



ENTERTAINMENT, INC.

August 27, 2002

TODD WILLENS  
VICE PRESIDENT  
GOVERNMENT RELATIONS

Mr. Barry Fukunaga  
Director, Department of Enterprise Services  
City and County of Honolulu  
777 Ward Avenue  
Honolulu, HI 96814-2166

Ringling Bros. -  
Barnum & Bailey®  
Combined Shows, Inc.

Dear Mr. Fukunaga:

Disney on Ice™

Thank you for contacting me to follow up Ringling Bros. and Barnum & Bailey's® offer to assist in Honolulu's effort of Asian elephant artificial insemination at the Zoo. I have consulted with our senior elephant reproduction and elephant care team about your latest correspondence.

Siegfried & Roy®  
at The Mirage

Ringling Bros. remains willing to provide assistance with the Zoo's insemination process. It is first important to determine which method of insemination is best for each elephant cow. It is our understanding that the Zoo has been documenting the cycle of the animals for several months now. Furthermore, we understand that the elephant facility is undergoing a major modernization project that will satisfy current AZA standards that ensure the safety and health of the residents.

Disney on Ice™ Presents  
Princess Classics

At this point, I recommend that Ringling Bros. senior reproduction team, Dr. William Lindsay, Director of Veterinary Care and Dr. Dennis Schmidt, Veterinarian Consultant, visit the Zoo for an evaluation visit of its Asian elephants. In preparation for this visit it would be best for Dr. Lindsay to talk directly with the Zoo's Head Veterinarian and senior elephant keeper. Dr. Lindsay can be contacted at (608) 239-9043. Once this conversation has taken place, specific details of the Ringling Bros. vet staff visit can be set in motion.


Disney on Ice™ Presents  
Toy Story 2

Disney on Ice™ Presents  
Disney Classics

Disney on Ice™ Presents  
100 Years of Disney Magic

I look forward to learning your thoughts on this suggested plan. If it is acceptable, I will contact Dr. Lindsay to inform him that he should expect a call following up on this letter. Should you have any questions, please do not hesitate to contact me at (703) 749-5547 or Steve Hirano at (808) 536-5688.

Sincerely,



Todd Willens  
Vice President, Government Relations

Cc: William Lindsay, DVM  
Steve Hirano

# Reproductive Resources

Dennis Schmitt DVM PhD  
5744 East Bennett  
Springfield, MO 65809

Phone 417-863-0754

August 8, 2003

Attn: Dr. Ben Okimoto  
Honolulu Zoo  
151 Kapahulu Avenue  
Honolulu, HI 96815-4096

Summary of Ultrasonographic reproductive evaluations of Asian Elephants.

Mari – 27 year old female Asian elephant. **Satisfactory Potential Breeder.**

A hand-held 2-4 MHz convex linear transducer was used to exam the caudal reproductive tract. The common urogenital tract was normal. The vagina was normal except for a 5cm X 1cm X 1cm oblong pool of fluid in the vaginal lumen. The vaginal mucosa appeared normal. The cervix and caudal uterus were normal. A 5-10 MHz linear transducer in a holder allowed complete examination of the cranial uterus and ovaries. No abnormalities of the cranial reproductive tract were noted. While the pool of fluid in the vagina is not normal, there are no other abnormalities visualized along with the fluid that would warrant a lower classification. A second examination sometime in the future would be more revealing if the fluid area is larger and there are lesions consistent with leiomyomas. However, at this time I would classify Mari as a satisfactory potential breeder with some reservations.

Vaigai – 17 year old female Asian elephant. **Satisfactory Potential Breeder.**

A hand-held 2-4 MHz convex linear transducer was used to exam the caudal reproductive tract. The common urogenital tract was normal. The vagina, cervix and caudal uterus were normal. A 5-10 MHz linear transducer in a holder allowed complete examination of the cranial uterus and ovaries. No abnormalities of the cranial reproductive tract were noted. I would recommend that if a priority needs to be established for breeding these two elephants that Vaigai be considered the primary priority.

If you have any questions please feel free to call or email.

Respectfully Submitted,

Dennis Schmitt DVM, PhD, DACT

DEPARTMENT OF ENTERPRISE SERVICES  
**CITY AND COUNTY OF HONOLULU**

HONOLULU ZOO

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MUFI HANNEMANN  
MAYOR



SIDNEY A. QUINTAL  
DIRECTOR

CARL Y. HARAGUCHI  
DEPUTY DIRECTOR

KEN REDMAN  
DIRECTOR OF ZOO

February 28, 2005

Mike Keele, Chair  
Elephant Taxon Advisory Group  
Oregon Zoo  
4001 SW Canyon Road  
Portland, Oregon 97221-2705

Dear Mike:

As director of the Honolulu Zoo, I am confirming that we have made a long-term commitment to exhibiting Asian elephants at our Zoo. We currently have invested slightly more than \$6 million for new holding quarters. Construction is under way and should be completed by the end of the year. The holding quarters includes space for a bull, for several cows, and a separate maternity area. We will have an ERD installed as well.

The holding quarters and new exhibit is located in a different area than where our elephants are currently on display, so construction has no impact on our two cows. The estimated cost for the new exhibit is \$10 million and, unfortunately, our request for funds was not approved in this year's capital improvements budget. Affecting the decision is that we have six construction projects taking place at this time and the City needs to attend to other basic needs while we complete the work that is under way. We are optimistic that the necessary funds will be appropriated in the next budget cycle.

We anticipate making our first attempt to artificially inseminate our younger, 19 year-old cow in the coming months. She has passed a reproductive assessment and all indications are that she is a prime candidate for breeding. Our 29 year-old cow will need a second assessment before a decision can be made whether to try to AI her. This all, of course, depends upon an endorsement from the TAG. If we should be so fortunate to get either cow pregnant on the first attempt, the new holding quarters will easily be available by the time of a birth. We anticipate that the new exhibit will be also be done by that time; if not, work will be well under way.

I hope this answers any concerns that the TAG may have. I can keep you informed of our progress and respond to any questions as they arise. Thank you.

Sincerely,

Date: April 8, 2005

To: AZA Elephant Holding Institution Directors

From: Mike Keele, Chair, AZA Elephant TAG/SSP  
Mark C. Reed, Chair, AZA Elephant Taskforce

Subject: Institutional Commitment Due - July 1, 2005

As you know from the January 2005, Elephant Directors meeting in Orlando and subsequent mailings one of the outcomes agreed upon by all attendees was –

- **Every director will determine their level of participation in the AZA Elephant TAG/SSP and have a statement of intent by 7/1/05**

We have actually received some commitments already and those institutions are to be commended. Beginning in early May, your elephant institutional representative (IR) will be contacted by an assigned Elephant TAG/SSP Institutional Liaison Member. (See attachment for your institution's Elephant TAG/SSP Institutional Liaison.) The liaison will be checking on your institution's progress in assessing your level of commitment. If you already know your commitment level please have your IR contact the Institutional Liaison assigned and send a letter/email to Mike Keele stating your level of commitment.

As a reminder, the commitment levels we are looking for include:

- Enhance population sustainability through institutional carrying capacity
  - SSP Participants that are breeding facilities will strive to hold 6-12 elephants, with capabilities for 2 or more males
  - Other SSP Participants will strive to hold 2-6 elephants, with capabilities for all males
- Participate in or contribute to *in-* or *ex situ* elephant conservation
- Participate in and support AZA Elephant TAG/SSP research projects (includes submitting samples, responding to surveys, contributing resources)
- Abide by AZA Elephant TAG/SSP breeding recommendations
- Promote AZA Elephant TAG/SSP education messages
- Contribute resources to developing conservation centers
- Contribute resources to hiring a full time position for program oversight
- Publicly speak and act with a unified voice
- Participate in a proactive public relations campaign
- Provide support for elephant staff to participate in AZA Elephant TAG/SSP activities.
- Abide by AZA Standards for Elephant Management and Care (with the understanding that they're dynamic and may evolve as our knowledge increases)

Because it is important for us to plan for future carrying capacity, please include the following information:

- a) Realistic time frames before your institution can obtain the level of commitment you are pledging i.e. realizing that money will be a major factor such as the passing of a bond issue or the successful completion of a capital campaign.
- b) Assurance that your commitment has the approval of your governing body.

For those institutions that intend to phase out their elephant programs for the short-term or permanently, please let us know your plan and possible timelines you are considering.

It is our intention to maintain a spreadsheet on all elephant holding institutions with their commitment levels, which upon conclusion of the process will be shared with you all. As we approach the July 1 deadline, Mark will start contacting the institutional directors that have not yet committed to check where they are in the process. In the meantime, if you have any questions feel free to contact us.

Mike Keelc, Chair, AZA Elephant TAG/SSP  
Oregon Zoo  
4001 SW Canyon Road  
Portland, OR 97221-2705  
503.220.2445  
[Keelem@metro.dst.or.us](mailto:Keelem@metro.dst.or.us)

Mark C. Reed, Chair, AZA Elephant Taskforce  
Sedgwick County Zoo  
5555 Zoo Boulevard  
Wichita, KS 67212  
316.266.8201  
[mreed@scz.org](mailto:mreed@scz.org)

MEMORANDUM

✓  
TO: Ken, Tom, Pete, Butch, Mo  
FROM: Ben Okimoto  
DATE: October 2, 2004  
SUBJECT: Elephant AI (blood values), Elephant Diet

Elephant AI:

Attached are latest blood hormonal values for both elephants, "Vaigai" continues to cycle regularly, and "Mari" less so. It appears to me that they both may next ovulate mid-November to mid-December. Subsequent to that the next projected ovulation will probably be around February. I have emailed Dr. Schmitt to ensure that he is receiving copies of the same data. The question is when will the elephants be ready (trained).

Elephant Diet (Chandra's recommendations):

Attached are copies from Chandra's research. Note from her text: "hay should provide the base of the elephant's diet... "Herbivore supplements" should be limited to 10 to 25% of diet DM (dry matter) to avoid mineral excesses... Although a small amount of produce may be helpful for shifting and medicating elephants, other products, such as leaf-eating primate biscuits can be used at considerably less cost with the same effect and a higher fiber level (Ullrey et al, 1997). Produce in as little as 5% of the diet's DM can amount to as much as 50% of the cost of an animal's diet (Ullrey et al, 1997). Produce should be limited or eliminated from elephant diets because of its high cost and the negligible amount of nutrients it supplies to the overall diet relative to hay and pellets (due to their high moisture content and the dilution of nutrients)... Browse, on the other hand, when used to replace an equal portion of the hay dry weight, can have the positive effect of stimulating an elephant's natural foraging behavior (Stoinski et al, 2000)."

Three alternative diets are proposed by Chandra:

- Alt. 1: no fruits or vegetables, Herbivore supplement pellets, alfalfa and timothy hay mix, some browse.
- Alt. 2: carrots, less Herb. pellets, less hay, more browse.
- Alt. 3: no fruits or vegetables, even less Herb. pellets, primate biscuits, the most hay, some browse.

Recognize that all three Alternative diets are nutritionally balanced, vs. the current diet, which is not balanced.

Also listed are cost comparisons of the 3 alternate diets with the current diet:

Current diet: \$7,849/elephant/year

Alternate 1: \$5,752/elephant/year

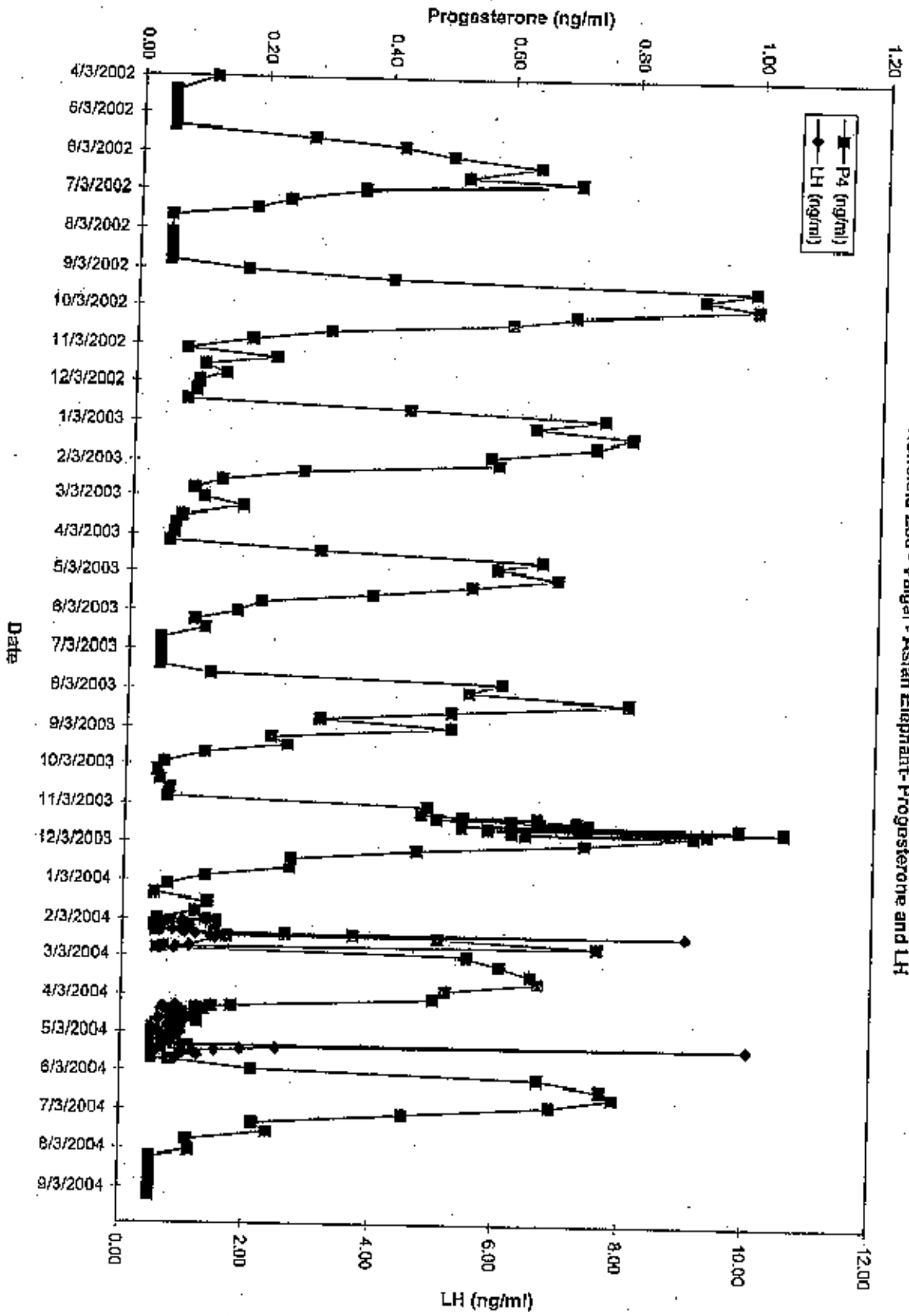
Alternate 2: \$9,305/elephant/year

Alternate 3: \$7,504/elephant/year

One of the alternate diets should be selected.

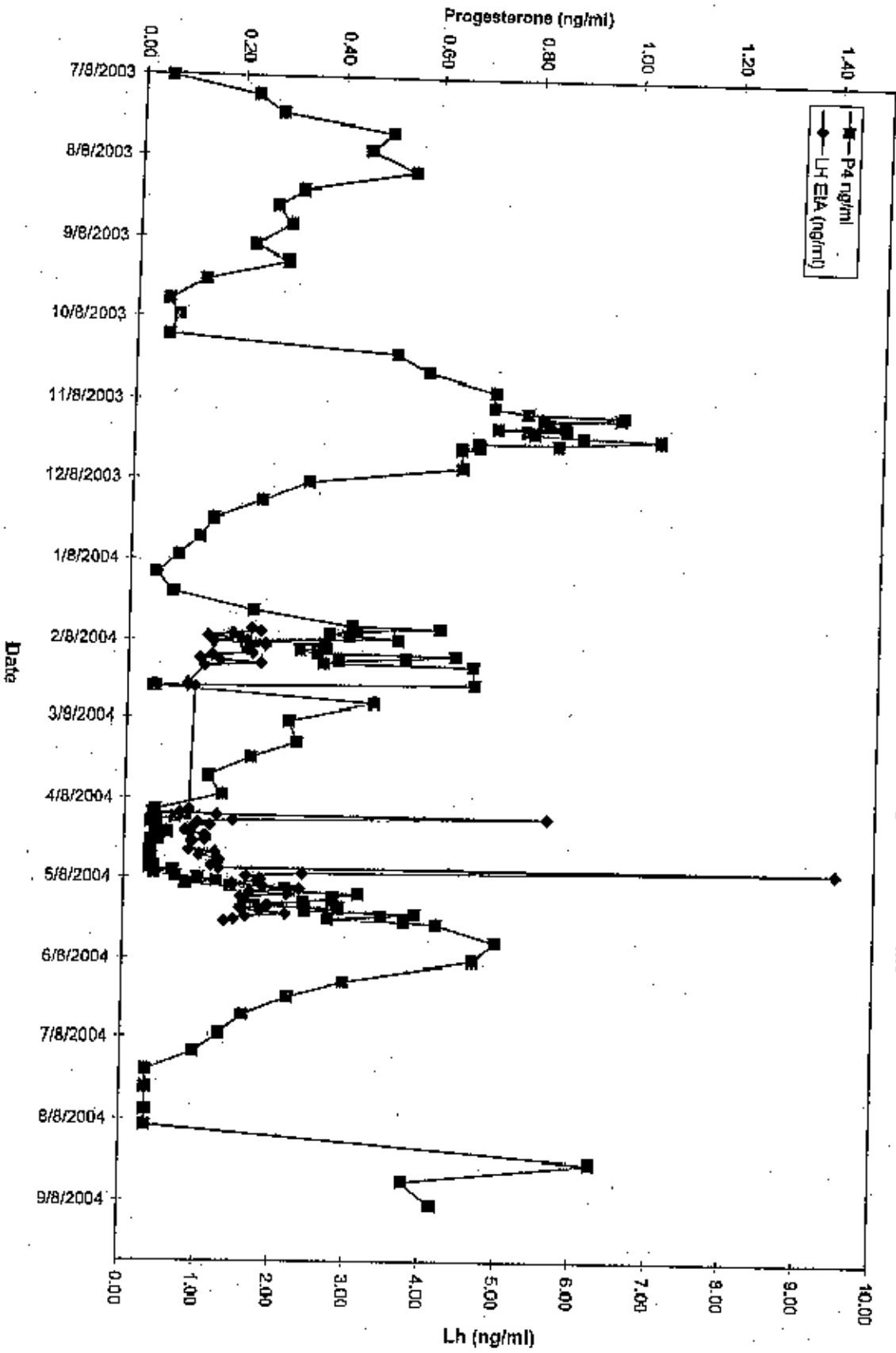
A suggested change-over schedule is also attached.

Honolulu Zoo - Valgai - Asian Elephant - Progesterone and LH



Mari

Honolulu Zoo - Mari - Asian Elephant - Progesterone and LH



large herbivores to prevent sodium deficiency, either mixed in the diet or presented in the form of a salt block.

Rhinoceros have dry matter intakes of 1% of their body weight when fed grass hay diets and 1.2 to 1.6% of body weight on alfalfa hay diet (Foose, 1982 as cited in; Dierenfeld, 1995a). The only other browsing rhinoceros species, the Sumatran rhinoceros (*Dicerorhinus sumatrensis*), consumes 1.4 to 2.5% of its body weight when fed a captive diet of mostly browse (62 to 83% of DM intake) (Dierenfeld et al., 2000). Intake should range from 1 to 2% of body weight (DM basis) on typical captive diets (Dierenfeld, 1999a). This range provides a base from which to work and should be altered based on individual animal needs and physiological states. The intake level of the black rhinoceros in this study were 1.86 and 1.70 % DM of the body weight based on diets consisting of roughly 50 to 54% formulated diet, 21 to 18% timothy hay, and 22 to 21% alfalfa hay, respectively.

The reformulated diets of the black rhinoceros presented here contain preformulated pellets and hay as the main bulk of the diet (>73% of the diet DM) and includes a mixture of grass and legume hay. Primate Maintenance Biscuits make up a portion of the preformulated portion of the diet as a high fiber (22%, DM basis) treat item. Browse has been incorporated into the reformulated diets at much higher levels than that of the assessed intakes and in most cases replaces a portion of the timothy hay.

#### **Asian Elephant:**

The nutrient needs of elephants are typically inferred from field studies of food plants and extrapolation from horse data (Ullrey et al., 1997). The domestic horse also currently represents the best nutritional model for elephants based on digestive tract

similarities (Dierenfeld, 1994b). At this time it is recommended that diets be formulated using National Research Council recommended levels for horses (NRC, 1989a), except when data suggest otherwise. Proposed minimum nutrient concentrations for elephant diets (based largely on extrapolation from horse requirements) are published (Ullrey et al., 1997). Based on the previously reported dry matter digestibility seen in Asian elephants, diets should be formulated to contain at least 4.0 Mcal/kg DM of gross energy (Dierenfeld, 1994b).

Since elephants are both grazers and browsers, nutritionally optimal diets should include characteristics of both browse and grass (Dierenfeld, 1994b). In captivity elephants are typically fed grass hays, although a mix of grass and legume hay will help raise the protein level of grass hays to suitable levels for adult elephant maintenance (Ullrey et al., 1997). This hay should provide the base of the elephant's diet (Ullrey et al., 1997). Pelleted feeds formulated for herbivores are often used to supplement hay and are useful for correcting specific hay nutrient inadequacies (Ullrey et al., 1997). To avoid digestive upsets, pelleted feeds should not exceed 50% of the diet dry weight (Ullrey et al., 1997).

'Herbivore supplements' are different from the pelleted feeds just mentioned in that they are lower in fiber and higher in digestible energy, protein, minerals and vitamins (Ullrey et al., 1997). They are primarily used to supplement low quality hays and should be limited to 10 to 25% of diet DM to avoid mineral excesses (Ullrey et al., 1997). Recommended ratios of hay and pellets have been published based on average nutrient concentrations of different species of grass and types of pellets or supplements (Ullrey et

al., 1997). Actual diet ratios of hay and pellets should be altered depending on local feed nutrient analysis.

Although a small amount of produce may be helpful for shifting and medicating elephants, other products, such as leaf-eating primate biscuits can be used at considerably less cost with the same effect and a higher fiber level (Ullrey et al., 1997). Produce in as little as 5% of the diet's DM can amount to as much as 50% of the cost of an animal's diet (Ullrey et al., 1997). Produce should be limited or eliminated from elephant diets because of its high cost and the negligible amount of nutrients it supplies to the overall diet relative to hay and pellets (due to their high moisture content and the dilution of nutrients).

Browse, on the other hand, when used to replace an equal portion of the hay dry weight, can have the positive effect of stimulating an elephant's natural foraging behavior. When an African elephant's diet (consisting of 86% hay, 7% grain, and 7% produce, AF basis) was replaced with a small amount (estimated as 11% DM basis, 22% AF basis) of fresh browse material, they showed a significant increase in feeding with a subsequent decrease in drinking and inactivity (Stoinski et al., 2000). This increased foraging time results from the increased handling time necessary to manipulate the browse items, i.e., stripping leaves, branches and bark. Additionally, the strategic placement of browse can increase the amount of time elephants are visible to zoo patrons and encourage elephant movement (Ullrey et al., 1997; Stoinski et al., 2000).

Vitamin E deficiency has been reported in elephants (Dierenfeld and Dolensek, 1988b; Papas et al., 1991) and can lead to disorders of the reproductive, muscular, circulatory and nervous systems (Savage et al., 1999). It has also been implicated in

captive elephant deaths (Dierenfeld, 1994b). Domestic herbivore species such as equines have circulating  $\alpha$ -tocopherol concentrations four times those reported in free-ranging and captive elephants (Savage et al., 1999). Because of these differences, equines may not be an appropriate physiological model for assessing vitamin E status and requirements in elephants, any more than they are appropriate for rhinoceros (Dierenfeld et al., 1998 as cited in; Savage et al., 1999).

Dierenfeld (1994c) recommends a level of 50 to 200 mg vitamin E/kg DM to prevent deficiency symptoms in most exotic species. The vitamin E concentration of native browses consumed by elephants in the wild is high (50 to 250 mg/kg DM) (Dierenfeld et al., 1990) compared to dried forage and grass diets (<35 mg/kg DM) fed to zoo animals in captivity (Dierenfeld, 1999b). Therefore, the daily consumption of fresh forage should easily meet the vitamin E (and vitamin A) needs of elephants (Sunder et al., 1998).

Asian elephants consumed 1.2 to 1.3% of their body weight in DM daily when fed a grass hay diet, compared to 1.1% on a legume (alfalfa) hay diet (Foosc, 1982 both as cited in; Hackenberger, 1987; Dierenfeld, 1994b). Sukumar (1989) reported free-ranging animals to consume between 1.5 to 1.9% (dry and wet season, respectively) of their body weight in AF forage in one 12-hour feeding day. Dry matter intakes reported for the mixed diets in this study (consisting of 90% timothy hay, 7% formulated diet, 1.4% produce and less than 1.6% browse on a DM basis) are considerably lower than literature values, at 0.79% of body weight in DM (0.99% on an AF basis).

The reformulated Asian elephant diets consist of hay and pellets as the main bulk of the diet (>75% DM basis), which is in line with nutritional recommendations. The

diets are balanced nutritionally without the inclusion of alfalfa hay at the same proportion as timothy. Produce was not nutritionally required in the reformulated diets of the elephants, but was forced in, along with primate maintenance biscuits, for behavioral manipulation during human encounters. All diets are balanced nutritionally containing from 13 to 19% browse on a DM basis, and it was therefore not deemed necessary to limit browse in the diets of the elephants. However, if a cost is estimated for the browse that exceeds the cost of other diet components the zoo may deem it necessary to reformulate diets with reduced amounts of browse.

#### **Guenther's Dik-dik:**

Because there is currently no domesticated species of ungulate classified as a concentrate selector, most zoo ungulates are fed based on nutrient requirements of domestic ruminant and hindgut fermenting species (Oftedal et al., 1996). Goats are intermediate feeders (mixed browsers/grazers) (Hofmann, 1989), getting a relatively small proportion of their daily DM intake in the wild from grass (Owen-Smith and Cooper, 1985). Because of this, goat nutrient requirements appear the most appropriate model for extrapolating nutrient requirements for dik-diks (NRC, 1981).

As previously discussed, Lintzenich and Ward (1997) have compiled proposed diet nutrient concentrations for herbivores ranging from concentrate selectors to less selective browsers to grazers. Their proposed diet nutrient concentrations, which are obtained from various sources, represent adequate intakes and not physiological minimums. The basic diet of herbivores should consist of pellets and hay, with only limited types and quantities of supplemental browse (Oftedal et al., 1996). Nutritionally complete pellets are normally formulated to ensure each species nutrient needs are met

Appendix Table 14. Prepared as food feed intake of appropriate date for rhinoceros, elephants and dik-diks at the Honefutu Zoo.

Feed Type*	Elephant											
	All 1				All 2				All 3			
Unit	%	g	kg	g	%	g	kg	g	%	g	kg	g
Banana		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Oranges		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Papaya, w/o seeds		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Total Fruit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cabbage		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Carrots		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Colony		0.0	0.0	0.0	18.6	0.0	0.0	0.0		0.0	0.0	0.0
Endive		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Head Lettuce		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Potato		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Romaine lettuce		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Spinach		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Sweet Potato		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Total Vegetable	0.0	0.0	0.0	0.0	18.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Blend of Pasture		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Canine Milk		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Herbivore 1/2 <sup>nd</sup> Supp. Past	8.3	1041.8	1.0418	122.3	6.9	3775.2	3.7752	121.1	6.7	1369.2	1.3692	78.7
Herbivore Pellet		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Leaf-Less Pilmato Diet		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Low Fibre Herb Pellet 1/4 <sup>th</sup>		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Prolyt Blend Soft Pellet		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Primate Maint. Biscuit		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Total Formulated Diet	8.3	1041.8	1.0418	122.3	6.9	3775.2	3.7752	121.1	9.0	1369.2	1.3692	78.7
Carrotine Diet		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Chiles		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Smell		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Total Meat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sunflower Seeds		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Total Seed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crickets		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Mealworms		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Total Insect	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alfalfa Hay	8.3	1041.8	1.0418	122.3	1.0	777.2	0.7772	24.3	0.0	0.0	0.0	0.0
Timothy Hay	38.3	4777.0	4.7770	569.6	31.0	1077.6	1.0776	34.3	8.0	2117.2	2.1172	333.7
Total Hay	44.6	5818.8	5.8188	691.9	33.1	1854.8	1.8548	58.6	8.0	2117.2	2.1172	333.7
Apple Banana, juft		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Apple Banana, stalk		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Apple Banana, white	20.9	2631.0	2.6310	319.7	17.2	3250.4	3.2504	398.3	22.3	4517.4	4.5174	564.3
Areca Palm, dry		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Areca Palm, green		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Black Mulberry		0.0	0.0	0.0	1.2	288.5	0.2885	32.2	1.6	395.6	0.3956	44.7
Cape Honey suckle		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Coral Hibiscus 1		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Coral Hibiscus 2		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Coral Hibiscus inflorescence		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Dwarf Elephant Grass		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Edible Hibiscus 1		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Edible Hibiscus 2		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Elephant Grass	6.3	799.0	0.7990	95.8	6.2	777.4	0.7774	92.3	6.2	777.2	0.7772	92.3
Golden Bamboo		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Hau		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Hula Bamboo	0.0	0.0	0.0	0.0	7.4	2995.6	2.9956	358.7		0.0	0.0	0.0
Ivy Gourd		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Loulu		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Ollal Alil		0.0	0.0	0.0	1.4	77.8	0.0778	24.3		0.0	0.0	0.0
Opulma		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Papyrus		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Pink Hibiscus 1		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Pink Hibiscus 2		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Prunella, Himalaya		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Rothos, native		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Sugarcane, Ko		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Thornless Kiwifruit	14.8	1838.8	1.8388	222.6	9.0	4833.7	4.8337	591.2	11.7	1844.0	1.8440	230.5
Viti, Masal, Nki Sava		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
Total Dried	47.1	5963.2	5.9632	718.5	41.4	22358.3	22.3583	2748.3	48.0	12218.2	12.2182	1527.4

Table 4-8a. Current and proposed feed category proportions in diets of Asian elephants at the Honolulu Zoo.

% of Diet	Assessed Diet		Reformulated Diets					
	Elephant <sup>a</sup>		Alternate 1		Alternate 2		Alternate 3	
	DM basis	WAF basis	DM basis	WAF basis	DM basis	WAF basis	DM basis	WAF basis
Fruit	0.7	3.0	0.0	0.0	0.0	0.0	0.0	0.0
Vegetable	0.8	5.8	0.0	0.0	5.0	18.8	0.0	0.0
Formulated Diet	7.1	6.1	13.0	8.3	13.2	8.9	15.9	10.7
Meat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Seed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Insect	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alfalfa Hay	0.0	0.0	10.0	5.3	2.8	1.5	10.0	8.8
Timothy Hay	89.8	77.8	80.0	35.3	80.0	31.8	81.1	41.8
Browse	1.8	7.1	17.0	17.4	18.0	47.4	13.0	40.8
Supplement	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
\$/kg	\$0.82	\$0.48	\$0.48	\$0.27	\$0.74	\$0.36	\$0.80	\$0.37
Consumption (g)	34415	3308	34415	58051	34415	71852	34415	55222
\$/animal/year	\$7,848	\$7,869	\$5,752	\$15,752	\$9,205	\$26,308	\$7,504	\$7,504

<sup>a</sup>Assessment represents an average of two animals.

## Changing Animal Diets

- Monogastrics: 7-10 days
- Ruminants: 10-14 days
- Diet adjustments should be done in the following ratio, approximately every 2-4 days depending on the type of animal.
  - 75% old diet: 25% new diet
  - 50% old diet: 50% new diet
  - 75% ~~old~~ diet: 25% ~~new~~ diet
- Depending on the degree of difference between the old and new diets and the acceptance by the animal this ratio may need to be more gradual
- Feed separate or mixed depending on current diet to track preferences and acceptability
  - Are particular items rejected?
- Allow a period of adjustment to see acceptance, rather than reverting back to the original diets too quickly

## Monitoring The Animals

- Take regular body weights
  - Allows for routine diet adjustment to maintain weight
- Keep daily records of animal behaviors (normal and abnormal) and health status
  - Allows abnormal behaviors to quickly be identified
- Keep detailed reports of the consumption of each diet ingredient
- Monitor for stool changes
  - Changes in firmness, moisture level, color and frequency
  - Stool changes can be expected with diet changes

DEPARTMENT OF ENTERPRISE SERVICES  
**CITY AND COUNTY OF HONOLULU**

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GOLF COURSE DIVISION • HONOLULU ZOO • NEAL S. BLAISDELL CENTER AND WAIKIKI SHELL

JEREMY HARRIS  
MAYOR



BARRY FUKUNAGA  
DIRECTOR

LYNETTE CHAR  
DEPUTY DIRECTOR

August 30, 2002

Mr. Todd Willens  
Vice President  
Government Relations Department  
FELD Entertainment  
8607 Westwood Center Drive  
Vienna, Virginia 22182

Dear Mr. Willens:

Thank you for the information relating to interest in the artificial insemination effort for the Asian Elephants at the Honolulu Zoo. We continue to pursue this alternative in the breeding program for the animals in our exhibit.

A delay in the actual start of the construction on our new elephant holding facility has been experienced due to higher than anticipated construction bids. An adjustment is being pursued to revise construction plans that will enable completion of the housing needed to undertake the breeding program. The construction will begin shortly under a revised development sequence and it is therefore important that we proceed with the breeding effort.

The monitoring of both cows is already underway and we appreciate your offer to have Dr. William Lindsey and Dr. Dennis Schmidt evaluate our elephants. Our Zoo Veterinarian, Dr. Ben Okimoto will contact Dr. Lindsey to discuss the status of both animals and provide any additional information they may require regarding their condition. In order to determine the cost of the insemination program and satisfy our procurement requirements, we shall also need an indication of the costs, anticipated procedure and general timetable that would be associated with any assistance facilitated by Ringling Bros. and Barnum and Bailey.

We look forward to any information you can provide that will assist in our familiarization of the services available from your organization and thank you again for the offer to aid our effort in this matter.

Sincerely,

  
BARRY FUKUNAGA  
Director

cc: Lynette Char, Deputy Director  
~~Barry Fukunaga, Director~~  
Cathy Maki, Administrative Officer  
Steve Hirano