in November 2006. The graph in Figure 1 charts her weight loss when put on the new diet: it shows that it took a little while for any loss to be seen. When first weighed she was 3.2 kg and her last weight was 2.2 kg.



### Wild weights

Here are just a few guide weights for some species of lemur. It should be remembered that these are wild weights (Schwitzer, 2003; Mittermeier *et al.*, 2006).

– Crowned lemur ( <i>Eulemur coronatus</i> )	1.2 kg
– Red-bellied lemur ( <i>Eulemur rubriventer</i> )	1.9 kg
– Ruffed lemurs ( <i>Varecia</i> spp.)	3.5 kg
– Sclater's lemur ( <i>Eulemur macaco flavifrons</i> )	1.8 kg
– Ring-tailed lemur ( <i>Lemur catta</i> )	2.2 kg

### Conclusions

1. Lemurs have a relatively low basal metabolic rate, and this should be taken into account when re-assessing diets.
2. Animals should ideally be weighed regularly to monitor any weight gain or loss.
3. It can sometimes take a while before any results are seen after adjusting diets. Stick with it and ensure all staff follow the diets closely.
4. If you are using food-based enrichment, take this into account and reduce the daily diet accordingly.

### References

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