

Come and get it! It's feeding time at the San Diego Zoo

kid space

IT'S 4:30 A.M., and most people are still fast asleep in bed. But while the rest of southern California snoozes away their Tuesday morning, a handful of workers are busily preparing food for 4,000 animals at the world-famous San Diego Zoo.

Delivery driver Martin Davila backs up to the loading dock of the Forage Warehouse and starts stacking boxes into the bed of a pickup. The boxes contain all sorts of goodies, including fruits and vegetables, fish, insects, meat, and squid. The zoo won't open to the public until 9, in another 4-1/2 hours, but Mr. Davila wants to make sure he drops off the food before the keepers start arriving at around 6:30 a.m.

"Some of these boxes can be pretty heavy," he says. Opening one of them, he looks inside and sees carrots, corn, broccoli, eggplant, cucumber, kale, and bok choy. A piece of tape on the box's side lets him know that this is for delivery to some herbivores, or plant-eating animals.

As Davila continues loading the day's chow, a quick look around would probably fool anyone into believing that this was just a typical restaurant kitchen. The food looks fresh and appetizing. Mark Edwards, the zoo's nutritionist, explains that it has to be.

"We use human-quality food," he says. "The same



TASTY GRUB: Some birds feast on grub worms (above). Others eat vegetables, fruits, or specially made pellets.

people that deliver to San Diego's finest restaurants [also] deliver to us." Well, almost.

The freezers hold stacks of boxes with herring, smelt, white-bait, and squid, which could easily make it onto any four-star menu. But mice?

"Mice get fed to things like birds and cats," a worker explains. Pulling a box of frozen rodents out of the freezer, she begins separating and bagging them for delivery. The mice come in two sizes: adult, for large animals, and "pinkies" for little animals.

"Let's go," says Davila. He's through loading up the truck, but swings by the grain house for a few other items. The grain house has pallets of bags with complete diets such as commercial cat and dog food. But the zoo also formulates its own diets.

"We're conducting ongoing nutrition research," says Mr. Edwards. "These diets are being constantly evaluated, and day-to-day husbandry of the animals generates information that goes into making better food."

The secret of the flamingoes' pink feathers

Working with a local pet food company, the zoo has come up with a number of complete diets: pellets and biscuits that contain all the calories, proteins, fats, vitamins, and minerals that they have determined an animal needs. Special chows made for the zoo include three herbivore diets, a pellet for cranes and other long-legged birds, and three types of primate biscuits. The pellets for the flamingos contain a special additive, roxanthin red 10, that gives them their gorgeous pink color. In the wild, flamingoes get this color from the small crustaceans they find in the mud.

The zoo also has its own carnivore diet, a special meat mixture with added vitamins and minerals that is fed to everything from lions and tigers, to foxes and eagles. In the past, the zoo used to buy horses and butcher them for the larger cats, but Edwards explains this has just become too difficult.

"Horse meat is not always available, and it's not inspected by the USDA," he says. "So we've gone to a beef-based diet, since cow meat is inspected. We actually have a higher-quality standard than normal pet food."

The carnivore food is made by a local pet food company and looks like a five-pound sausage. The freezer is filled with boxes of this meat, which is thawed and fed raw. The diets are evaluated by monitoring how they affect the animals' weight and blood composition, and the way the food passes through the animals.

"People don't realize this, but it's not only important what goes in the animal, but also what comes out," he says. "You can learn a lot from monitoring the stools, seeing, for example, how the fiber is handled."

Hungry lions roar in the distance

With the truck fully loaded, Davila heads out to make his deliveries. He will be stopping by 30 small kitchen sites scattered throughout the zoo. In the afternoon, he has more deliveries of hay and grain. It's still dark, and in the distance you can hear hungry lions beginning to roar. Yesterday was their fasting day, when they got only bones. Lions get the carnivore diet for five days, rabbits on the sixth day, and nothing but a bone on the seventh. The bones keep their teeth clean and the fasting helps to replicate their normal eating pattern in the wild.

Trucks continue arriving at the Forage Warehouse. One drops off big boxes of live mice for the snakes. Warehouse worker Debbie Lowe helps unload another truck carrying large boxes of bananas, apples, toma-



What's in the kitchen?

IT TAKES a lot of food to satisfy all 4,000 animals at the San Diego Zoo. Last year, the zoo spent \$860,000 on groceries, which comes out to about \$2,400 a day. While some of the items on the menu probably won't make it into a school lunch, most of them can be found at your local supermarket. Here's a partial list of what animals ate last year.

Apples - 1,900 cases, or 76,000 lbs.	Hay - 6,000 bales.
Bananas - 1,020 cases, or 40,600 lbs.	Mealworms - 3,200 lbs.
Carrots - 1,020 bags, or 52,000 lbs.	Carnivore Diet (frozen) - 60,000 lbs.
Crickets - 2.5 million	Mice - 288,000
Fish (frozen) - 112,000 lbs.	Rabbits - 2,500
Grain - 9,500 bags, or 500,000 lbs.	Rats - 5,000
	Yams - 1,500 cases, or 60,000 lbs.

atoes, melons, broccoli, yams, and green beans. "We try to consistently buy the same produce," she says. "But sometimes we can't get it 'cause it's out of season, and sometimes it just gets a little too expensive. Right now, a box of figs costs \$75."

When items get too pricey, the zoo will substitute a similar fruit that is coming into season and cheaper to buy. Animals like some variety, but they also like keeping a schedule both with their food and feeding times.

Around the zoo, keepers are starting to arrive and are cleaning out the exhibits. The sun is just beginning to peak through the trees. A senior keeper for bears and otters, Randell Herren, is tossing squid to a small, female spotted-necked otter. "They just got here to the zoo, and she's still a little spooked," he says. Feeding time is not only about food, but also a good chance for



CHOW DOWN: Well before the zoo opens at 9 a.m., the 4,000 widely varying animals must be fed. Above, red river hogs eat food pellets. Left, keeper Danila Cremona hand feeds Shani, an African serval. Below, crickets are incubated at the Forage Warehouse, where animal food is delivered from commercial vendors and then specially prepared.

keepers to see how their animals are doing. And food is also about fun. In The Owens RainForest Aviary, a huge birdcage as large as a three-story office building, another keeper is placing dishes full of pellets and bits of fruits or vegetables all about the exhibit.

Tossing worms into the air

Standing on a walkway, 30 feet above ground, the keeper tosses wax worms high above her head. Swooping out of the sky, all sorts of colorful birds snatch the worms from the air before dashing off into the trees. By the time 9 a.m. rolls around and visitors begin arriving, most of the work is done and all the animals have been fed. "It's really a great job, and actually quite a bit of fun," says the bird keeper. "Where else would I get to see and feed such beautiful animals?"

Paul D. Thacker



HARD WORK: Giant panda Bai Yun shakes out enriched biscuits from the small holes of a 'boomer ball.' The zoo uses such devices to keep the animals mentally engaged.

Homegrown specialties

SOME FOODS just can't be found in a store. At a picnic or barbecue, fruit flies are annoying little insects that buzz around your face.

But insectivorous reptiles and amphibians see them as a tasty delicacy. Keepers in the reptile house grow fruit flies in jars with fruit on the bottom. When enough flies flit around, they are released into the enclosures of frogs and lizards - where they are quickly snapped up.

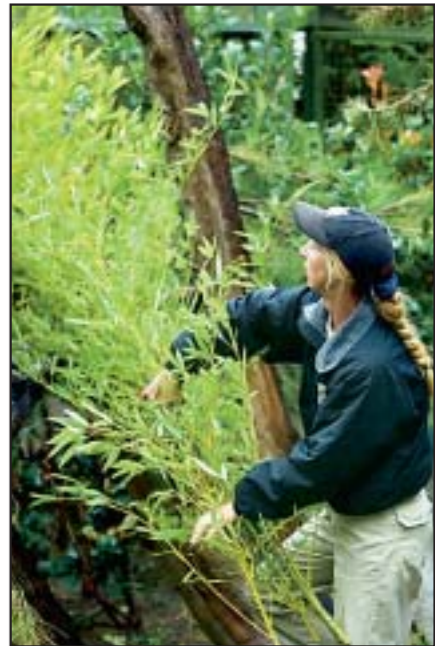
Perhaps the most difficult animals to feed are the zoo's pandas and koalas. Pandas are an endangered species from China that feed almost exclusively on bamboo, and the only thing a koala will eat is eucalyptus leaves. Thankfully, San Diego has a wonderful climate, and the zoo is also a world-class botanical garden.

"There's no such thing as 'koala chow,'" says zoo nutritionist Mark Edwards. To solve this problem, the zoo has gone into agriculture, growing large quantities of both bamboo and eucalyptus, just as a farmer grows corn or soybeans.

"There's one person whose 40-hour work week is dedicated to growing and harvesting bamboo, which is done on about five acres of land," Mr. Edwards says. "The same with eucalyptus. That's another guy's full-time job."

Eucalyptus is an Australian tree that grows abundantly in California. The zoo uses 33 types of eucalyptus to feed the koalas, and actively cultivates 25 of these species. Koalas eat only the tender leaves from the tips of the branches, however, so the zoo grows the tree in a special way. Constant pruning keeps the trees small like a bush, and this technique ensures that the tree is putting out nothing but fresh, tender leaves.

"If you looked at the site from a distance, you would probably think it was a grape vineyard," Edwards says.



LEAFY DIET: A panda keeper sets out bamboo. The zoo grows and harvests its own bamboo on five acres of land.



P.D.T.

FOR THE BIRDS: At top, a Raggiana bird of paradise downs a grub from a feeding tray. Above, Mireille Delmar chops lettuce that will be fed to the plant-eating birds. The birds eat between 7:30 and 8 a.m.



Photos by Robert Harbison - staff

