

Assessment of welfare of dromedary camels kept under pastoralism in Pakistan

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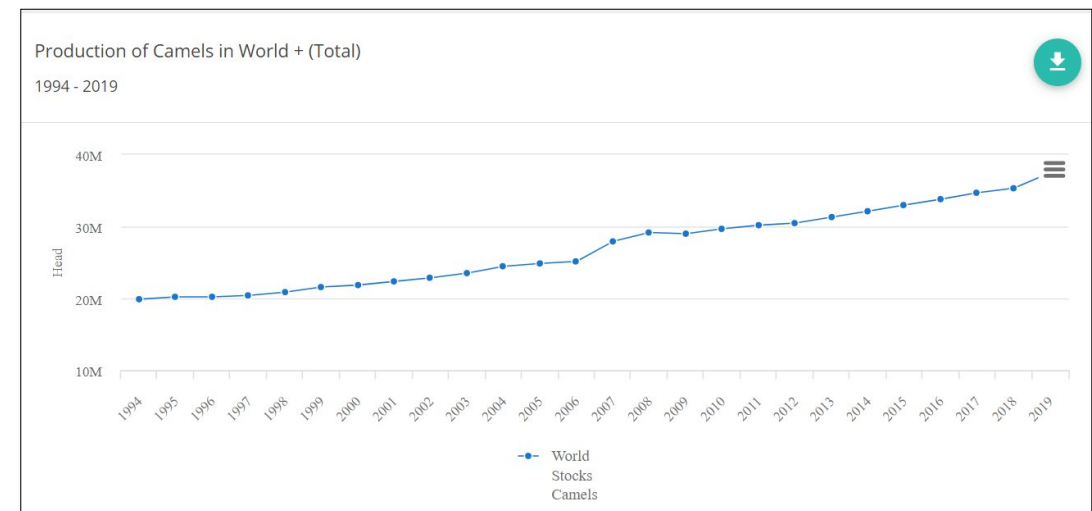
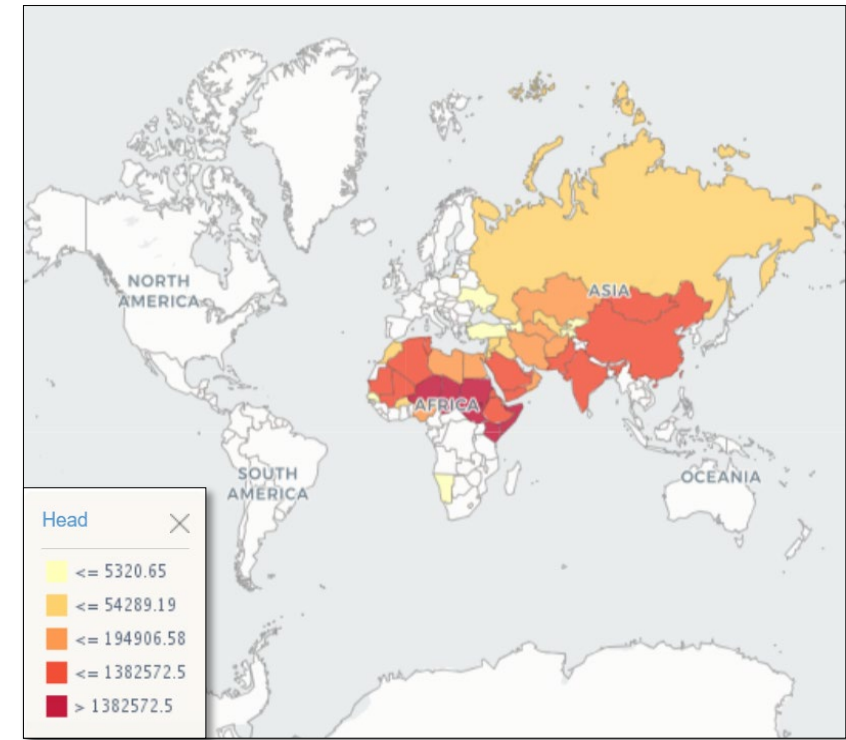


Animal welfare science

- Welfare is a term that describes a potentially measurable quality of a living animal at a particular time and in a scientific concept.
- The assessment of welfare requires a multi-dimensional approach and aims to determine the actual welfare of animals, including both physical and mental states, using environmental- (EBM) and animal-based (ABM) measures

Importance of the camel today

- Around 38 million heads (FAOstat 2019)
- Growing trend
- Camel is a multipurpose animal able to adapt to climatic changes
- Scientific interest in the camel is growing
- Studies are still quantitatively marginal compared to other species
- Very few papers on welfare
- No camel welfare standards



Protocol for intensive and semi-intensive husbandry systems

- We proposed a protocol for assessing welfare in camels reared in intensive or semintensive farming systems conceived by the idea of adapting criteria and principles of Welfare Quality, AWIN and the Five Domains protocols to this peculiar species

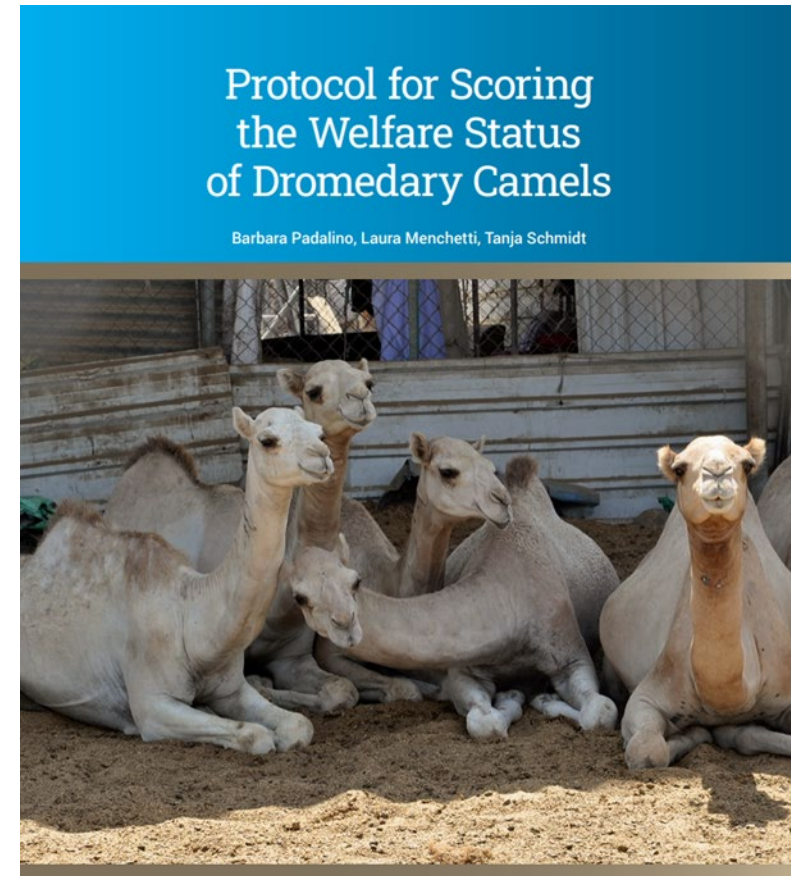


The First Protocol for Assessing Welfare of Camels

Barbara Padalino and Laura Menchetti*

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User-friendly booklet

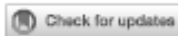


Protocol for camels kept in extensive husbandry systems

- We developed a novel protocol for assessing welfare in camels reared in pastoralist nomadic environments. Welfare principles and indicators were adapted from the existing protocol for assessing welfare in dromedary camels raised in intensive and semi-intensive systems to suit the unique conditions of camel pastoralism

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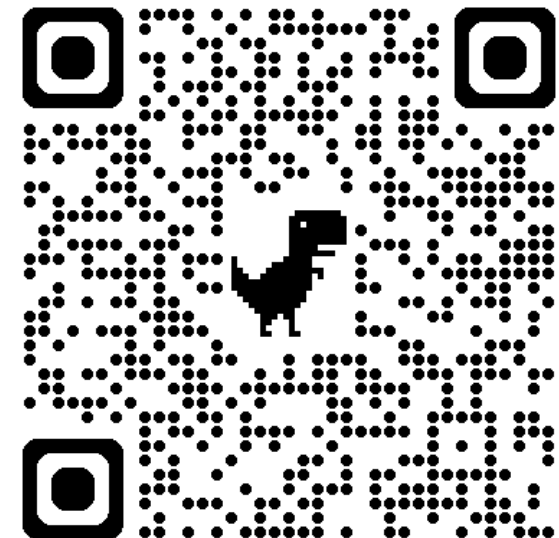
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The first protocol for assessing the welfare of dromedary camels (*Camelus dromedarius*) kept under nomadic pastoralism

Barbara Padalino^{1,2*} and Laura Menchetti³



Aim

- Our aim was to apply the protocol and assess the welfare of dromedary camels kept under pastoralism in Pakistan.

Materials and methods

- A total of 44 welfare indicators (animal-, resource, and management-based indicators) aligning with animal welfare principles ('Good Feeding,' 'Good Housing,' 'Good Health,' and 'Appropriate Behavior') were gathered into two assessment levels: 'Caretaker-Herd level' and 'Animal level'.

Protocol for assessing welfare of dromedary camels in nomadic pastoralist settings

First contact with camel herd manager/owner



1. During this initial meeting, the welfare protocol's objectives and methods are elucidated, and permission to implement the assessment protocol is obtained.
2. The number of dromedary camels to be individually assessed for their welfare at each herd is determined.

Scoring of indicators included at Caretaker-Herd level



Face-to-face
interview
with herd
manager
/owner

Good Feeding

Good Housing

Good Health

Appropriate Behavior

Direct evaluation of
caretaker's attitudes
in animal handling
+
Appropriate Behavior



Scoring of indicators included at Animal level



Appropriate
Behavior

Good
Housing

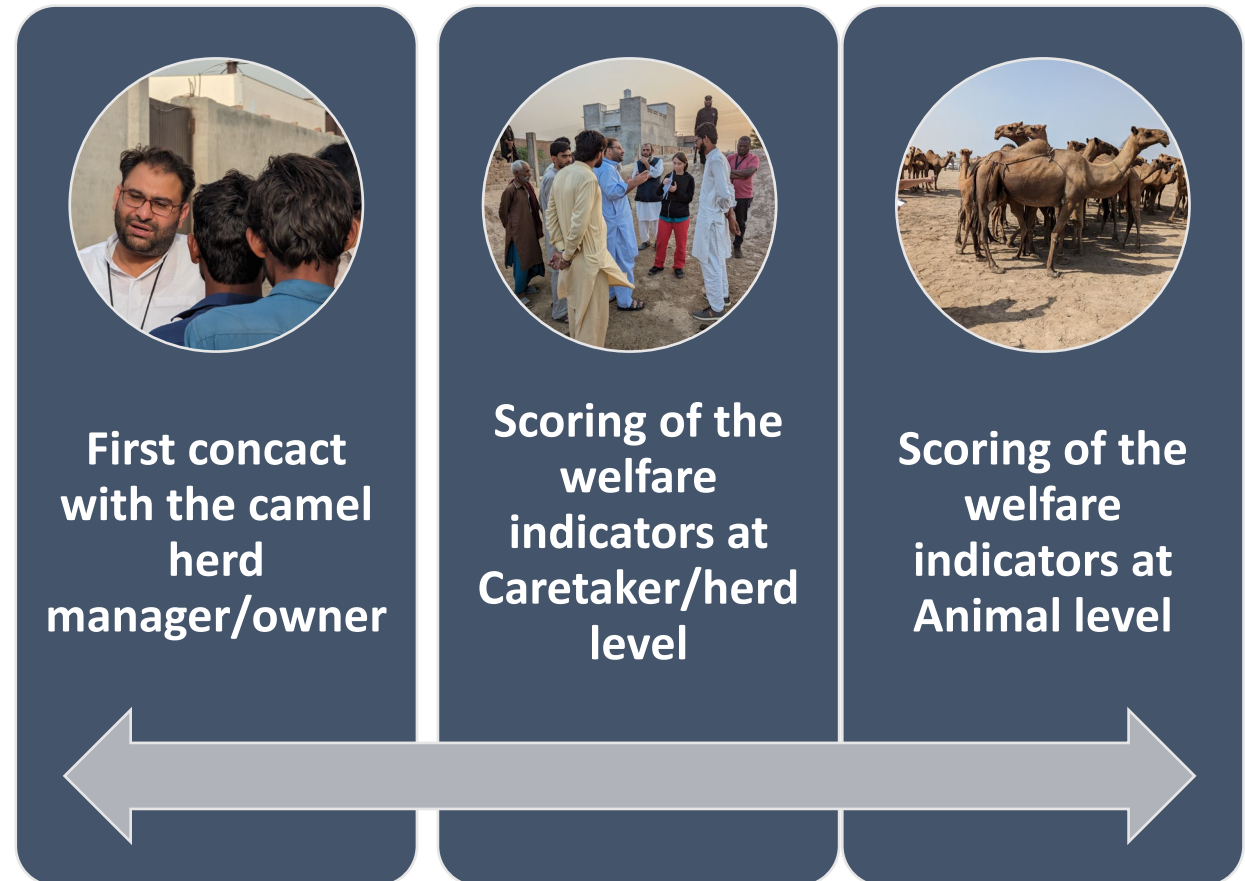
Good
Feeding

Good
Health



Materials and methods

- Data were collected in 2023 in the Cholistan desert in the southern Punjab province.
- A total of 54 herds for a total population of 1186 camels, of which 510 (495 females and 15 males; average age: 5-6 years old) at Animal-level, were evaluated



Equipment required

- weather stations
- meters, thermometers, anemometers
- evaluation/recording sheets, pens, markers
- stop-watches



Caretaker-Herd level recording sheet

Recording sheet to use during the dromedary camel welfare assessment at the Caretaker-Herd level.

Questions are split accordingly with each welfare principle and possible answers are scored on a three-point scale where 0 is the best welfare condition

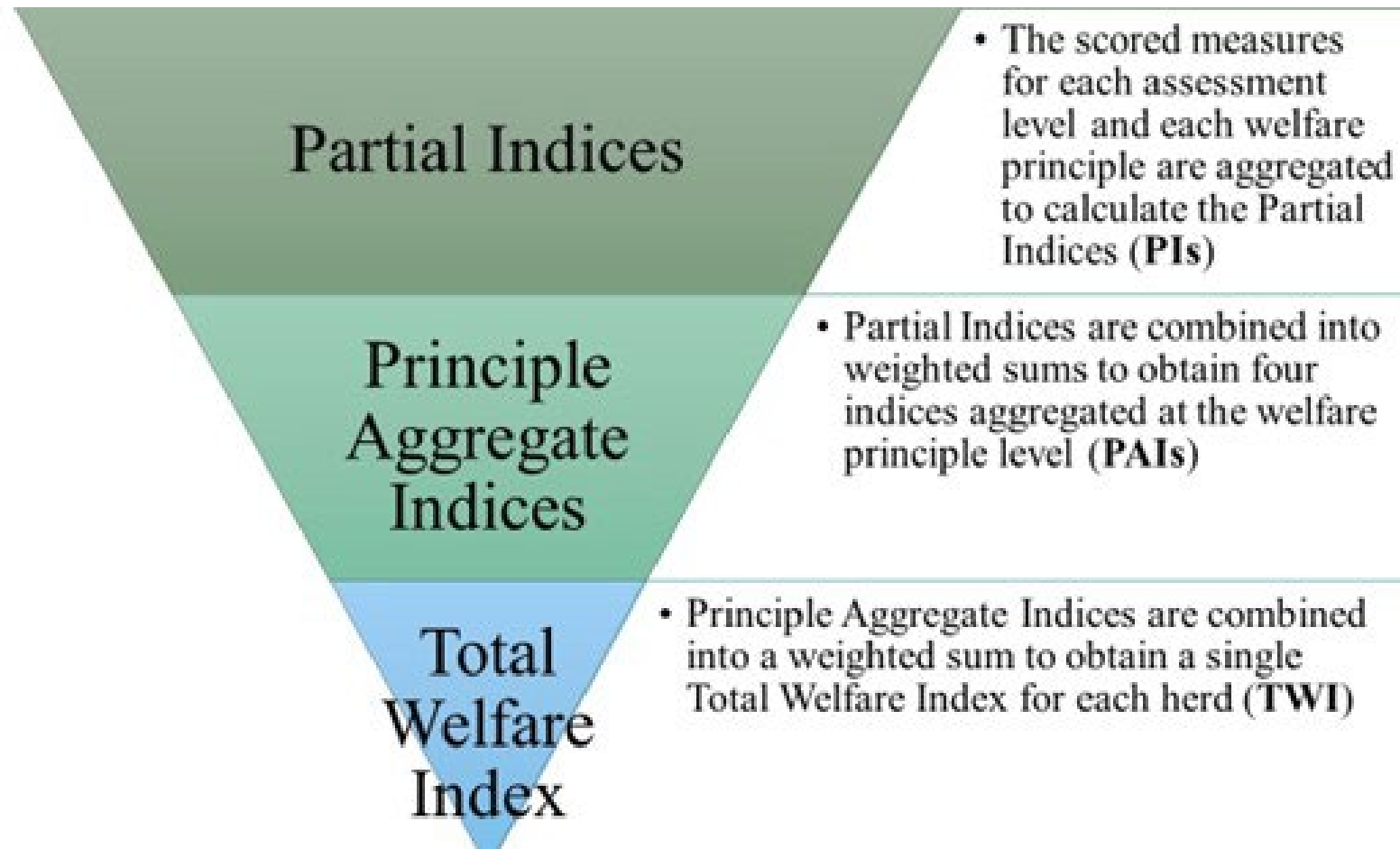
Day a time:	Location:	Season:	Temperature: Humidity:	Lux:
Principle	Question/welfare indicator	Answer/observation	Scoring scale	Notes
Good Feeding	How often do you feed the camels?	Grazing for around 10-12 h per day + supplementation	0	
		Only grazing for 10-12 h per day	1	
		Only grazing for less than 6-8 h per day	2	
	How often do you water the camels?	Always available	0	
		Available more than once daily	1	
		Available less than once daily	2	
Total Observed Score for Good Feeding at Caretaker-Herd level				
Good Housing (Environment)	Do camels have a resting place overnight?	Yes	0	
		No	2	
	How many adult animals do you have in your herd? ^{1,2}	<30 camels (Small size)	0	
		>30 camels (Large size)	2	
	Do the camels have access to shaded areas?	Free access during the whole day	0	
		For a short period of time per day	1	
		Never	2	
	Do you practice any type of predator control? ³	Yes	0	
		No	2	
Total Observed Score for Good Housing at Caretaker-Herd level				
Good Health	Who routinely assesses the camel’s health?	A veterinarian	0	
		A non-veterinarian	1	
		Not conducted	2	
	Who treats the camels when they are sick?	A veterinarian	0	
		A non-veterinarian	1	
		Not conducted	2	
	Are vaccinations routinely conducted?	Yes	0	
		No	2	
	Is deworming routinely conducted?	Yes	0	
		No	2	
		A non-veterinarian	1	
		Not conducted	2	
	What is the 1-year-old calf mortality rate? ^{4,5,6,7,8,10,11}	Below 10 %	0	
		Over 10 %	1	
		Records not available ⁹	2	
	Do you identify your animals?	Yes, using non-invasive methods	0	
		Yes, using pain-induced practices	1	
		No ⁹	2	
	Do your animals have the possibility to contact with other livestock herds (commingling)?	No	0	
		Ratherly	1	
		Yes	2	
Total Observed Score for Good Health at Caretaker-Herd level				
Appropriate Behavior	Do you have any aggressive/dangerous animals in your herd?	No	0	
		Yes, but only during the breeding season	1	
		Yes	2	
	How many years of experience in handling camels do you have?	More than 10	0	
		Between 5 and 10	1	
		< 5 years	2	
	What is the ratio between number of caretakers and	Ratio ≥ 0.05	0	
		Ratio < 0.05	2	

Animal-level recording sheet

- Recording sheet to use during the dromedary camel welfare assessment at the Caretaker-Herd level.
- EBM's and ABM's are split accordingly with each welfare principle and possible answers are scored on a three-point scale where 0 is the best welfare condition

Principle	Welfare indicator	Observation	Scoring scale	Note
Good Feeding	Food availability	Yes, and of good quality	0	
		Yes, but of low quality	1	
		No	2	
	Water availability	Yes, fresh and clean water is available	0	
		Yes, but of low quality (e.g. dirty, warm)	1	
		No	2	
	Body Condition Score (BCS)	BCS=3 (good body condition)	0	
		BCS=2 or BCS = 4 (Moderate body condition)	1	
		BCS=0-1 or BCS=5 (cachexia or obesity)	2	
	Total Observed Score for Good Feeding at Animal level			
Good Housing (Environment)	Currently available shade	Yes	0	
		No	2	
	Risk of injury/foreign body (e.g. presence of rubbish and other foreign objects which could be eaten or could injury the camel)	No	0	
		Yes	2	
	Presence of ectoparasites	No	0	
		Yes	2	
	Camel coat cleanliness	Clean	0	
		Partially clean	1	
		Dirty	2	
	Tethered	No	0	
		Yes	2	
	Restrained into two/three legs	No	0	
		Yes	2	
	Hobbled	No	0	
		Yes	2	
	Voluntary resting behavior	Yes	0	
		No	2	
	Total Observed Score for Good Housing at Animal level			
Good Health	Presence of bleeding	No	0	
		Yes	2	
	Presence of injury (open wounds)	No	0	
		Yes	2	
	Presence of swollen joints	No	0	
		Yes	2	
	Presence of lameness	No	0	
		Yes	2	
	Presence of skin disorders	No	0	
		Yes	2	
	Presence of discharge (nose, eye, vulva)	No	0	
		Yes	2	
	Presence of diarrhoea	No	0	
		Yes	2	
	Presence of respiratory disorders	No	0	
		Yes	2	
	Presence of other health disorders*	No	0	
		Yes	2	
	Presence of pain-induced management practices	No	0	
		Yes	2	

3-step process of scoring and aggregation



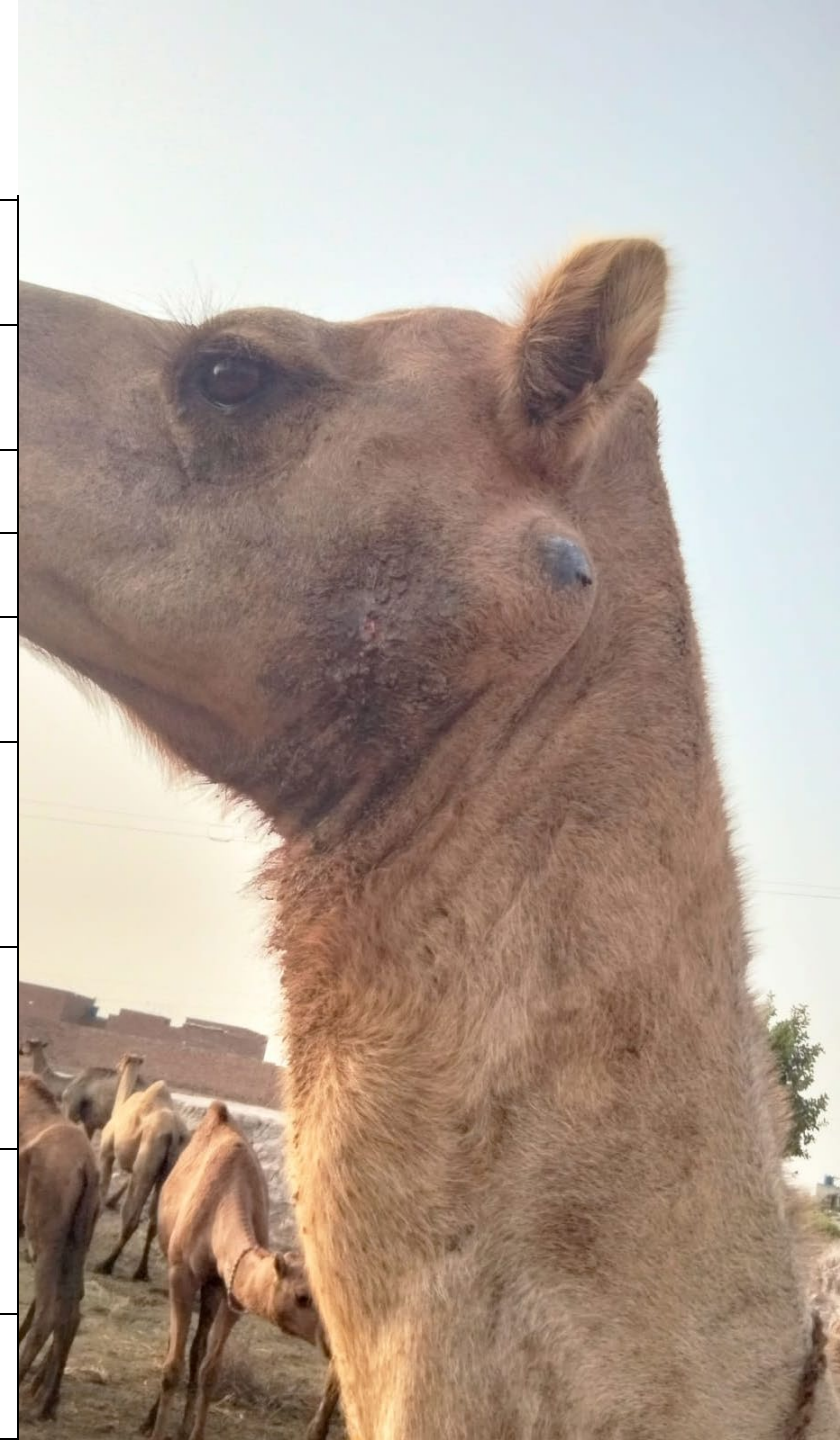
Results at caretaker-herd level

Welfare principle	Question/Welfare indicator	Answer/Observation	Scoring scale	Number	Percentage	P value
Good Feeding	How often do you feed the camels?	Grazing for around 10-12 h per day + supplementation	0	10	18.5	<0.001
		Only grazing for 10-12 h per day	1	36	66.7	
		Only grazing for less than 6-8 h per day	2	8	14.8	
	How often do you water the camels?	Always available	0	0	0	-
		Available more than once daily	1	54	100	
		Available less than once daily	2	0	0	
Good Housing	Do camels have a resting place overnight?	Yes	0	21	38.9	0.134
		No	2	33	61.1	
	How many adult animals do you have in your herd?	<30 camels (<i>Small size</i>)	0	46	85.2	<0.001
		>30 camels (<i>Large size</i>)	2	8	14.8	
	Do the camels have access to shaded areas?	Free access during the whole day	0	0	0	<0.001
		For a short time period of time per day	1	7	13	
		Never	2	47	87	
	Do you practice any type of predator control?	Yes	0	54	100	-
		No	2	0	0	



Results at caretaker-herd level

Good Health	Who routinely assess the camel's health?	A veterinarian	0	6	11.1	<0.001
		A non-veterinarian	1	48	88.9	
		Not conducted	2	0	0	
	Who treats the camels when they are sick?	A veterinarian	0	6	11.1	<0.001
		A non-veterinarian	1	48	88.9	
		Not conducted	2	0	0	
	Are vaccinations routinely conducted?	Yes	0	54	100	-
		No	2	0	0	
	Is deworming routinely conducted?	Yes	0	6	11.1	<0.001
		No	2	48	88.9	
	What is the 1-year-old calf mortality rate?	Below 10 %	0	0	0	-
		Over 10 %	1	0	0	
		Records not available ⁹	2	54	100	
	Do you identify your animals?	Yes, using non-invasive methods	0	21	38.9	<0.001
		Yes, using pain-induced practices	1	33	61.1	
		No ⁹	2	0	0	
Appropriate Behavior	Do you have any aggressive/dangerous animals in your herd?	No	0	32	59.3	<0.001
		Yes, but only during the breeding season	1	0	0	
		Yes	2	22	40.7	
	How many years of experience in handling camels do you have?	More than 10	0	54	100	-
		Between 5 and 10	1	0	0	
		< 5 years	2	0	0	



Results at Animal-Level

Welfare principle	Welfare indicator	Observation	Scoring scale	Number	Percentage	P value*
Good Feeding	Food availability	Yes	0	352	69	<0.001
		No	2	158	31	
	Water availability	Yes	0	89	17.5	<0.001
		No	2	421	82.5	
	Body Condition Score	BCS=3 (good body condition)	0	180	35.3	<0.001
		BCS=2 or BCS = 4 (moderate body condition)	1	267	52.4	
		BCS=0-1 or BCS=5 (cachexia or obesity)	2	63	12.4	



Welfare principle	Welfare indicator	Observation	Scoring scale	Number	Percentage	P value*
Good Housing	Currently available shade	Yes	0	41	8	<0.001
		No	2	469	92	
	Risk of injury	No	0	445	87.3	<0.001
		Yes	2	65	12.7	
	Presence of ectoparasites	No	0	391	76.7	<0.001
		Yes	2	119	23.3	
	Camel coat cleanliness	Clean	0	375	73.5	<0.001
		Partially clean	1	112	22	
		Dirty	2	23	4.5	
	Tethered	No	0	488	95.7	<0.001
		Yes	2	22	4.3	
	Restrained into two/three legs	No	0	365	71.6	<0.001
		Yes	2	145	28.4	
	Hobbled	No	0	486	95.3	<0.001
		Yes	2	24	4.7	
	Voluntary resting behavior	Yes	0	143	28	<0.001
		No	2	367	72	



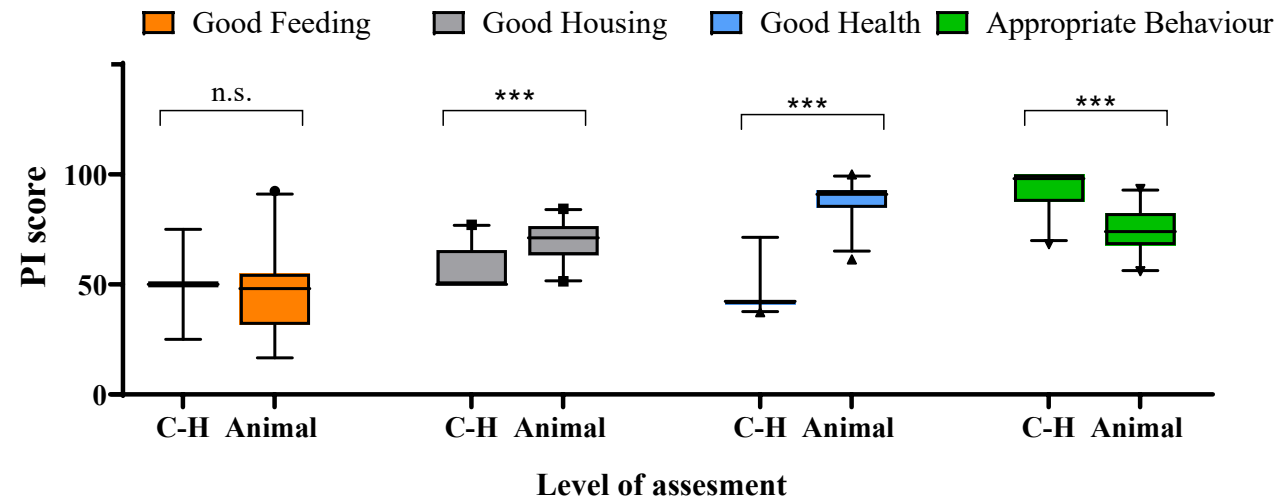
Welfare principle	Welfare indicator	Observation	Scoring scale	Number	Percentage	P value*
Good Health	Presence of bleeding	No	0	477	93.5	<0.001
		Yes	2	33	6.5	
	Presence of injury (open wounds)	No	0	459	90	<0.001
		Yes	2	51	10	
	Presence of swollen joints	No	0	495	97.1	<0.001
		Yes	2	15	2.9	
	Presence of lameness	No	0	507	99.4	<0.001
		Yes	2	3	0.6	
	Presence of skin disorders	No	0	329	64.5	<0.001
		Yes	2	181	35.5	
	Presence of discharge (nose, eye, vulva)	No	0	370	72.5	<0.001
		Yes	2	140	27.5	
	Presence of diarrhoea	No	0	499	97.8	<0.001
		Yes	2	11	2.2	
	Presence of respiratory disorders	No	0	507	99.4	<0.001
		Yes	2	3	0.6	
	Presence of other health disorders	No	0	425	83.3	<0.001
		Yes	2	85	16.7	
	Presence of pain-induced management practices (cauterization, branding, nose pag, mutilation)	No	0	358	70.2	<0.001
		Yes	2	152	29.8	
	Evident pain	No	0	493	96.7	<0.001
		Yes	2	17	3.3	



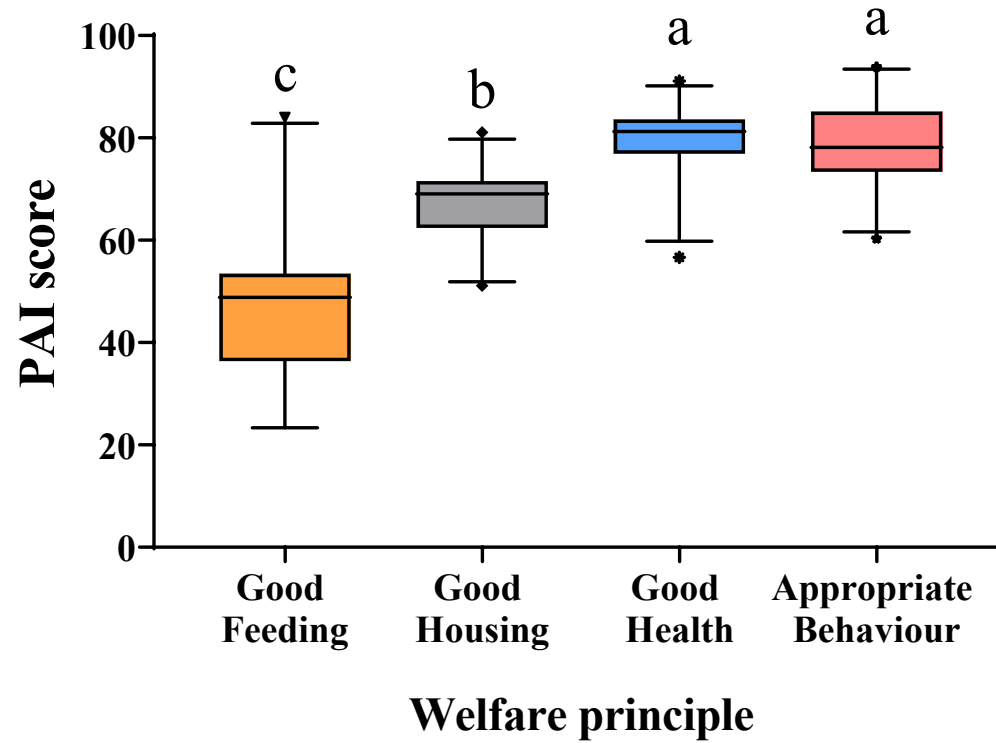
Welfare principle	Welfare indicator	Observation	Scoring scale	Number	Percentage	P value*
Good Health	Presence of bleeding	No	0	477	93.5	<0.001
Appropriate Behavior	Positive social camel-camel interactions (cow-calf contact, allogrooming, sniffing)	Yes	0	339	66.5	<0.001
		No	2	171	33.5	
	Aggressive camel-camel interactions	No	0	500	98	<0.001
		Yes	2	10	2	
	Stereotypies	No	0	508	99.6	<0.001
		Yes	2	2	0.4	
	Feeding or rumination	Yes	0	207	40.6	<0.001
		No	2	303	59.4	
	Approaching test	Positive	0	272	53.3	<0.001
		Neutral	1	151	29.6	
		Negative	2	87	17.1	



Partial indices at Level assessment



Principle aggregate indices (PAIs)



Classification of camel units

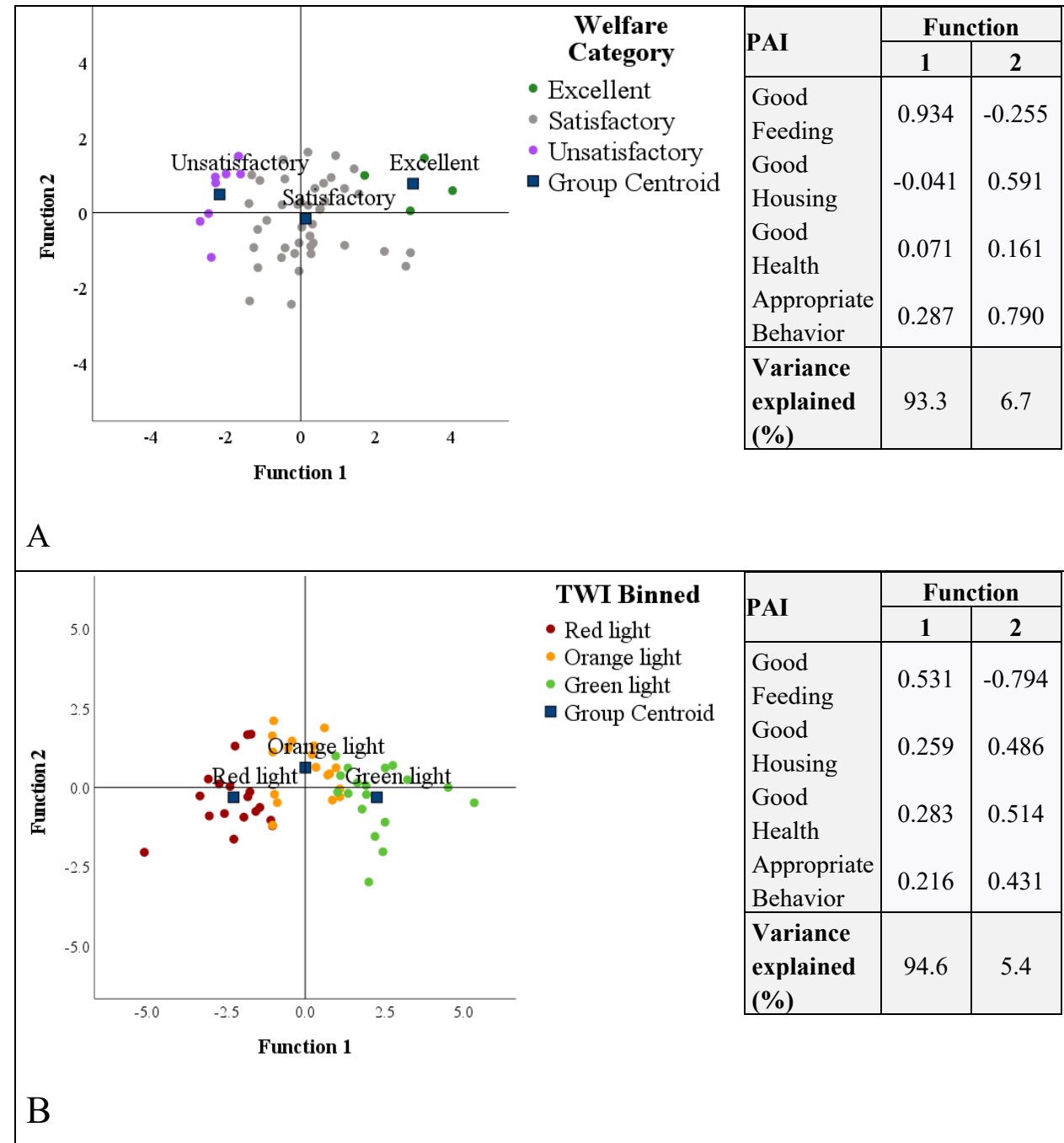
Welfare category	Criteria	Number of herds
Excellent	>60 for each PAI and >80 for at least two PAIs	4
Satisfactory	>30 for each PAI and >60 for at least three PAIs	42
Unsatisfactory	>20 for each PAI and >30 for at least three PAIs	8
Unacceptable	Failure to meet the abovementioned criteria	0

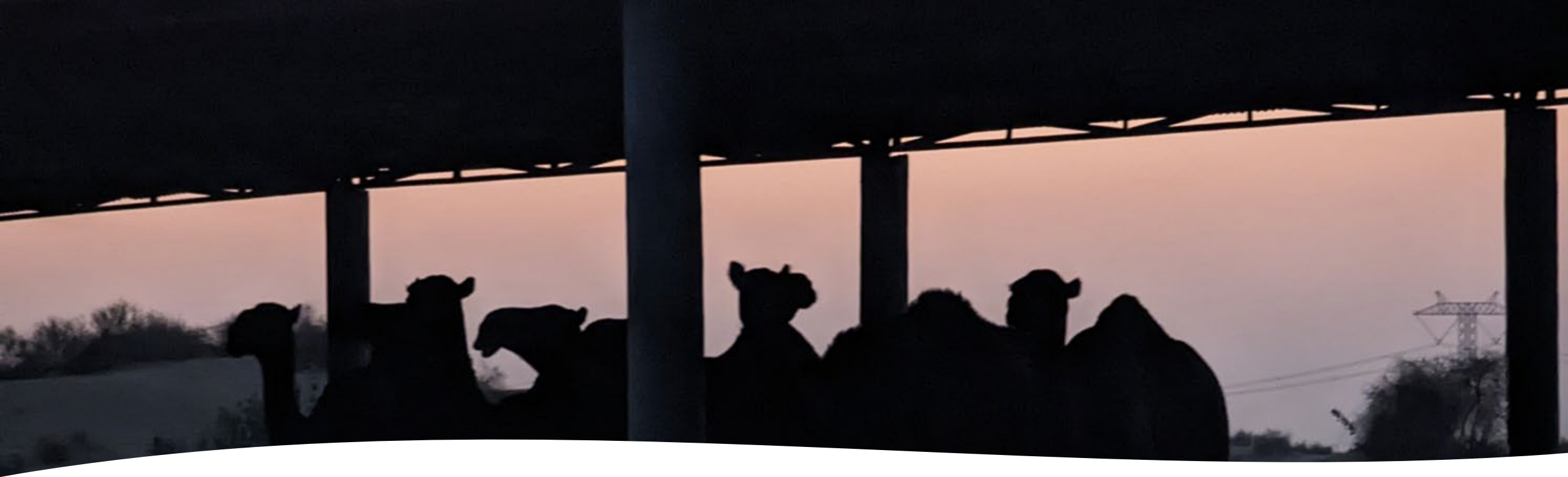
MCA analysis

The figure shows the discriminant scores of the DAs carried out to identify the most important variables in the classification according to the "welfare profiles system" (Panel A) and "light traffic system" (Panel B).

The first functions extracted explained more than 90% of the variance for both systems, and it had the highest coefficients for the Good Feeding variable. This suggests that this PAI was the most influential variable in classifying herds.

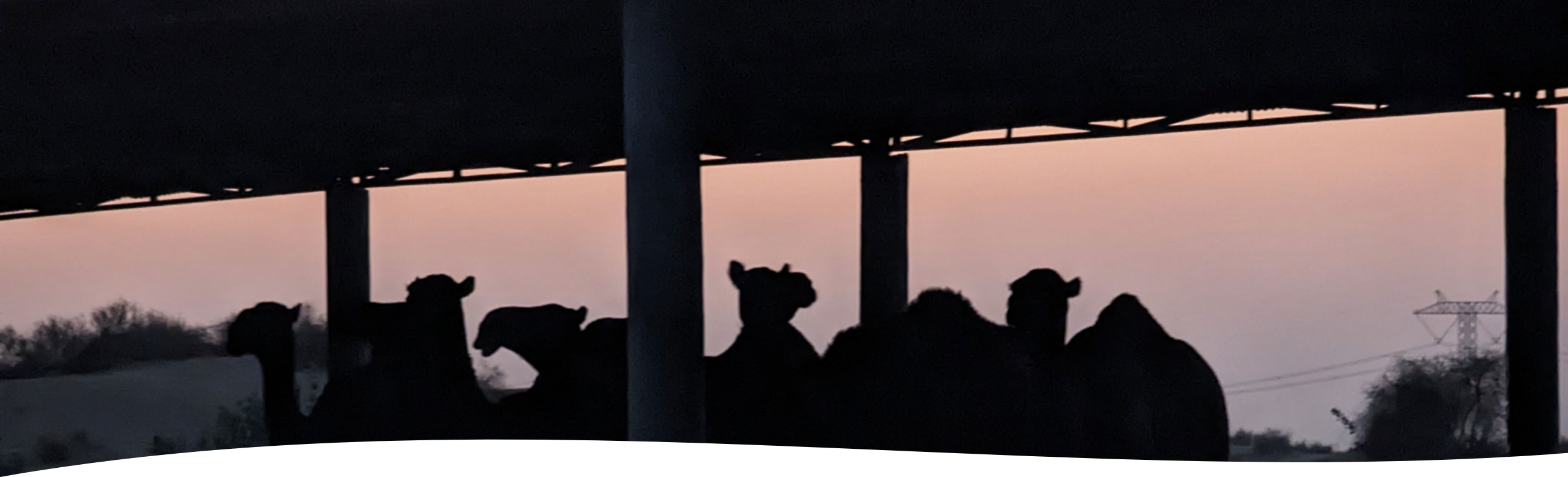
The coefficients of Good Feeding variable were positive, as well as the centroids for both the Excellent and Green light categories indicating that herds having high scores for Good Feeding PAI could achieve the highest levels of welfare





Conclusions

- The camels had a better level of welfare compared to those reported in the literature for intensive systems. However, the study identified critical points, and it was still possible to suggest best practices for improving those herds with criticalities.
- In terms of nutrition, **poor water availability** and **variable feeding practices** were highlighted as areas needing attention.
- Regarding good housing, the **lack of shade** and **overnight staying** places were identified as welfare risk factors.
- Regarding good health, the pastoralists stated that non-veterinarians treated their camels and **lack of identifications** and **record keeping** were highlighted.



Recommendations

- It would be good if more **resting and sheltered points** could be built along the common pastoralism ways so that camels could be watered, shaded, and rested at night and when temperatures are above their thermal neutral zone. These areas could also **provide vet and vet tech assistance** to improve the welfare of camels in Pakistan.
- **Minimal welfare standards** for dromedary camels should be implemented not only in Pakistan but worldwide.

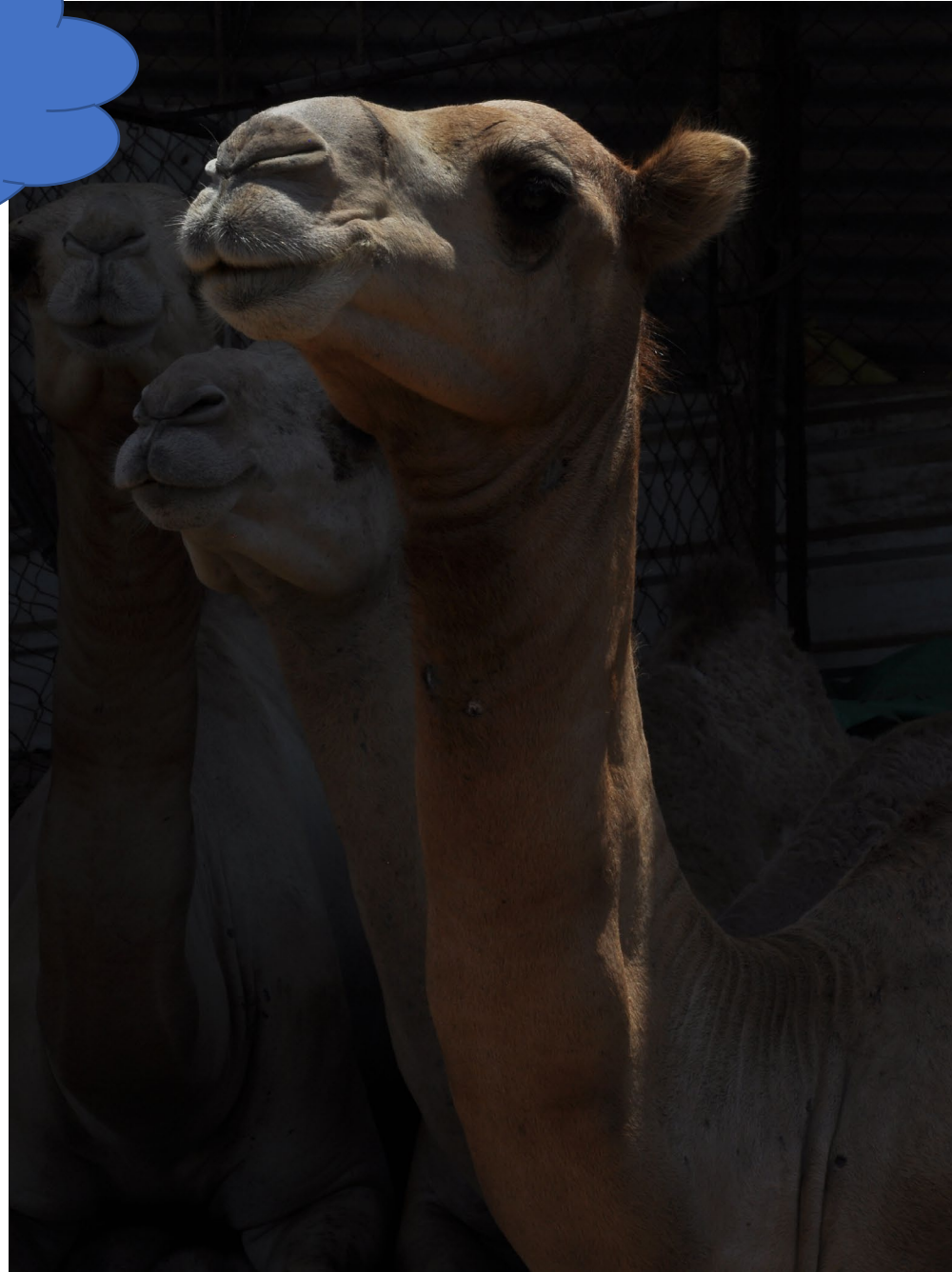
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Thanks for the attention!!

Questions?



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