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BEHAVIORAL MODULATORS IN ZOOLOGICAL SPECIES

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Behavioral modulators are sometimes employed in zoological species to minimize or limit aggression; achieve tranquilization or calming for treatment, relocation, or shipment; facilitate introductions between animals; minimize stereotypic behaviors; achieve mild sedation prior to darting of excitable animals; or as an anxiolytic for individuals experiencing temporary stressful episodes. The use of these medications is an ancillary step, and not a substitute for inadequate exhibits, maintenance of incompatible animal pairings, animal management shortcomings, or severe behavioral abnormalities.

Medications used for behavior modification in zoos include the benzodiazepines (diazepam), phenothiazines (chlorpromazine), both short acting butyrophone neuroleptics (haloperidol, azaperone) and long acting neuroleptics (perphenazine enanthate, pipothiazine palmitate, fluphenazine decanoate, zuclopenthixol decanoate or acetate, and flupenthixol decanoate), progestogens (megestrol acetate, medroxyprogesterone acetate), gonadotropin hormone releasing hormone agonists (leuprolide acetate or deslorelin implants), and selective serotonin uptake inhibitors (fluoxetine). Benzodiazepines induce sedation, muscle relaxation and relief of anxiety. Phenothiazines result in tranquilization through depression of the central reticular activating system. Progestogens are anti-estrogenic, suppress testosterone levels, and eliminate cyclic ovarian activity. Gonadotropin hormone releasing agonists are long acting and reversible. Administration results in an initial increase in follicle stimulating hormone and luteinizing hormone causing transiently elevated reproductive hormone levels, followed by a progressive suppression that results in reducing circulating hormonal levels to those of a neutered animal. The butyrophone neuroleptics cause tranquilization and sedation through inhibition of central dopamine and norepinephrine while the long acting neuroleptics have a sustained duration of effect due to repositil preparations.

Aggression control can be attempted by treatment with diazepam, haloperidol, or long acting neuroleptics. If aggression is hormonally influenced, treatment with progestogens or gonadotropin releasing hormone agonists may be of assistance. In this case the aggression may be related to the cyclic changes associated with the reproductive cycle, with either females exhibiting changed behavior associated with their endogenous hormonal changes or by males exhibiting testosterone related aggression during this time.

Short acting and long acting neuroleptics are commonly utilized to achieve tranquilization or calming in transiently stressful situations and are frequently combined to exert both an immediate and a prolonged effect. These include situations when repeated handling or darting is necessary for treatment, animals are relocated within the zoo to new exhibits or holding areas, or animals are shipped to another institution. Nervous or excitable species or individuals may not respond to these temporary episodes as well as other conspecifics and for these individuals the stress associated

with these procedures for can be decreased through the use of appropriate pharmacologic intervention.

When attempting to introduce aggressive animals it is sometimes advisable to administer short acting neuroleptics alone, or in combination with long acting neuroleptics.

The use of azaperone in non-domestic suids (babirusa, red river hogs) has been very successful at facilitating introductions of initially incompatible animals in several zoos. Medical treatments to assist with introductions must be performed concurrently with optimal animal management procedures such as gradual familiarization of the animals to be introduced and appropriate timing of the introduction relative to the reproductive cycle to be most effective.

Expressions of stereotypic behaviors in zoological species are complicated phenomena. When they occur, they need to be addressed at many levels, including behavioral and environmental enrichment, animal management steps, adjustments in the social structure of the group, and occasionally by pharmacologic therapy. Fluoxetine has been used successfully to minimize stereotypic pacing in polar bears and other stereotypic behaviors in non-domestic felids. Short acting neuroleptics alone, or in combination with long acting neuroleptics, have also been used to minimize stereotypic behaviors.

Animals, especially the great apes (orangutan, gorilla, and chimpanzee) may become quite excitable prior to darting. Premedication with diazepam may be helpful in calming to decrease the anxiety associated with the procedure and to facilitate easier darting that is less stressful for both the animal and the clinician.

Animals that are anxious due to acclimation to a new exhibit, new enclosure mates, or undetermined causes may be treated with chlorpromazine, diazepam, haloperidol, or long acting neuroleptics in an attempt to decrease their anxiety. Frequently, higher doses will initially be required to achieve an appropriate effect with subsequent tapering of doses to gradually wean the animal off the medication.

Although behavioral modulators are frequently employed in zoological species, the frequency of use greatly exceeds the specific published reports of these treatments. Prior to initiation of therapy, it is recommended that the practitioner not only review published literature, but also to contact an experienced zoological veterinary practitioner for recommendations of appropriate drugs and doses for the specific species, situation, and desired effect. In addition, there is individual variation in response to these medications so it is frequently necessary to adjust doses and tailor the dose based upon the individual animal response.

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