DEVELOPMENT OF A QUALITY-OF-LIFE ASSESSMENT PROTOCOL FOR AGED RUMINANTS AND CAMELIDS IN ZOOS BASED ON A REVIEW OF GERIATRIC ZOO ANIMAL WELFARE

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INTRODUCTION

- Improvements in veterinary care, husbandry and nutrition
- Extended **longevity of zoo animals**
- Increase in **age-related diseases**, which tend to be chronic and painful
- Compromised **quality-of-life** of aged zoo animals
- Growing need for objective and animal-based tools to assess the welfare of geriatric animals in zoos

OBJECTIVES

1. Review the available scientific information about geriatric zoo animal welfare, in particular age-related diseases, focusing on ruminant and camelid species.

2. Develop a protocol to assess the welfare of aged ruminants and camelids in zoological settings.

ZOO ANIMAL WELFARE

- Animal welfare: **physical health, behaviour, emotional state**
- Assessment: **Five Domains Model** ⟶ health, nutrition, behaviour, environment and mental state
- **Zoological setting**: challenging !!!
  - Diversity of zoo species and facilities
  - Limited information about the biology of species

BIOLOGY OF RUMINANTS AND CAMELIDS

- **Even-toed ungulates**
- Type of **nutrition**: grazers, intermediate feeders, browsers
- Highly **social** and **gregarious** animals
- Handling and restraint: behavioural, chemical, physical

AGE-RELATED DISEASES

- **Any body system**: musculoskeletal system, gastrointestinal tract, nervous system, eyes, urogenital structures...or multisystemic
- The most important diseases in ruminants and camelids are:

DENTAL DISEASES	DISEASES CAUSING LAMENESS
Abnormal tooth wear Dental attrition Periodontal disease	Degenerative joint disease Osteoarthritis Laminitis

Figure 1. Most common age-related diseases in geriatric ruminants and camelids with some examples of primary causes

- Chronic conditions have **impacts on:**
  - **Health**: pain, limited mobility, poor body condition
  - **Behaviour**: aggressions from other herd members, difficulty in the access to resources

DISCUSSION

- **Subjectivity** of the observer
- More research on species-specific **biology** and **social behaviour**
- Lack of species-specific **husbandry guidelines**
- Further understanding about **age-related chronic and painful conditions** in geriatric zoo ruminants and camelids

QUALITY-OF-LIFE ASSESSMENT PROTOCOL

A.DAILY QUESTIONNAIRE

Objectives:
- **Daily monitoring** of the welfare of old captive ruminants and camelids through a fast and simple questionnaire
- Alert system to detect welfare concerns

Observers: **Zoo keepers**
Frequency: **Daily**
Questionnaire: 10 questions. Rate from 0 to 4 the animal's...

1.Attitude/mood
2.Ease in rising from a recumbent position
3.Ease of movement after overnight sleep
4.Willingness to interact with the keeper
5.Overall mobility
6.Ease in lying down
7.Appetite
8.Faeces (consistency)
9.Presence of fluid discharges
10. Presence and degree of lameness

B.EXHAUSTIVE PROTOCOL

Objectives:
- Assess the aged animal's quality-of-life through a more **detailed** and **complete** form
- Aid decision-making involving management, end-of-life planning, anaesthesia or even euthanasia of the animal

Observers: **Veterinarians** and/or **curators**
Frequency: **6 months-1 year**
Protocol: 4 principles, 11 criteria, 28 indicators.

PRINCIPLES	CRITERIA	INDICATORS
Good feeding	1.Absence of prolonged hunger	1.1.Body condition
	2.Absence of prolonged thirst	2.1.Number of water points 2.2.Availability of water 2.3.Cleanliness of the water points
	3.Adequate forage intake	3.1.Quantity of forage 3.2.Quality of forage
Good housing	4.Thermal comfort	4.1.Availability of shade 4.2.Availability of shelter
	5.Ease of movement	5.1.Enclosure size (area) 5.2.Square meters available per animal
Good health	6.Absence of injuries	6.1.Lameness 6.2.Integument alterations
	7.Absence of diseases	7.1.Nasal discharge 7.2.Ocular discharge 7.3.Difficulty breathing 7.4.Diarrhoea 7.5.Stiffness of gait 7.6.Hoof/nail overgrowth 7.7.Presence of swelling/deformity 7.8.Prolonged recumbency
Appropriate behaviour	8.Expression of social behaviour	8.1.Affiliative behaviour 8.2.Target for intra-specific aggressions 8.3.Isolation from the group
	9.Group size	9.1.Number of animals 9.2.Composition of the group
	10.Expression of other behaviours	10.1.Stereotypies 10.2.Environmental enrichment program
	11.Good human-animal relationship	11.1.Medical training program 11.2.Capture, immobilization and handling

Table 1. Principles, criteria and indicators of the protocol to assess quality-of-life in geriatric zoo ruminants and camelids

CONCLUSION

- Dental and musculoskeletal conditions are the most common age-related diseases in ruminants and camelids.
- The protocol to assess the welfare of aged ruminants and camelids in zoos could enable the detection of early signs of poor welfare and aid decision-making regarding end-of-life planning and euthanasia.

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