

9-6-1986

Elephant Training and Ride Operations, Part I: Animal Health, Cost/Benefit and Philosophy

Donald E. Moore

Burnet Park Zoo

Charles E. Doyle

Burnet Park Zoo

Follow this and additional works at: <https://digitalcommons.wayne.edu/elephant>

Recommended Citation

Moore, D. E., & Doyle, C. E. (1986). Elephant Training and Ride Operations, Part I: Animal Health, Cost/Benefit and Philosophy. *Elephant*, 2(2), 19-31. Doi: 10.22237/elephant/1521731987

This Article is brought to you for free and open access by the Open Access Journals at DigitalCommons@WayneState. It has been accepted for inclusion in *Elephant* by an authorized editor of DigitalCommons@WayneState.

Elephant Training and Ride Operations, Part I: Animal Health, Cost/ Benefit and Philosophy

Cover Page Footnote

Thanks especially to David Raboy, Burnet Park Zoo Director; without his philosophical guidance and direction, our elephant program and new zoo would not have been realized. Thanks to the Buffalo Zoo staff, especially Director Minot Ortolani, Curator Gerald Aquilina, and Keeper Jan Lyon who has consistently provided excellent care for Siri and help in the training program and who has provided welcome information about the elephant "Lu." Thanks to all our colleagues in the field who responded to the questionnaire, to Larry Joyner (New York Zoological Park, Bronx, New York) who has provided expertise and direction for our training techniques and saddle design, and to the staff of the New York Zoological Park for their professional know-how and hospitality. Thanks to David Gucwa who helped with questionnaire design. Finally, thanks to Lu and Siri.

**ELEPHANT TRAINING AND RIDE OPERATIONS, PART I:
ANIMAL HEALTH, COST/BENEFIT AND PHILOSOPHY**

by **Donald E. Moore and Charles E. Doyle**

**Burnet Park Zoo
P.O. Box 146
Liverpool, New York 13088 USA**

ABSTRACT: Results from a survey, conducted by the authors as employees of the Burnet Park Zoo, show that very few captive elephants in zoos (18 in the USA) are trained for ride operations. Trained elephants are easily accessible for treatment, are less "bored", and overall are healthier than non-trained elephants, which may be manifested in a longer life span. The benefits derived from a well planned elephant training and ride operation clearly outweigh the costs incurred.

INTRODUCTION

About 250 Asian elephants (Elephas maximus) are currently maintained in captivity in North American zoological parks (Lash, 1982); most of these animals are females kept singly or in small groups (ISIS, 1982). Although certain zoos have rigorous training programs for their elephants, most only have their animals trained for minimal management needs, i.e., chaining at night; very few have ride operations.

The importance of training elephants cannot be underestimated: it allows personnel to meet management needs, reduces inactivity, and may be important for monitoring animal health. In addition, trained "ride elephants" may return more in other revenues and capital funding than is earned simply from elephant ride ticket sales.

Management Needs

Because the elephant has such sensitive feet and skin, keepers need to perform routine pedicures (Friedman et al., 1983; Markowitz, 1982) and skin care (Friedman et al., 1983). However, many zoos have inadequate facilities to allow these necessary routines to be performed (Markowitz, 1982). Although the Burnet Park Zoo in Syracuse, New York, had inadequate facilities (the zoo is currently closed for complete renovation of the physical plant to twentieth century captive wild animal management standards), we had a partially-trained, young female Asian elephant. The Director and staff committed one keeper per day to perform routine maintenance and training for Siri, the only elephant, and when the keepers reached the maximum of their admittedly somewhat limited training ability a professional trainer was contracted to visit the zoo for a few days to give "pointers". The results were more knowledgeable keeper/trainers and a more workable elephant. The constant proximity of keeper/trainer and elephant on a daily basis resulted

in better, more consistent skin and foot care and ultimately in better appearance of the animal.

Increased Activity

The space for exercise and activity is reduced in captivity; in the wild elephants are involved in avoidance of predators, food seeking and eating (Hunsaker, 1974; Hediger, 1964). Meeting psycho-social needs and adequate "cage" size are important for increasing activity in the captive situation (Hunsaker, 1974; Markowitz, 1974); "clearly one of the most urgent problems in the biology of zoological gardens arises from the lack of occupation of the captive animal" (Hediger, 1964 and see Figure 1).

The result of inactivity may be stereotyped movements (Hunsaker, 1974; Hediger, 1964) which in elephants include "bobbing", "swaying" and "pacing". These movements probably simulate activities important to the animal in the wild (Hediger, 1964), e.g., moving in search of food. Hediger (1964) states:

"It is clear that dangerous inactivity and harmful poverty of surroundings of this sort must be avoided at all costs. The captive animal must be given a new interest in life, an adequate substitute for the chief occupations of freedom. In the author's opinion this substitute can take the form of biologically suitable training and assumes the importance of occupational therapy... Naturally, the more highly organized the captive animal the more its lack of activity will be noticeable... In progressive zoological gardens they have gone so far as to give predators, as well as elephants, occupation through training... The imperative need of the captive animal for something to do follows clearly enough from the analytical comparison of freedom and captivity and shows itself unmistakably in practice. It is an important task of the biologist of zoological gardens to satisfy this great need. The most suitable way is by training."

Although no trainers, including those in circuses, make the claim that stereotyped behaviors disappear when elephants are trained beyond the level required to meet baseline management needs, a gradient of physical health can generally be observed between untrained, trained and working animals: those that are not adequately trained and exhibit little activity (at best, limited stereotyped behaviors) in zoos have relatively poor muscle tone; those that perform behavior demonstrations and perhaps give rides in zoos have better muscle tone; and those that work long periods daily in shows and moving equipment in circuses are generally in relatively good physical condition. Also, trained elephants may be approached by keepers who may present novel stimuli (say, logs for stacking), in attempts to increase the elephants' levels of exploration or play, thus decreasing, at least, the amounts of sleep and rest performed by unstimulated, untrained captive animals. The amount of increased activity, which is genuinely interesting to the zoo-going public, may include 1-3 hours of off-exhibit training and public demonstrations, and 3 hours of riding daily (see Fig. 1).

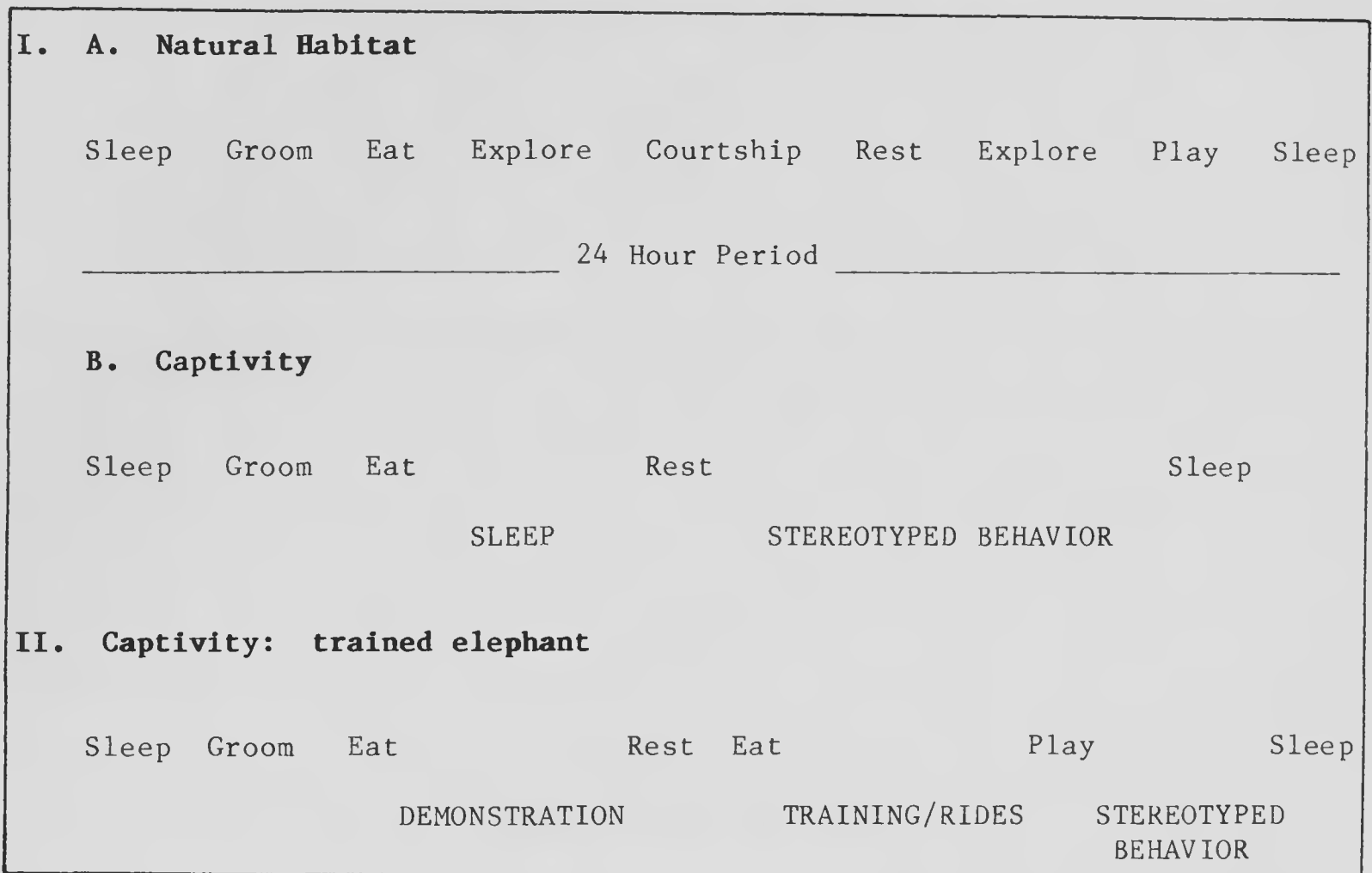


Figure 1. I. Activity patterns for elephants in natural habitat (A.) versus elephants in captivity (B.) (after Hunsaker, 1974). II. Activity pattern for trained elephants in captivity as suggested by the authors (activity periods not to time scale). Compare this figure to Figure 4 and Table 1 in Eisenberg (1980).

Animal Health

The use of training to monitor animal health is best exemplified by the Washington Park Zoo example which has been reviewed by Markowitz (1982), Markowitz (1974), and Markowitz et al. (1978). Three elephants were given a visual discrimination test after an eight-year interval. While one animal showed remarkable evidence of memory, the other two struggled with the task and had apparently failed to remember. Because the researchers felt that the difficulties were visual, a subsequent ophthalmoscopic examination revealed vascular deficiency in the area of the optic disc in the two animals which could not perform the task.

Perhaps, if the animals' routines had not been so stereotyped (see Markowitz et al., 1978), these physical deficiencies would have been noticed earlier by the keeper staff. Markowitz et al. (1978) noted that only in an active program of behavioral engineering where animals are regularly observed

is the management staff likely to detect early or subtle changes in behavior which indicate physical deterioration before the animals become moribund or develop some severe visible lesion. We submit that the behavioral engineering does not have to be as elaborate as that used by researchers at Washington Park Zoo (see Markowitz, 1982): the same results may be obtained if elephants must perform tasks, as in working demonstrations where logs must be stacked or placed accurately; the requirement of regular observation is met during training for and performance of such demonstrations.

Additionally, hard physical work in the form of aerobic activity is known to be important for increased vascularization and heart-lung efficiency, with consequent better health and longer life in male and female humans (Carleton, 1981). There is, in our opinion, no reason to assume different effects in elephants. For example, Staehr et al. (1981) found that regular movement in boars (*Sus scrofa*) resulted in decreased incidence of disease, better general condition, and better sperm quality. Although elephant riding may be a poor substitute for exercise compared to exercise gotten by free-ranging or working elephants of the teak forests of Asia, an elephant can travel one mile per ride-hour (pers. obs.), possibly more given longer track, cool weather, etc., and therefore is performing aerobic exercise during the ride period. This should result in better health and longer life.

MATERIALS AND METHODS

A questionnaire (see Figure 2) was distributed by Burnet Park Zoo in July 1981 to zoos known or thought to have working elephants.

Additionally, the Burnet Park Zoo established an Elephant Management Subcommittee of the Zoo's Animal Management Committee; the Subcommittee consisted of elephant keepers, curators and director. The Elephant Management Subcommittee was important for establishing goals and guidelines for the total elephant program. Initial goals were improved foot and skin care but were advanced to establish a ride operation which would be safe for the keeper/trainers, the elephant, and the public. The veterinary and education staffs were involved peripherally in Subcommittee deliberations to help effect improved animal health and staff (and docent group) awareness.

As discussed above, training progressed quantitatively and qualitatively so that we could begin a riding operation. This operation continues at the Buffalo Zoological Garden (New York) where our elephant and keeper/trainer reside while Burnet Park completes renovation.

RESULTS

Twelve responses were obtained from 1981 through 1983 for the twenty questionnaires mailed; five of the twelve indicated "no rides". Following are the summary of our results:

COUNTY OF ONONDAGA



DEPARTMENT OF PARKS AND RECREATION

P. O. BOX 146

LIVERPOOL, NEW YORK 13088

JOHN H. MULROY
COUNTY EXECUTIVE

~~457-2890~~ 315-425-3775

JAMES R. JOHST
COMMISSIONER

BURNET PARK ZOO

Dear Colleague,

We are working on a technical elephant riding paper for submission to the Elephant Interest Group journal Elephant. Could you please answer the following questions regarding your riding operations?

1. How many elephants give rides?
 - 1a. How long is each elephants riding session?
2. How old are the elephants?
3. How much do rides cost?
 - 3a. What is your zoo's annual gross income from the riding operations? (Institution will be confidential).
4. How many personnel are used per day?
5. What substrate do elephants walk on while giving rides?
 - 5a. Have you had any foot problems arise which you attribute to the substrate?
6. Could you send us pictures or drawings of platform and saddles (front view, rear view, both side views, top view if possible)?
 - 6a. What materials are the saddles made of? Do keepers consider them manageable?

We are trying to present an idea of different saddle designs and girth types and placements to give an idea of the safest, most easily manageable types of saddles.

Sincerely,

FIGURE 2. Elephant ride questionnaire.

Number Of Elephants Used For Rides: Range 1-4, average 2.25. Number of animals used is apparently related to number of animals in the zoo's inventory and level of training reached by the elephants.

Length Of Ride Session: Range 1½ hours (two sessions daily) to 8 hours (one session per day). Length of the ride session seems to be dependent upon temperature, the elephant's physical ability and personal preference of the institution staff.

Age Of Ride Animals: Range 8-42, average 20.5.

Ride Cost: Range U.S. \$.75-2.00, average \$1.25. One institution (private) includes rides in its one-price entrance fee.

Annual Gross Income From Elephant Rides: Range \$5,000 to \$40,000 per animal. Note that the discrepancy is due to inclusion of "year-round" operations with seasonal operations. \$5,000 per animal is fairly typical for seasonal operations. \$35,000 is typical for year-round operations. One institution gives 10% of all annual ride income to World Wildlife Fund.

Number Of Personnel Used: Range 2-5. One handler is used for each animal; one loader is necessary. Tickets may be sold at entry booths or concession stands, but Burnet Park found it was necessary to establish a separate ticket booth (to control waiting lines and minimize visitor aggravation due to ride stoppage while people were still in line). Therefore, one extra person is needed during ride operations (see Discussion).

DISCUSSION

Considerations -- Animal

Note that elephants may be trained at an early age but should not be used for work; in Thailand elephants are not started working until age 10 years and are retired at age 60 years. Full work capacity is realized from age 25 to 50 years (Corvanich, 1979). Personnel at Marine World/Africa USA (Redwood City, California) indicated in their response to our questionnaire that ride elephants should begin work at no younger than 15 years; those started earlier apparently have developmental problems due to the strain of their work. We recognize this concern and think it may be a useful rule of thumb; we also believe that because elephants, like people, develop as individuals, some animals may be started riding a couple of years earlier than others. The Marine World/Africa USA trainers also reinforced the generally held belief (e.g. Evans, 1910) that the elephant's spine is relatively weak: for a 5 ton animal, their suggested load capacity is 750 pounds; 4 tons, 500 pounds; and 3 tons, 400 pounds. Corvanich (1979) indicated a load capacity of only 220 pounds, but we have found that saddle equipment alone may weigh that amount (Evans, 1910). Ferrier (1947) presents a table of load capacities for healthy animals in good condition and younger than 48 years of age; the table indicates that net weight (pads, saddle, riders, and incidental equipment) may be 600 pounds for young animals, height 6'6"; 700 lbs, ht.

7'0" (young animals); 900 lbs, ht. 7'0" (mature animals); 850 lbs, 7'6" (young animals); 980 lbs, 7'6"; 1080 lbs, 8'0"; maximum 1180 pounds for the largest animals. Other constraints Ferrier (1947) placed on load capacity were the gear (in this case the Sanderson guddee/guddela combination, discussed in our next paper) and the load added to that gear for an elephant walking on level ground for not more than 12 miles.

Corvanich (1979) indicated that strong sunshine is not conducive to good elephant health; most institutions replying to our questionnaires have some sun-shade. In Thailand, elephants are worked from 6 a.m. - noon, rested for the afternoon, and work 3 days on, 2 days off; in summer they cease work entirely. So for each work-year each elephant performs 160 6-hour days (Corvanich, 1979).

African elephants (Loxodonta africana) are also used in ride operations.

Elephants generally appear to be very nervous about strange and unusual noises (Hediger, 1964). Because the elephant is so large and potentially dangerous, the "riding ring" should be attached to the management facility. In addition, the ring barrier should be strong enough to restrain an excited animal. To reduce excitement, heavy and novel equipment must be restricted from the elephant area whenever rides or demonstrations are taking place.

Considerations -- Human

I. The Administrator's Perspective (written by D.E. Moore). Elephants are large, dangerous animals which are capable of killing a keeper/trainer, whether intentionally or unintentionally (Markowitz, 1982; Adams, 1981). Elephants may only accept certain keepers; it is in the best interest of the administrative staff, keeper/trainers and animals for the relationship between trainers and elephants to be as positive as possible (Hediger, 1964). The result of a positive working relationship is avoidance of accidents and simplified administration of the facility (Hediger, 1964; pers. obs.). Administrators should recognize that women, as well as men, make highly competent, responsible elephant trainers (Adams, 1981; pers. obs.).

Once keepers are selected, the management subcommittee should be formed so that guidelines for management and training routines will be established with the result that goals of the program are attained in the safest way possible. Each animal is an individual; thus, training techniques will be different for each elephant. They should however be standardized among all keeper/trainers (for each command, the keeper/trainers' body language, hand signals, voice intonation, and command "pressure point" -- hook placement -- should be constant among keeper/trainers). The subcommittee should meet periodically; this approach is important to insure long-term standardization of training techniques among all keeper/trainers and to insure that goals are being pursued and updated as necessary.

Administrators should also recognize that the keeper/trainer should have decision-making responsibility for the elephant program while he/she is

working the animal. Only a keeper/trainer who works with an animal on a daily basis will recognize the early signs of excitement (i.e., "high-headedness") and consequently be able to stop rides or demonstrations before the situation becomes a safety hazard. For this reason, keeper/trainers should have two-way radio communication with responsible administrators; the elephant staff may then be alerted quickly if, say, unscheduled heavy equipment is rolling through or past the zoo, and, conversely, may alert the administrative staff if rides or demonstrations must be stopped early (e.g., due to approaching thunderstorms).

Our primary responsibility is to our zoo visitors, and the keeper/trainers and loaders are the first stage in meeting this responsibility. A prime goal of the program is probably greater public awareness of the elephant program and therefore increased gate and concession sales, and not income directly from ticket sales; thus, we can ill-afford to alienate any of the people who desire rides. To enhance our capabilities to meet the goals of the program, administrators should provide adequate informational signage and public relations work before rides begin and before they end for the season. Ticket sales people and loaders, in cooperation with the keeper/trainers, control the time the rides stop on a daily basis and interact on a continuous one-to-one basis with the public. They must be able to maintain good public relations even when confronted with aggravating visitors under adverse conditions (e.g., hot days). In addition, this close keeper-public interaction represents an unique opportunity to educate the public about elephants and their plight in the wild and captive management of the species ("Why does that animal work when none of the others do?").

We cannot emphasize enough the importance of listening to the keeper/trainer's assessment of the safety of the situation and of administrative communication with the elephant program staff.

II. The Keeper/trainer's Perspective (written by C. E. Doyle). The keeper's perspective parallels management's viewpoint with the exception of order of priority. So I would like to give (in no particular order) this keeper's views on the subject of elephant rides.

The first question that must be asked before considering a ride operation is: "Are we capable of giving safe rides, and, if not, what must we do to develop the necessary capability?" Many zoos have started elephant management committees, as discussed above. Keeper participation allows open discussion on and decisions about training techniques needed for their particular animals. The committee should meet periodically to insure that training techniques are standard and that the goals are being pursued and updated in the best way possible (see above).

The second question that comes to mind is "Why ride"? Management lists many valid arguments for elephant rides, including increased revenues, public relations and educational opportunities. But for the keeper/trainer, these arguments are secondary to how giving rides affects his/her animals.

The exercise gained by working an elephant as a pack animal for a number

of hours each day cannot be measured without physiological research, but it is certainly more desirable than leaving the animal as an exhibit animal. Also, the commonly expressed concern about overwork can be put aside as long as good common (keeper) sense is applied.

The keeper must not be concerned only with the physical effects of riding but must also take into account the behavioral changes that may occur. I base my opinion on existing literature, conversations with "elephant people", and personal experience giving elephant rides in a zoo situation during the last four years. In my present situation, Siri, Burnet Park's 16 year old Asian female works approximately 5 months per season, 3½ hours per day, 5 times per week, weather permitting. We have a 6 month layoff due to our severe winter; so we are forced to start each riding season slowly to get Siri ready. She shows no real signs of resentment towards rides. Like any worker, man or animal, Siri has her good days and her bad days. Her bad days were much farther apart in her fourth year giving rides, and she still seems to enjoy the attention she receives from the public. Although she must work, she still has the same disposition she had 4 years ago. But I do admit she seems glad when the work day is over and she can swim and play in her pool; she does this almost every day for at least ½ hour.

In addition to my experience with Siri, Jan Lyon (keeper, Buffalo Zoo, New York) and I have worked with Lu, a 33 year old Asian female, at the Buffalo Zoo while Siri has been kept there. Initially, Lu was an easy-to-work-around, but inactive, "exhibit only" animal, and Jan increased Lu's activity through training and interacting with her. We have increased Lu's level of training, which has made her even more active, and the animal is now more vocal and "brighter" in the psycho-social sense (to be anthropomorphic, she seems much happier than she was before training).

The additional time spent with an elephant should help reinforce the keeper's control over his charges. It should also help in spotting any physical or behavioral changes, no matter how slight (see above). The keeper can view time spent giving rides as a negative, especially if other management needs are impacted. Rides cannot be allowed to interfere with the necessary basic maintenance of the animal; daily baths, foot care, off-exhibit training and demonstrations should not be pushed aside when rides are begun. Siri receives minimally one morning off each week so that we may continue proper foot and skin care.

Keepers also need to spend some time with their elephants when nothing is expected except basic good manners. If the animals only see their keepers during work situations, there is the possibility of resentment by association. (The zoo veterinarian is often faced with this problem, because the only time many animals see him is when some treatment is necessary -- vets should consider stopping by to give a "treat" apple or orange and some friendly words to elephants during their rounds.)

One of the aspects that is most difficult to understand about a ride operation is what it can do to a keeper's morale. When a keeper first starts

to give elephant rides, he/she may be nervous due to the responsibility of making rides a safe experience for the public. Once keeper and animal fall into the routine of rides, boredom sets in. This may be noticeable in the animals when there are no riders in line, but the elephants must be ready (saddled) to give rides in any event. If elephants have some hay and their keepers to amuse them, boredom at this time does not seem to be a problem. For the keeper, walking in circles around the ride ring may seem like an enviable position, but it can quickly turn into a very tedious, unpleasant task. If there are sufficient capable elephant keepers who can share the task, no one should get too complacent about remaining aware of the potential danger involved in a ride operation. Keeper/trainers and loaders have different jobs to do as the public mounts or dismounts and should not interact socially at this time but should pay particular attention to their work to maintain ride safety. We heartily recommend that sufficient depth be established in the keeper/trainer staff so they can be used in rotation to minimize boredom (and consequent increased danger potential) as suggested previously.

Time And Economics

If we assume most zoological parks in existence are, by Hediger's (1964) definition, "progressive" and therefore wish to, at the very least, increase elephants' activity through training, then that activity combined with routine maintenance (cleaning and feeding), may occupy five hours of the keeper/trainer's time each day. The institution is left with a 3 hour ride schedule; note that active training and foot care may be performed as a public demonstration. Assuming a temperate (seasonal) zoo and ride operation, minimally \$5,000 revenue per animal, keeper/trainers at \$8.00/hour and keeper/loaders at \$6.00/hour (each working the same hours during operation: $2 \times 3 \text{ hours} \times 7 \text{ days} \times 20 \text{ weeks} \times \$7.00 \text{ average keeper wage} = \text{US } \5880.00), and \$1,000 for liability insurance, then revenues do not meet expenditures for the ride operation alone (but see Hagler and Bear, 1983).

Hidden Benefits

A ride or demonstration operation will result in increased attendance and increased per capita concession sales due to increased per capita visits (because of increased interest in the now active elephants). Also, the Burnet Park Zoo is not alone in being an antiquated, inadequate management facility. The role of our elephant, Siri, and keeper staff interacting with concerned members of the public cannot be overstated. Siri was possibly the personality that affected the current capital project. The political climate in Central New York (State) had been anti-new zoo for over thirty years. Because a new United States Department Of Agriculture Veterinary Services Inspector enforced the physical requirements of the Animal Welfare Act, the zoo was threatened with closure (this is not a complaint - it was a welcome relief, ethically and politically). It was very possible, in the prevailing political climate at that time, that the zoo would have been shut down as a "negative asset" to the Central New York Community. However, concern for the elephant, who had arrived at Syracuse as a young animal, and then been housed

in inadequate facilities the entire time, was probably magnified as the public watched us progress through taking her outside for walks, establishing an outside "run" (chainlink yard where the elephant was chained to a cable but removed for working demonstrations), and finally establishing elephant rides. Political pressure by Siri's "friends", by people who stopped to watch the demonstrations and to interact with keepers afterwards, and by our Friends Of The Zoo organization (which raised the funds to construct a door large enough to allow Siri outside in the first place), changed the political climate to one which resulted in the on-going \$12 million capital improvements project. A cost/benefit analysis of elephant rides cannot, therefore, be based solely upon gross ride ticket receipts. Additionally, at least one institution gives a portion (10%) of ride ticket receipts to World Wildlife Fund. We cannot begin to assess the public relations benefit and possible benefit to wild elephant populations in comparison to the small cost involved (we should all consider the consequences of each institution contributing a small percentage of ride receipts to WWF - a small cost to us, a major benefit to WWF and elephants).

"Exploitation" - A Hidden Cost

Animal rides have been criticized, by keepers and "humaniacs" alike, as another form of animal exploitation. Although the criticism is made infrequently, we would like to address it as a "hidden cost". Certainly, whenever animals (including Man, by the way) are used to make money, the act meets Webster's secondary definition of "exploit" - "to make profit from the labor of others". As we have seen above, the profit margin in real dollars may, in fact, be non-existent. We feel the act of animal training and riding more closely meets Webster's primary definition of "exploit" - "(to) utilize productively"; that is, that training and riding (for profit or not) is clearly preferable to the unfortunate "exhibit only" policy in effect in too many zoos. Again, the costs, in keeper time, public relations, dollars, etc., are clearly outweighed by the benefits of improved animal health and well-being and in increased public awareness and concern for the species' plight in nature.

SUMMARY

1. Although over 200 Asian elephants are maintained in North American zoological parks, only a few of these animals (18 in this survey, which did not count circuses) perform in ride operations.
2. Elephant training allows the staff to perform important and necessary management procedures, for instance, routine skin and foot care.
3. Elephant demonstrations and rides reduce the inactivity and boredom typically observed in "highly organized" animals in captivity.
4. Regular training and concurrent observation increase the likelihood that keepers will observe the subtle changes in behavior indicative of deterioration in the animals' physical health.

5. Riding, and possibly some working demonstrations, can be considered aerobic activity which, as in humans, should result in better health and longer life.
6. Elephants used as ride animals should begin work at approximately age 15 years; if started earlier, developmental problems may result.
7. The elephant's spine is relatively weak. Load capacity as suggested here is based on height or adult weight: 5 Ton animal, 750 pound total load capacity; 4 Ton, 500 pound; 3 Ton, 400 pound.
8. Elephants need shade from the sun.
9. Full work capacity is reached between ages 25 and 50; for each work-year, each elephant in Thailand performs 160 6-hour days.
10. Elephant keeper/trainers may be male or female.
11. A zoo management committee should be formed to set goals and guidelines for any elephant training program and should meet on a regular basis after the program is started. Goals of the program must be attained in the safest way possible.
12. The keeper/trainer has major responsibility for his safety when working with the elephant and for public safety when giving rides.
13. Trained "ride elephants" may return more in other revenues and capital funding than is simply realized from elephant ride ticket sales.
14. One-to-one interactions of zoo staff and members of the public represent unique opportunities to educate the zoo-going public about elephants and other animals.
15. Costs of a ride operation include capital expenditures for the demonstration/ ride ring, saddle, and loading platform; costs also include program expenditures for personnel involved and for marketing.
16. The benefits derived from a complete elephant training/ride operation clearly outweigh costs incurred. Benefits include better animal health, the ride operation as an excellent marketing tool, and increased public awareness of the zoo and of elephants and their plight in nature.

ACKNOWLEDGMENTS

Thanks especially to David Raboy, Burnet Park Zoo Director; without his philosophical guidance and direction, our elephant program and new zoo would not have been realized. Thanks to the Buffalo Zoo staff, especially Director Minot Ortolani, Curator Gerald Aquilina, and Keeper Jan Lyon who has consistently provided excellent care for Siri and help in the training program and who has provided welcome information about the elephant "Lu".

Thanks to all our colleagues in the field who responded to the questionnaire, to Larry Joyner (New York Zoological Park, Bronx, New York) who has provided expertise and direction for our training techniques and saddle design, and to the staff of the New York Zoological Park for their professional know-how and hospitality. Thanks to David Gucwa who helped with questionnaire design. Finally, thanks to Lu and Siri.

LITERATURE CITED

- Adams, J. 1981. Wild elephants in captivity. Center For The Study Of Elephants, Carson (California), 201 pp.
- Carleton, R. A. (Chairman). 1981. Statement on exercise by American Heart Association Subcommittee on Exercise/Cardiac Rehabilitation. *Circulation*, 64:1302A.
- Corvanich, A. 1979. Elephant logging in Thailand. Pp. 70-75, in Report Of The FAO/Norway Training Course On Logging Operations. (Softley-Latini, J. ed.). FAO/UN, Rome, Italy.
- Eisenberg, J. F. 1980. Ecology and behavior of the Asian elephant. *Elephant (Suppl.)*, 1:36-56.
- Evans, G. H. 1910. Elephants and their diseases. Government Press, Rangoon (Burma), 343 pp.
- Ferrier, A. J. 1947. The care and management of elephants in Burma. Williams, Lea & Co., Ltd., London, 188 pp.
- Friedman, S. L. Gemlo, and R. Pawley. 1983. Animal training at Brookfield Zoo. *Brookfield Zoo Bison*, 1(1):13-16.
- Hagler, E., and T. Bear. 1983. Financial and other aspects of the elephant ride at The Kansas City Zoo. Pp. 13-24, in Proceedings of the Fourth Annual Elephant Workshop, Kansas City, Missouri, October 14-16, 1983, 121 pp.
- Hediger, H. 1964. Wild animals in captivity. Dover Publications, Inc. New York, 207 pp.
- Hunsaker, D. 1974. Behavior of animals in captivity. Pp. 141-150, in Centennial Symposium On Science And Research, Philadelphia Zoo. Hills Division Riviana Foods, Topeka (Kansas), 259 pp.
- ISIS. 1982. Species Distribution Report. December 1982. International Species Inventory System, Apple Valley (Minnesota), microfiche.
- Lash, S. 1982. Captive elephant population of North America: 1982 update. *Elephant*, 2(1):147-150.
- Markowitz, H. 1974. New methods for increasing activity in zoo animals; some results and proposals for the future. Pp. 151-162, in Centennial Symposium On Science And Research, Philadelphia Zoo. Hills Division Riviana Foods, Topeka (Kansas), 259 pp.
- Markowitz, H. 1982. Behavioral enrichment in the zoo. Van Nostrand Reinhold Co., New York, 210 pp.
- Markowitz, H., M. J. Schmidt, and A. Moody. 1978. Behavioral engineering and animal health in the zoo. *Int. Zoo Yb.*, 18:190-194.
- Staehr, B., G. Kolitsch, and H. Bensch. 1981. Effects of regular movement on performance of insemination boars. *Monatsh Veterinaermed.*, 36(17): 660-663. (In German with English summary).