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Socio-economic aspects of camel farming: a case study from Oman

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Abstract: The study examines the social and economic factors that affect camel breeding and production, such as financial, medical, fodder and food supplements, breeders' gender and age, income, employment status, organisational support and funding. Primary data are obtained using a bilingual questionnaire from 200 camel holders from the North Sharqiyah Region in Oman. The study found that camel breeders' main source of income is earned from the sale of camels and the camel racing competitions. The sector is not organised, and the return is risky and insecure. A focused approach to camel farming is not observed due to specific challenges that the camel breeders face, such as the price of fodder and food supplements in the market and the difficulties in securing adequate water for camel farms. The study recommends strategies to develop and guarantee sustainable support for the camel farmers, as it contributes to the country's social and economic development.

Keywords: social welfare; camel farming; livestock; food security; Oman.

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1 Introduction

In the history of development economics, livestock has been thought of as a key factor of the agricultural output mainly in the developing countries. In these countries, the survival strategy used by rural households is diversification to overcome poverty and sustain their lives (Ellis, 2000). Birthal and Negi (2012) viewed that the diversification of the agricultural production portfolio by including livestock is an effective way to accelerate agricultural growth and reduce rural poverty. Our focus is on livestock, specifically camel farming in the Sultanate of Oman. In Oman, livestock farming is considered one of the oldest economic activities and rural families make a living by engaging a verity of social and economic activities from camel farming. Camels have been always part of rural households' culture and are essentials for their way of living. Omani camels are one of the best pedigrees among the camels living in the Arabian Peninsula (Raymond, 2002). According to Food and Agriculture Organization of the United Nations (2017), the number of camels worldwide is approximately 28,811,392 heads distributed in 48 countries. It is estimated that there are about 8,929,930 camels in the Arab countries alone. As per the available statistics, the total number of camels in the Sultanate of Oman is 245,907 in 2016.

We address planned initiatives to promote camel farming from the perspective of the growing demand for livestock products outlined in the empirical research (Bose et al.,

2017; Birthal and Negi, 2012). The issue has grown in importance in light of recent fluctuations in oil prices, given that Oman is highly dependent on oil revenues which compromises around 60% of its total exports in 2020 (Sources: National Center for Statistics and Information). Hence, diversifying away from crude oil revenues has become and essential role for the Omani Government. Bose et al. (2017) observed that the sustainability of the livestock sector in Oman would guarantee its contribution to food security, the creation of employment, alleviation of poverty, and improvement of the living standards of the rural communities, which, in turn, are parts of the country's strategic plans. For many centuries, people have used camels for transportation and farming. More importantly, camels were raised for their meat and milk, leather and traveling. In the Sultanate of Oman, however, a seemingly different practice is also evident, focused on breeding and raising camels for racing and beauty competitions and these practices were also observed in other countries (Drosa, 2007). This paper considers two relevant pieces of information to emphasise the importance of camel farming. The first and foremost is population growth, which, in turn, demand food security. The second important factor is the role of camel farming on inclusive and sustainable development.

Therefore, the aim of this paper is to examine the demographic, social and economic aspects of camel farming and its impact on the rural households style of living in Oman. More specifically, it focuses on camel breeders in the North Sharqiyah region to explore the changes in camel farming dynamics and the extent of support provided from various governmental and non-governmental organisations. There are several important areas where this study makes an original contribution to livestock in general and camel husbandry in particular. First, the livestock sector in Oman is underrated and the traditional methods used for raising camels currently do not contribute effectively to the growth of the national economy due to the difficulty of raising these animals and providing shelter and fodder, medicine and other needs for camel breeders. Second, the lack of governmental contribution to the development of breeding sector such as financial support, providing suitable location for barns, and enhance the awareness with training on the latest breeding techniques. Third, there are no commercial mechanisms to market the camel products such as meat, milk and other camel milk products. Therefore, in order to find ways to enhance the socio-economic benefits of camel breeding, it is also important to understand the current status of camel farming, the challenges, and the ways to mitigate some of these problems. Furthermore, this research is expected to give better understanding of the opportunities and resources of the livestock market in the region.

The rest of this paper is organised as follows: Section 2 offers the review of literature, Section 3 presents the materials and method, Section 4 shows the results, the discussion is presented in Section 5, Section 6 concludes, and Section 7 provides the recommendations.

2 Review of literature

Several studies have focused on the importance of raising livestock from economic, social, environmental and other perspectives around the world. Given the livestock importance on the food security and economic development and sustainability of the rural societies, much of the current literature on livestock pays particular attention to the developing countries (Ahmad et al., 2010; Faye, 2013; Herrero et al., 2013; Megersa et al., 2014; Pica-Ciamarra et al., 2015; Oripov and Davlatov, 2018; Ronaghi and

Ronaghi, 2021). Compared to other types of livestock, some recent studies (e.g., Faraz et al., 2019; Orazov et al., 2021) have shown that camel husbandry plays an essential role in rural communities development and more importantly food security. As for the socioeconomic factors, Tadesse et al. (2014), examined husbandry practices in the two major camel rearing regions of Ethiopia (Afar and Somali), concluded that feed, diseases and lack of water were the major camel production constraints, along with persistent drought. In Algeria, Mayouf et al. (2014) studied the reproductive performance of dromedary's camels using a structured questionnaire and found that camel plays a vital role in the life and survival of nomadic herders in the study areas. Pasha et al. (2013) examined the traditional management practices and dromedary camel production in Pakistan. Based on the interviews with 75 households and single-visit-multiple-subject diagnostic surveys, they found an improvement in the family's living status of the camel herders in all three ecological zones. This study concluded that camels play an important role in the nomadic people's socio-economic conditions in this area. Idreis (2007) explored the economic importance of four million camels in Sudan. The study found that camel's meat and milk represent around 6% and 1% of the total production, respectively and the camel products represents around 10% of the total revenues in the country. Moreover, lack of central market for camel food product is addressed in this study. More recent study by Mohammed and Milad (2019) confirmed that camels have significant social and economic value for the world and Libya in particular, if their milk and meat production are well exploited for the improvement food security. With regard camel products and their medical advantages, Gader and Alhaider (2016) explored that camel food products are not solely used for nutrition purpose but also used for medical treatments like cancer and diabetes in the nations like the Middle East, part of Asia and Africa.

Ali et al. (2016) examined the impact of different factors on camel farming in the Cholistan desert in Pakistan. These aspects are camel health, production, feeding, socio-economic values, marketing, and some constraints and suggestions of this animal's welfare. The study found that the nomadic herders rely their life on these animals, the civil life has greatly influenced the health of the camel in general, and affected its strain, and the quality of breed became poor. It also showed that the overgrazing of these animals directly caused affected the extinction of some plants from this region. Ali et al. (2017), based on a study about the factors affecting food security in Sudan, found that food security significantly improves through better camel breeding mechanisms. In another study, Elbashir et al. (2018), based on interviews, group discussions and a questionnaire distributed to 114 camel owners, found that the main obstacles facing camel breeders were: poor pastures and forage resources, diseases and health problems, marketing camel and their products and shepherds' availability. Faye and Bonnet (2012) examined the current situation of the camel economy globally and its main trends since 1961 and found that the camel populations around the world are not endangered even though there is a significant or regular decline of the camel population in some countries. However, we should not lose sight of the fact that camels in the Arabian Peninsula breeds are classified based on coat colour, shape, region and use (Wardeh, 2004; Porter et al., 2016; Alhajeri et el., 2019).

A unique study found in the literature about camels in Oman was conducted by ElMahi (2011). The author studied the issue of camel pastoralism in Dhofar, south of Oman. The author concluded that camel husbandry is expensive, and their maintenance turns to be demanding. Camel owners in the region have limited income, and nomadic

camel pastoralism renders unreasonable returns. Also, the demand for camel products, milk and meat are minimal compared to other products available in the market. It might be one reason that prompted the camel breeders to raise camels for other purposes, such as racing and competition. While analysing the research findings of empirical studies, it is evident that though camel farming is still a significant part of livestock farming in the region, it is affected by the cost and traditional techniques deployed and is economical in monetary terms. To check whether such inferences are only relevant for camel farming, we examined literature related to other livestock. For instance, Zaibet et al. (2004) examined the case of goat production in the Sultanate of Oman and found that non-farm income is the primary source of income for farmers though relatively large flock sizes are maintained. The inference reiterates that the problems encountered by livestock holders are common and is not limited to camel farming alone.

The studies discussed above help us infer specific antecedents regarding camel farming's current status, challenges faced, and the way forward. To be sustainable, camel farming requires support, which is sustainable and inclusive. The findings of empirical research provide a certain direction in this context. Bose et al. (2017) commented that considering the strategic importance of agriculture sustainability, the development and promotion of SMEs and cooperatives could function as possible strategic tools in realising the socio-economic potential of the livestock sector. Hence, this research seeks to address whether there is a potential for the camel sector to contribute to significantly to the economic growth, food security and social welfare. More specifically, this study seeks to explore the different economic and social aspects that affect camel breeding and challenges those camel breeders face in Oman. Though camel farming in Oman has an ancient record, its importance to support the economic development of the rural communities is not addressed. Hence, this research fills this gap.

3 Material and methods

3.1 Design and respondents

For data collection, a quantitative survey approach employing a structured questionnaire is used. As this study aims to evaluate the social and economic factors and concerns related to camel farming in Oman, factors like availability of water, fodder, medicine, government support. Other factors such as costs, revenues and breeding techniques of camel farming were also addressed in this research. In order to assess these factors, a questionnaire is developed, and the questionnaire items adapted in this study were retrieved from related literature (Ocaido et al., 2005; Yadav et al., 2017, Giday et al., 2018; Rivera-Huerta et al., 2019).

The questionnaire was bilingual (English and Arabic) and included four sections. Section 1 consists of two parts; demographic information of farmers and livestock details in their farms. 11 statements constitute Section 2. The statement used a five-point Likert scale (1 – strongly disagree, 2 – disagree, 3 – neither agree nor disagree, 4 – agree, 5 – strongly agree) and cover areas related to raw materials, medical facility and facilities offered by the government. Section 3 solicits farmer's response to their knowledge of modern technologies that enhance camel production. Section 4 concludes the questionnaire by asking their suggestions to improve camel farming by including open-ended questions. The questionnaire was pre-tested by on a pilot sample of 40 camel

holders and two experts in the field. Modifications were made based on the feedback received. The research is mainly based on the final version of the survey.

The total number of camel holders in North Al-Sharqiyah region is 3,015 and the majority of them are located in three main areas: Al Mughaibi (1132), Bidiya (990), and Al Qabil (562) and the remaining is found in the other small areas in the region. The details of camel holders are obtained from Oman Chamber of Commerce and Industry and Ministry of Agriculture and Fisheries and water resources, records. A survey consisting of structured questions was conducted amongst 200 livestock holders in the Al-Sharqiyah region. This sample was chosen because of the expected difficulty in to reach some camel farms in the prospective covered areas, educational level of the respondents, misconceptions regarding the intentions of this research, and reluctance by the camel holders in sharing relevant information. The farmers surveyed belong to three regions: Al Mudhaibi (84), Al Qabil (50) and Bidiya (66). The area is selected because of the predominance of the region in camel breeding and farming. the survey was conducted from October 2020 and March 2021. The farmers were contacted for their convenient time. The purpose of the study was explained to them before their feedback is obtained. The confidentiality of data collected is ensured, and individual details are excluded from the study. The ethical considerations were briefed, and their permission to participate in the survey is obtained. The farmers stay in villages; hence, the research team visited the farmers and collected their responses.

We knew that some of the farmers would find it difficult to read all statements on their own. Hence, the research team spends a few hours with the farmers when they agreed to fill the questionnaire to address their queries effectively.

3.2 Statistical analysis

Once the data are obtained, we have translated responses that were Arabic, and thereafter coded the data and entered in Microsoft Excel. We have developed an understanding of the various statistical techniques to deploy, in order to find answers to the initial questions that we developed. Also, a conceptual framework was made, linking the various items to the constructs. The internal consistency of the questionnaire is determined by checking Cronbach alpha-score. Cronbach alpha score measures the internal consistency reliability of the data (Hair et al., 2019). The alpha score is expressed as a number between 0 and 1.0, which describes the extent to which all the items in a test measure the same construct and hence it is considered to the inter-relatedness of the items within the test (de Lauwere et al., 2020). In empirical research, it is commonly stated that if the Cronbach alpha score range between 0.70 and 0.90, a construct is being considered consistent (Tavakol and Dennick, 2011).

Initially, we have conducted descriptive analysis, covering the camel breeds and their farm details. As the next step, we used mean and standard deviation to summarise the five-point Likert scale questions. Inferential analysis is based on analysis of variance (ANOVA). We drew inference by comparing their level of agreement with the demographic variables. To complete the detained analysis, the data was transferred into Statistical Package for Social Science (SPSS).

4 Results

4.1 Respondents

Of the 200 camel breeders, 199 breeders were male, showing that camel farming is a male-dominated activity. Interestingly, camel breeders' age profile shows that there are three camel breeders below 20 years of age. Sixty-six camel breeders were of the age group between 41 years to 50 years, while 48 participants belonged to the age group 51 years to 60. There are 15 participants above the age group of 60 years. The profit indicates that the participants belong to all ages, and there is no dominance of a special age group in camel farming. The t-test shows that there were no statistically significant differences among the camel breeders of different age groups.

Of the camel breeders who participated in this research, 57 were employed and considered camel breeding as a part-time activity. Forty-one participants were job seekers and considered camel farming as a way to engage their time. On the other hand, 75 participants were active farmers, who devoted their time and attention fully to farming. Twenty-seven participants also considered it as a full-time activity and joined camel farming after their retirement from work. The next question addressed by the participants was regarding their years of experience in camel farming. 19 participants were engaged in camel farming for more than 25 years. Interestingly, only 15 farmers mentioned an experience of camel farming for less than five years. All of them mentioned that the area is known for camel farming, and they got attracted though challenged by many limitations.

4.2 Details of farm

Table 1 shows the camels age group and gender owned by farmers selected. 200 participants in the survey hold a total of 3,842 camels, which includes 933 (24.20%) male (bull) camels) and 2,909 (75.7%) female (cow) camels. It constitutes an average of 19 camels per farmer. We drew attention to the number of camels less than 2 years of age. 82.52% of the male camels are less than two years of age, which is 54.62% in female camels. The region is close to UAE, where the majority of the camel races are organised. Camel race is organised for male and female camels separately.

We drew attention to the farmer's claim that holding camels' primary purpose is to engage them in the race and other competitions. Table 2 shows this trend. The primary source of revenue is camel racing competition. 89.5% of the participants generate their revenue from the competition; 37.5% earn revenue from selling camels for meat purposes (35 camel breeders earn around OR 2000 or less, that is around USD5195 or less). As the table demonstrates, camels are not raised primarily for milk and meat, which in itself is a significant observation. Many reasons are cited, including the amounts involved in the camel competition and the number of competitions held every year (most camel breeders earn above OR 12001 from racing competition itself). The use of camels for tourism purposes is also neglected. When the issue of deficit in male camels were addressed, the camel farmers put forward a few important suggestions to address the issue, and include:

- Organise breeding camels by employing modern methods that are used in other countries.

- There is a significant deficit of male camels, and to protect species, the government should prohibit the export of male camels to other countries. However, they should allow the import of quality breeds of male camels.

Table 1 Camel age group and gender

Camel age group	*Male (bull) – number (%)*	*Female (cow) – number (%)*
< 1 year	157 (16.80)	193 (6.60)
1–<2 years	613 (65.70)	1,396 (47.90)
2–<3 years	65 (6.90)	265 (9.10)
3–<4 years	13 (1.30)	221 (7.50)
4–<5 years	13 (1.30)	157 (5.30)
5–<6 years	3 (0.30)	170 (5.80)
>6years	6 (7.30)	507 (17.40)
Total	933 (24.20)	2,909 (75.7)

Table 2 Annual earning from camel production and activities in Omani Rials

Earning classification in Omani Rials (OR)	*Milk*	*Meat*	*Beauty competition*	*Racing competition*	*Tourism*	*Other*
0	200	125	180	21	200	200
≤2,000	0	35	17	6	0	0
2,001–6,000	0	30	2	18	0	0
6,001–12,000	0	9	1	58	0	0
≥12,001	0	1	0	97	0	0
Total	200	200	200	200	200	200

Table 2 also highlights an interesting observation. Camel farming is not yet fully explored, and as rightly pointed out by Ahmad et al. (2010), it is part of the social set-up to play its role beyond the commercial role. However, proper marketing and promotion are essential to exploring camel farming's commercial aspects for dairy and meat production.

4.3 Camels lost annually and reasons

Camels are lost due to many reasons. We drew attention to this specific issue by examining its severity and causes. Table 3 reports the number of camels lost annually. From Table 3, 51.5% responded that they had not lost any camels (N = 103). It also means shows 48.5% of camel breeders report loss of camels annually. 31% of the participants (N = 62) reported that they lose one camel annually.

Table 3 is highly relevant. It highlights the importance of adequate medical support in camel farming to camel breeders. As observed, 67 participants reported the loss of camels due to diseases. The common camel diseases are trypanosomiasis, brucellosis, mastitis, diarrhoea, worm infestation, camel pox and tuberculosis. When medical supports are not available, the pastoralists self-medicate camels and other livestock, leading to over-dosing, under-dosing or improper drug use (Lamuka et al., 2017). Hence, there should be proper facilities for camel health management, and awareness programs are

required to utilise their services instead of self-medicating camels and other livestock. Another observation from the table 3 that one more primary reason for death is accidents (camels crossing roads in the region is a reason for many accidents). The statistics are relevant because a significant portion of the loss can be reduced provided good medical facilities proper barriers to avoid road-cross of camels. The t-test analysis highlights the significance of the relationship.

Table 3 Camel lost annually

Death reasons for no. of camels	*Aging*	*Accidents*	*Diseases*	*Other reasons*	*NIL*	*Total*
0	0	0	0	0	103	103
1	0	17	41	4	0	62
2	1	5	14	1	0	21
3	0	1	9	0	0	10
4	0	0	1	0	0	1
Equal or more than 5	0	1	2	0	0	3
Total	1	24	67	5	103	200

We drew the attention of camel farmers to these issues. They have suggested few measures to address two significant reasons for camel fatality, i.e., accident and disease. It is worth mentioning their suggestions, which include:

- Strong and high wire fences should be erected along the sides to protect both livestock and highway users.
- Provide medical support by building a private veterinary hospital employing highly qualified medical staff to do embryo transfer and artificial insemination and provide appropriate and enough medicines to the camels.
- Set up modern factories to process camel meat and milk camel's meat and milk (packaging and selling and distribution operation).
- There should be periodic inspections following from specialised government institutions to check camel disease and provide immediate medical attention.
- There should be government controls on the prices of veterinary clinics and pharmacies.

4.4 Number of workers on the farm

Camel farms need workers. The majority of those worders are recruited from overseas and hence require permission from the government (visa). A significant concern of camel owners is lack of workers. We drew attention to this issue by soliciting feedback from participants regarding employees' current camel farm status. The details are highlighted in Table 4. It is observed from Table 4 that 73 participants (36.5%) have just one worker working in the camel farm, 30.5% of them have two workers, 11.5% have three workers, 8% of breeders have four workers, 4% of breeders have equal or more than five workers, and 9.5% they do not have any workers. This is quite insufficient considering the number of camels in each farm.

Table 4 Number of workers vs. no. camels in each farm

No. of camels \ *No. of workers*	*0*	*1*	*2*	*3*	*4*	*5 and above*	*Total*
Less than or equal to 5	10	4	1	0	0	0	15
6–10	6	32	0	1	0	0	39
11–15	3	34	13	3	1	0	54
16–20	0	3	33	4	1	0	41
21–25	0	0	10	6	3	1	20
More than or equal to 26	0	0	4	9	11	7	31
Total	19	73	61	23	16	8	200

The comparison highlights that the number of workers is insufficient in farms with more than 15 camels.34 farms with 11 to 15 camels and 32 farms with 6 to 10 camels employ only one worker. This is quite inadequate and may compromise the camel health management. We drew the attention of policymakers regarding this issue. When enquired about the workers available, the camel farm owners gave few suggestions, which includes

- Reduce the number of camels to obtain workers' permits.
- Absconding workers should be properly dealt with
- Granting ownership of farms.

4.5 Economic aspect of camel farming: annual expenses

The annual expenses and their distribution is summarised in Table 5.

- *Feeding expenses*: 5.5% of breeders spend OR2,000 or less for their camels breeding, 17.5% spends OR2,001 to OR6,000 for feeding their camels, 37.5% spends between OR6,001 to OR12,000, 39.5% spends equal or more than OR12,001. We can understand that there is a positive relationship between the number of camels and the cost of feeding the camels.
- *Medical expenses*: The analysis shows that 71.5% of camel breeders spend OR2,000 or less for their camels' treatments, where 26.5% spend between OR2,001 to OR6,000, and 1% spend between OR6,001 and OR12,000 for treatments annually.
- *Transportation expenses*: The analysis shows that 74% of camel breeders spend OR2,000 or less for their transportation, where 23% spends between OR2,001 to OR6,000, and 0.5% spends between OR6,001 and OR12,000 for transportation annually.
- *Workers expenses*: From Table 5, it is evident that 42% of camel breeders spend equal or less than OR2,000 and 46% of them spend between OR2,001 and OR6,000 for workers annually, and 3.5% spends more than OR6,000 for workers.

We further verified the source of income to meet their expenses. Specifically, we inquired what percentage of revenue is retained in the camel farms to meet the various expenses. Their responses are summarised in Table 6.

Table 5 Annual expenses for camel farming in Omani Rials

Expenses classification in Omani Rials (OR)	*Feeding*	*%*	*Medical*	*%*	*Transportation*	*%*	*Workers*	*%*
0	0	0	2	1	5	2.5	16	8
≤2,000	11	5.5	143	71.5	148		84	42
2,001–6,000	35	17.5	53		46	74	92	46
6,001–12,000	75		0	26.5	1	23	7	3.5
≥12,001	79	37.5 39.5	2	0 1	0	0.5 0	1	0.5
Total	200	100	200	100	200	100	200	100

Table 6 Earnings retained in the camel farm

Percentage of earnings retained	*Frequency*	*Percent*
0%–25%	6	3.0
26%–50%	25	12.5
51%–75%	65	32.5
76%–100%	104	52.0
Total	200	100.0

It is observed that 101 farmers retain half of their earnings to meet the camel farm expenses.

4.6 Rating of support and resources available

In order to understand the quality of support offered, and the level of agreement, feedback is collected from camel breeders on a five-point Likert scale. Their responses are summarised in Table 7.

Table 7 Summary of feedback on support available and other factors

General support offered	*Mean*	*Response*
Negative impact of fluctuation of oil prices camels breeding	4.75	Strongly agree
Impact of substitutes of camel products (beef, dairy) on demands on camel products	3.62	Agree
There are enough training and awareness programs conducted by the ministry of agriculture for camel breeders	2.06	Disagree
Easily to avail land from the government for camels farm	1.5	Strongly disagree
Overgrazing or unorganised grazing of bulk camels create huge damage to vegetation	2.78	Neutral
We would like to have more organised camel breeding system	4.42	Strongly agree

4.6.1 Training and awareness programs from the government

This section's major interpretation is related to the support offered (training and awareness programs) from the government represented by the Ministry of Agriculture and Fisheries for camel breeders, as shown in Table 7. It is observed that the camel

breeders are not happy with the support offered (mean 2.06, response = disagree). When asked whether the Ministry of Agriculture and Fisheries' support is adequate, 51.5% of respondents (N 103) disagreed with the statement, and 49% (N 49) strongly disagree.

4.6.2 Availability of land

The camel farmers considered it challenging to avail land from the government for camel farming (mean =1.5, response= strongly disagree). Land availability is an important factor that influence the prospects of camel farming.

4.6.3 Medical support – government clinics vs. private clinics

Three important aspects were addressed in Table 8. The availability, cost and quality. Medical support includes veterinary treatment, medical immunisation and other facilities. It is observed that the camel breeders are not satisfied with medical support received from the government clinics in terms of availability, cost and quality. They rated it as 'disagree' on availability (mean = 2.08), cost (mean = 2.3) and quality (mean = 2.48). On the other hand, the farmers strongly agreed that the medical support from private clinics are available (mean = 4.5) and has good quality (mean = 4.23), but at the same time, it is costly too (mean = 4.81). Since it is costly, the camel breeders find it difficult to approach private clinics when medical support is required.

Table 8 Medical support from government clinics vs. private clinics

Medical facilities from government clinics	*Mean*	*Response*
Availability	2.08	Disagree
Costly	2.3	Disagree
Quality	2.48	Disagree
Medical support from private clinics	*Mean*	*Response*
Availability	4.5	Strongly agree
Costly	4.81	Strongly agree
Good quality	4.23	Strongly agree

Table 9 Feeding resource and water – availability, price and quality

Feeding resources in the market (cloverleaf, Barley, others)	*Mean*	*Response*
Availability	4.45	Strongly agree
Costly	4.64	Strongly agree
Good quality	4.39	Strongly agree
Water for camel farm	*Mean*	*Response*
Availability	4.15	Agree
Costly	3.54	Agree

4.6.4 Feeding resources in the market (cloverleaf, barley, etc.,) and water

According to the camel breeders, Table 9 shows both feeding resources and water are available (feeding resources, mean = 4.45; water, mean = 4.15), but both are costly

(feeding resources, mean 4.64; water, mean = 3.54). The price significantly influences the economic returns from camel farming. The feeding resources are of good quality (mean 4.39), according to the camel breeders.

4.6.5 Work clearance for expatriate workers

As Table 10 shows, one of the essential requirements for camel farming is the need for the labour force. About the availability of the expatriate workforce, the camel breeders disagreed that the workers are available to meet their requirements (mean = 1.74); however, their recruitment is very costly (mean = 4.26). The camel breeders suggested that the procedure to recruit expatriate workforce should be relaxed, and the cost involved should be reduced to enhance the camel farming sector.

Table 10 Work clearance for expatriate's workers for camel farms – availability and cost

Work clearance for expatriate's workers for camel farms	*Mean*	*Response*
Availability	1.74	Strongly disagree
Costly	4.26	Strongly agree

A common observation in this segment is the preference of camel farmers to focus on organised farming (mean 4.42, response = strongly agree).

4.6.6 Impact of oil prices

It is observed from the analysis that there exists a relationship between the fluctuating oil prices and camel breeding (mean 4.75, response = strongly agree). 76% of the respondents (N = 152) strongly agree that the relationship is significant and influence the support offered, as summarised in Table 7. This may be due to the financial and other supports received from different organisations, subsidies offered, and camel racing competitions' impact.

4.6.7 Competition from substitute products

The competition from substitute products such as beef and dairy products on camel farmers' economic return is also significant (mean 3.62, response = agree), as summarised in Table 7.

4.7 Readiness to change and organise

To reap the benefits of modern methods of breeding, two important factors are relevant. The first among them is the breeder's knowledge of modern techniques, and the second is their readiness to apply modern techniques. The analysis showed that about 50% of the respondents know the modern techniques used in camel farming, while others hold knowledge about the traditional methods alone. With regard to the readiness, a higher percentage of respondents (N = 111, 55.5%) responded that they are not ready to apply new methods of camel breeding. The authorities concerned should educate the camel owners and breeders to utilise modern techniques to provide more benefits to them. Both their awareness and readiness need to be enhanced.

4.8 Support from institutions

Table 11 summarises the support received by camel breeders from a different organisation, such as Oman Camel Racing Federation, Ministry of Agriculture and Fisheries, and Royal Camel Corps. 68% of the respondents confirmed support from Oman Camel Racing Federation for racing fields. 93% of the respondents commented that they receive medical support from the Ministry of Agriculture and Fisheries. Royal Camel Corps also provided racing field support, according to 36.50% of respondents. Financial support is availed from other institutions such as banks, according to 27.50% of the respondents.

Table 11 Support from institutions

Support provided by different organisations	*Oman camel racing federation*	*Ministry of agriculture and fishers*	*Royal camel corps*	*Other institutions*
Medical	2.00	93.00	0.50	0.00
Financial	12.50	0.00	12.50	27.50
Marketing	2.00	0.00	9.00	0.00
Race Field	68.00	0.00	36.50	0.00
Other	0.50	0.00	0.50	0.00
NIL	15.00	7.00	41.00	72.50
Total	100.00	100.00	100.00	100.00

A major inference from the analysis is the lack of financial support and marketing support, evident from Table 11. In order to reap economic and social benefits, we recommend that the camel breeders need to support, especially on the financial and marketing side. At present, they rely on banks and other financial institutions for their financial requirements.

In addition to the above, the camel breeders also mentioned that the following support are required from the authorities concerned. It includes:

- Allocate specific places for tourism and tourist vehicles to protect grasslands and livestock.
- Provide water and electricity to the farm or at least to the areas which are near to the farm site.
- Government support on (feeding materials, fuel prices, provision of rider's riding gear with high quality, organisation and distribution of racing camels, purchase of camels and provide special revenues to sell them to the public through meat auctions).
- Remove or at least reduce the customs duties and facilitate camel exit procedures.
- Provide a platform to embark and disembark camels from the vehicles near each camel breeding area.
- Setting fixed standards for race camel pricing.
- Revitalise the role of the Omani Association for camels to organise activities related to camel racing.

5 Discussion

Camel breeding is a male-dominated profession. 99.5% of the camel breeders are male. Omani society does not give Omani women opportunities to engage in this profession. This might be because camel breeding requires a lot of physical strength. The majority of camel breeders are above 40 years of age. On the other hand, young people are not engaged with camel breeding because of many reasons such as education, job seeking, travel and other similar reasons. Urbanisation has influenced the way of life of people in all Arab countries, including Oman. Some breeders who are between 20–30 years of age have started to take camel breeding as a daily chore for the sake of helping their families. Breeders who are between 31–40 years are more in number than the previous groups, which probably means that this particular group has more expertise and more financial strength. Breeders who are between 41–50 years are the highest percentage among the participants, because of certain reasons, as part of them are retired or unemployed, and they have more sense of responsibility towards securing their families' income. The local society study shows that people like to breed camels and take care of these animals to gain benefits through production (milk and dairy) or camel racing competitions. The statistics show that the main aspect breeders rely on is camel racing competition because of the huge returns that might come, but it is not secure and reliable than the expenses.

Most of the breeders are unemployed. There are also job seekers and retired breeders representing the majority of our respondents compared to 28.5% who are employed, which means this kind of work or activity needs a lot of effort and requires the breeder to be around the farm to take care of the camels. Also, it seems that those employed breeders are working in the same place where the farm is located. Most of the camel breeders have 5–25 years of experience, and only 7.5% of breeders are practicing camel breeding for a period which is less than 5. Investment with high capital is needed to start a camel farm; besides that, this work requires long experience, and young people's orientation is to get secured and constant income from permanent and comfortable jobs.

Most of the breeders have between 6–20 head of camels. It seems that it is appropriate for them to hold these numbers to give them scope to control to prepare the camels for the race competitions or other purposes related to production, both in terms of finance or efforts. Most of the breeders prefer to have female camels more than males. This probably means that the breeders prefer to have females more than males because the return of investment is high on female camel comparing to males, another conclusion from the first look at mean; the most number of camels in the farms are between 1–2 years, which are the most beneficial camels comparing to other groups after that most of the camels were sold off from the farm. Most of the breeders are not losing any camels during the first year of the camel age because they take care of the camels well. (enough feeding-medical treatment-holding them inside the farms). While the leading cause of losing camels is diseases such as (ulcers, diarrhoea, skin diseases, smallpox, the tick), the second reason is incidents of running over of the camels, and there are other reasons it such as eating from waste containers which lead to food poisoning or bowel obstruction. Most of the farms have 1–2 workers, depending on the number of camels inside the farm and the workload.

There are no ways to exploit camel milk commercially, so breeders consume it in their own families or with neighbours only. There is an excellent demand for camel meat in the local market. Most of the breeder's earnings are from racing competition or sales of camels after competitions, and most of them rely on this sort of gain entirely. The

financial return from the racing competition is large but unpredictable. The cost of the feeding of 11 to 20 camels is between OR 6,000–12,000 annually. Spending on medical conditions differ between breeders and depend on the total number of camels they own, and it depends on the camel's age and the purpose of rearing. Transportation expenses differ based on the farm's distance and places where they conduct some competitions; some breeders share one track with other breeders to reduce transportation expenses. The number of workers and the amount of salary they charge differ due to the number of camels and the workload.

Most breeders said they reuse or reinvest 76% to 100% of the earnings generated from camel farm again in the camel farm. Camel breeders are indirectly affected by the non-stability of oil prices because most of the camel barns are a long distance away from residential places, and most feeding and water resources are remotely located. Demands for camel products are affected negatively to some extent by the availability of alternate products. Camel breeders face a challenge in getting work clearances for their barns because of strict government rules, and it is costly to get a work clearance. The majority of camel breeders are facing a challenge in the prices of feeding resources in the market. Most of the camel breeders are not facing any problems in providing water for camel farms since the ministry of the municipality provides water wells. Still, some of them find it difficult to supply water to their camel farms.

There is a lack of financial support from the government to camel breeders. Camel breeders need training and awareness programs related to breeding activities. Camel breeders require more medical services from government clinics and also want all types of medicines with good quality to be provided by the government to help them maintain their livestock's health; and also, they are suffering from the prices of treatment services and medicines provided by private clinics. Camel breeders are facing difficulties in obtaining suitable areas of land with facilities like water and electricity. Many institutions provide many types of limited support like (medical, financial, marketing, and race fields) and the private sector need to contribute more by supporting camel breeders in races and beauty competitions prizes.

Most breeders know about the government penalty when camel causes car accidents, and they did not honestly give their opinions. Stray role in damaging some camel farms since they enter and eat and sometimes damage private and public proprieties. The majority of the respondents request the camel breeding activity to be organised. The camel breeders need to be informed about modern techniques of camel breeding. Most breeders accept any effort in modernising breeding methods, and they are aware that this will increase productivity

6 Conclusions

The main goal of the current study was to determine the social and economic aspects of camel farming in Oman. The research is conducted using a quantitative survey method, and the data collected from camel breeders in North Al Sharqiah Governorate, in Oman. The survey is based on questionnaire and used a convenience sample of 200 camel breeders. In this study, several social and economic factors and other concerns associated with camel farming were assessed. The most obvious finding to emerge from this study is that most of camel breeders' earnings come from racing competition or from sales of camels after competitions. The second major finding was that camel holders face

challenges like fodder and food supplements high prices, lack of labour in this field, lack of water resources.

The study also found evidence that camel holders who are between 41–50 years old represent the highest percentage among the participants. The reasons behind this retired or unemployed and they have more sense of responsibility towards securing their families' income from camel farming. The research has also shown most food and water resources for the camels are remotely located and the cost of transportation, food supplements in the local markets and the medicine is unreasonable. The insights gained from this study may be of assistance to

7 Recommendations

Given the participants' suggestions, significant findings, and conclusion of this study, the following recommendations are to be considered for better camel breeding and the optimum exploitation of camel production. There is a significant and large financial and economic contribution to the local market, which has clear and wide breeding activities, which should never have been neglected. On the contrary, it must be included in Oman GDP if still not. Furthermore, this particular sector suffered from the lack of appropriate attention in previous years; the government should initiate a national development strategy to improve the camel breeding sector to overcome the challenges and needs of camel breeders, especially when taking into consideration that the GCC area is a strong source and profitable market for camel trading.

We recommend customising a special farm dedicated to camel breeding in each region using the most recent breeding techniques. It will also facilitate and organise the process of filling, packaging, distributing the camel products all over the country or even abroad, and contributing to economic growth. Through this vision, most of the demands can be achieved, and most of the camel breeding challenges and obstacles can be avoided.

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