Communal institutions for the management of rangeland resources and dairy production in Taleghan Valley, Northern Iran

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Abstract. Mutual help among pastoralists plays a key role in herding in rural Iran where pastoralists share a rich knowledge of dairy production. Nariyan village, located in the Taleghan region in Northern Iran, was chosen for this study on local traditions of the dairy production chain because it is still largely based on reciprocal sharing of labour and milk and local traditions of social cohesion. The results reveal that an elaborate network of communal institutions, based on seasonal cooperation, exists among pastoralists that regulate the use and management of milk and milk products. Different social roles, such as those of owners of herds of different sizes, herd manager and shepherds, are organised in a traditional co-operative institution, called \textit{Shirvāreh}, a summer seasonal cooperative that strengthens social ties among the pastoralists and guarantees an efficient dairy production chain for subsistence and marketing. Precise data on milk-sharing reciprocity, such as are provided in this paper, seem to be rare for this geographical region if there are any at all, and this fills a gap in empirical rangeland science as it adds to the theory of traditional knowledge being a means to harmonise societal inequalities.

Additional keywords: cooperative livestock management, local collective action, milk exchange, mutual help, social cohesion.

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Introduction
The struggle for higher productivity from arid and semiarid land through a well developed dairy production chain has relied for several centuries on traditional techniques of conservation and management of land resources. These techniques were the outcome of trial and error methods and values that pertained to patterns of land utilisation. Traditional and indigenous knowledge was developed in the form of land- and water-use systems, water-harvesting techniques, livestock rotation and a particular pastoralist perspective on a grassland regime under conditions of scarcity and competition of users.

Over the past 70 years, due to socioeconomic, political, cultural and technological transformations of the traditional rural societies in Iran, there has been intense human and livestock pressure on rangelands. After the reign of Reza Shah had come to an end in 1941, there has been a decline in traditional knowledge in many parts of rural Iran following the Land Reform Act of 1963 (Lambton 1969; McLachlan 1988; Majd 2000) that has negatively affecting the balanced use of this fragile ecosystem. This process has often resulted in an ecological deterioration of the nutritive value of the forage plants of the rangelands and an increase in the use of less productive land in remote agricultural and livestock-rearing areas (Bharara 1999; Abolhassani 2011).

Since the Iranian Revolution of 1979, little research has been done in the inter-related fields of indigenous knowledge applied to rangeland, animal husbandry and dairy production management in Iran. The focus of our case study carried out in Northern Iran is on mutualism in an age-old economic sector of local food production despite the change in the socio-political framework in this sector in Iran over about the past 35 years. It shows that a traditional mode of production meets the standards of managing private assets (milk and milk products) in a spirit of reciprocity for the benefit of all members of the...
milk-sharing cooperative (Shirvâreh). It attempts to exceed the scope of previous case studies as it shows how an institution of milk-sharing among pastoralists overcomes the problem of large herd owners displacing small- and medium-sized herd owners in order to monopolise the use of local natural resources and ultimately to obtain local power due to modernisation processes. However, notwithstanding the value of traditional modes of production, one can witness some structural socio-cultural changes in the Lower and Middle Taleghan Valleys, where the improvement of roads and a substantial increase in secondary holiday homes built by wealthy citizens of nearby Tehran and Karaj have largely transformed these areas into holiday resorts during the summer months.

The socio-political background of rangeland management in Iran

Rangeland ecosystems are among Iran’s most important resources; especially those in the northern regions of the Alborz Mountains. About 54% of Iran’s territory comprises rangelands (Ghafari 1991; Badripour et al. 2006) and historically these areas had been the foundation of Iranian rural and nomadic traditions and culture (Sunderland 1968). The area of rangelands in Iran has been estimated, through satellite imagery, to be 90 million ha at the beginning of this century (FAO 2004).

Pastoralists depend on rangelands that are not suitable for agricultural cropping and they accumulate knowledge of ecosystem processes through experience (Niamir-Fuller 1995) and cultural traditions embodied in myth and lore (Conklin 1954; Colding and Folke 2001), which are reflected in their institutional arrangements (Agrawal 1993). For many pastoralists, rangelands are their major or even only source of income, especially for those at a subsistence level (Farahpour 2002).

Cooperation and co-management among pastoralists as applied indigenous knowledge

Local knowledge has been defined as ‘a cumulative body of knowledge, practice, and belief, evolving by adaptive processes’ and most authors agree that such knowledge is passed down from generation to generation by cultural transmission about the relationships of one individual with another and about their environment (Berkes et al. 2000; Gemedo-Dalle and Maass 2006). The term, local knowledge, is often used synonymously with ‘knowledge gained by daily contact with the natural world and ecological processes’ (Knapp and Fernandez-Gimenez 2008), differing from one community to another and frequently changing (Davis and Wagner 2003; Fazey et al. 2006). In this study, our goal is to critically understand the role of local knowledge and the substance of pastoralists’ communal institutions in order to assess their utility and explore the ways of how they contribute to a system of local collective co-management in the dairy production chain.

The Iranian land reform of 1963

Prior to the enforcement of land reform in 1963, there were two principal systems of property rights for rangelands, which were common rangelands used by nomads and private rangelands managed by landlords. Nomads governed most of the rangelands in Iran. Nomadic society was composed of tribes (Eil) who themselves comprised of Tayefe (clans), Tire (lineages), Olad (sons) and Khanevar (households) (Abolhassani 2011). In 1963, the Iranian parliament passed the Nationalisation of Rangelands and Forests Act, which allows rangelands to be leased to individuals and groups of herdsmen. Under the Act, all rangelands and forests were allotted to the government and all existing land ownership certificates were revoked. Rangeland users now had to apply for grazing licenses from the government. These licenses define the boundaries of the rangeland, grazing seasons, and grazing capacity and could be given to both private and common users, e.g. a group of pastoralists. In the initial years, grazing licenses were issued for a period of 10 years. In the 11th year, the land was evaluated and, if the rangeland condition had improved, the licence was renewed for a period of 30 years (Badripour et al. 2006). The licenses were granted by the Technical Office of Rangelands in the Rangelands and Forests Organisation, which manages the rangelands for improvement and legal issues.

The traditional system of rangeland co-management among herd owners and dairy producers and the standard of nomadic livelihoods were harmed by the enforcement of this land reform. It partly led to some social erosion of the traditional system (Seeland 1993), shifting from a quite well regulated land-use system to an unregulated open-access common-property situation with overgrazing conflicts between landlords and tribal heads (Sunderland 1968; Abolhassani 2011). Many of the main rangeland managers moved to the cities. As it became easy for the local people to get a land-ownership certificate after the land reform, a portion of the more productive rangelands were now cultivated and farmland replaced some of the former permanent rangelands. There was no incentive by the government for the claimants to cooperate and protect the land and many rural people used the rangelands as squatters (Abolhassani 2011).

Materials and methods

Study area

The Taleghan district in Northern Iran comprises a sum of several small villages (Dehestan) in the Alborz province. This region has mild summers and cold winters, ranges from sea level up to 2360 million a.s.l, and is where Nariyan village, used in this study, is located at 36°13′N, 50°59′E. The Taleghan catchment basin, which is equivalent to the district, is one of the subsidiary basins of the larger Sefidrood catchment basin, which is bordered by Alamoot in the north, the region of Ziaran and Samgh Abad in the south, one section of the Karaj catchment basin in the east, and the Shahrood catchment basin in the west. The Sefidrood catchment basin is located in mountainous regions with steep slopes containing many stone outcrops, and ranges between 1776 and 4300 m a.s.l. About 90% of the basin consists of rangelands.

In Nariyan, most of the population make their living from livestock herding and agriculture as well as horticulture. In winter, spring and autumn, there are 90 households but, in summer, 350 households reside in the village. Out of these
350 households, 90 households, who own livestock, stay on whereas the others migrate seasonally to low-lying regions or nearby cities in winter.

The area of Nariyan is 5942 ha and its grazing permit was granted to the Islamic council of the village by the District Office of Natural Resources in Taleghan. This permit allows pastoralists to utilise the rangelands within the traditional boundaries of Saman-Orfi (a locally well known geographic area, which is recognised traditionally according to legal and social aspects by the villagers) of their village for grazing their livestock and each part is grazed by a specific owner’s herd. Rural livestock herders are semi-nomads and have a permanent home in the village where they do supplementary subsistence farming or maintain an orchard. They move to the rangelands often far from their village in spring and autumn to graze their livestock or join the local traditional institution of Chakaneh (one herd), where these herds of sheep and goats are taken care of in one united herd for one season. Participation in this institution is compulsory as the size and productivity of pastureland is limited and grazing one’s animals individually is forbidden by local customary law. However, nobody is excluded from membership of the communal institutions related to livestock grazing if he complies with its obligations.

Field survey

The data were obtained by field-survey methods over a period of 17 months in 2010 and 2011 based on participant observation and doing interviews with all Nariyan pastoralists and the shepherds employed by them (n = 27; response rate of 100%). All were interviewed face-to-face as this is the most accurate method for surveying people who cannot read (Salant and Dillman 1994). The survey was conducted during the winter months in Nariyan village and during the grazing season in its Saman-Orfi, using a standardised questionnaire. Only men were interviewed as they are in charge of all work connected with animal husbandry.

First, we prepared the Saman-Orfi village map based on prominent geographical points in the landscape and then revised it according to the advice of local experts (i.e. pastoralists and village council) (Fig. 1). Second, we made a list of all...
pastoralists and the number of their flocks in Nariyan village and their roles in the herds’ management. For each herd, the network of people who hold a position in that herd was recorded, along with details about how the herd was managed and who received payments for services in the spring, summer and autumn seasons. Furthermore the amounts of milk in the six milking periods in one season were recorded in each of the six periods (see Table 1).

Results

Livelihood pattern and social roles of pastoralists

In Nariyan village, three livestock herds, with ~2433 heads in total, were maintained at the time of our survey. The stakeholders of each herd were organised in a traditional institution called Chakaneh utilising the rangelands, and each herd comprises the animals of 10–13 pastoralists. They have different social roles, which are: (1) Pishkar, the head of herd, (2) Rafigh, a herd owner who works together with the Pishkar in the management of the herd during one season of 9 months, (3) Taraz, who owns a few animals and mostly stays in the village and gives them to the one herd during these nine months to be cared for by (1) and (2) and (4) the shepherds, who just work for the livestock owners during one season and get a salary, food and clothing.

The Pishkar is the responsible person of the herd who governs all affairs related to livestock management, including leasing of the rangeland, finding shepherds, finding solutions for conflicts among the livestock owners, and accounting for the herd expenses. His tasks comprise dealing with the Pishkars of other herds in order to facilitate a better regulation and management of rangeland use in the region, choosing the lowland and midland rangelands by consultation with the Rafighs of his herd. The role of the Pishkar is hereditary in this village and traditionally he should have characteristics, such as honesty and trustfulness, a high level of esteem and influence on the pastoralists’ community. He should also be competent at performing a primary diagnosis of livestock diseases and apply traditional treatments and herbal remedies, and should be good at memorising each animal of the herd and its owner.

Rafighs are those herd owners who are the main collaborators in handling the herd together with the Pishkar during spring, summer and autumn, always for 1 year. They organise the building of temporary camps, provide drinking water, prepare food and take care of the transport mules. One of the most important duties of the Pishkar and Rafigh during the milking seasons (spring and summer) is to make arrangements for the milking of the herd in which every owner will milk his own livestock and those animals that are entrusted to him by the Taraz. The Taraz are herd owners with a small number of livestock (usually 8–30) who generally do not accompany the herd to the rangelands. These livestock owners hand over their animals to the Pishkar or one of the Rafighs based on mutual trust. The Taraz must pay the costs of taking their animals to the rangelands for grazing, including the wages of all persons involved and the fee to lease the rangeland in spring, summer and autumn seasons, and finally the vaccination costs for their animals. The Pishkar must account for these costs based on the number of livestock. As the herds graze in the rangelands of Nariyan village during the summer, the fee is very small, ~400 Rials (US $0.03) for each animal. This fee has to be paid to the District Office of Natural Resources of Taleghan. The Taraz should pay both the rangeland fee and the wage for herding their mature animals. In spring, the Taraz do not pay the wage and fee for their mature lactating animals because of the high amount of milk produced by them, which is all given to the Rafigh, instead of money. In summer, however, the Taraz must pay the shepherd’s wage for their non-lactating mature animals. This is due because of the decreasing amount of milk in this season, and they pay the shepherd for taking care of their young animals below the age of 6 months (Bârrah Vân). In turn, during the summer season, Rafighs have to give 4 kg of cheese from each of their lactating animals to the respective Taraz. Those animals above 6 months of age are called Gâlleh Vân and are not lactating. A typical herd of mature animals consists of 70% lactating animals and 30% of

<table>
<thead>
<tr>
<th>Name of pastoralist</th>
<th>Role</th>
<th>No. of lactating livestock</th>
<th>No. of non-lactating livestock</th>
<th>1st period</th>
<th>2nd period</th>
<th>3rd period</th>
<th>4th period</th>
<th>5th period</th>
<th>6th period</th>
<th>7th period</th>
<th>8th period</th>
<th>9th period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ali-Sab</td>
<td>Head of hirvâreh</td>
<td>140</td>
<td>35</td>
<td>1</td>
<td>5^B</td>
<td>6</td>
<td>3</td>
<td>0.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ta-Sha</td>
<td>Member</td>
<td>94</td>
<td>46</td>
<td>1.5</td>
<td>4.5</td>
<td>8</td>
<td>5</td>
<td>1.5</td>
<td>0.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gh-Mir</td>
<td>Member</td>
<td>85</td>
<td>78</td>
<td>2</td>
<td>4</td>
<td>8</td>
<td>4</td>
<td>1.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Man-Sab</td>
<td>Member</td>
<td>65</td>
<td>10</td>
<td>2.5</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>1.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Az-Sha</td>
<td>Member</td>
<td>55</td>
<td>5</td>
<td>2.5</td>
<td>2.5</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total of the milking days per period</td>
<td>–</td>
<td>439</td>
<td>174</td>
<td>9.5</td>
<td>19</td>
<td>38</td>
<td>20</td>
<td>8.5</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sum of the milking per period</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>19</td>
<td>38</td>
<td>76</td>
<td>40</td>
<td>17</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total of milk produced in each period in Man^c</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>570</td>
<td>855</td>
<td>1064</td>
<td>440</td>
<td>170</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

^a The data shown in the table are the total number of milkings per period.

^b No. of days in the second and subsequent periods include the amount of milk given to each other during the period to give the amount of daily produced milk from the herd.

^c One Man of milk = 3 kg.
others, which are kept for their meat, wool and skins. The price paid per kg of wool is ~4000 Rials (US $0.30), and on average each sheep produces 800 g of wool, but in Nariyan village, milk, dairy products and meat are the most important in providing a livelihood.

In autumn, the Taraz must pay both the fees for all animals and the shepherds’ wages because the milking process comes to an end, and the Rafigh and Pishkar do not get milk from the Taraz animals anymore. The average fee and wage for all pastoralists amount to 100 000 Rials (US $9.50) per animal for 9 months. In Table 2, the shepherd’s wage for one herd in Nariyan village is shown in detail. In spring, shepherds’ wages were lower than in other seasons because the pastoralists hired them for 2 months, starting from 20 April, when the herds were going from the village to the lowland rangelands and for 7 months in summer and autumn. The name of Taraz does not appear in the Tables 2 and 3 because they do not accompany the Pishkar and Rafighs in spring and summer.

Shepherds are not involved in the milking process because they lack the knowledge about the ownership of the animals and, therefore, would not know to whom the milk of each animal belongs. A shepherd usually leads the herd entrusted to him to the milking place called Bāramāl (a stone wall- or hedge-enclosed place for milking the livestock). A shepherd’s average wage for each animal in spring, summer and autumn was 28 000 Rials (US $2.66), 42 000 Rials (US $3.99) and 42 000 Rials (US $3.99), respectively. The fee for the leasing of the rangelands in spring, summer and autumn is shown in Table 3 and was higher in spring than in summer and autumn. The fee in summer was less than in other seasons because the pastoralists have a network composed of three kinds of relationships: personal relations (including friendship, kinship and conversation), work relations (cooperation of pastoralists for livestock breeding affairs) and financial relations (in the pastoralists’ network). The intensity of these relations depends on the status and performance of the persons in herd management and dairy processing (Fig. 2).

The Pishkar, as the head of the herd, has working and financial relationships with the others and has the most powerful position of all. The Pishkar also has several financial and working relations with the Taraz, but the intensity of these relations is less than the relations between the Pishkar and Rafighs. The Rafighs have working and personal relations with other collaborators in the management of the herd, namely, the Pishkar, Taraz and the shepherds. Every Rafigh has financial relations with his Pishkar and his associated Taraz, in which the costs of the wages and fees are regulated. The shepherds have financial relations only with the Pishkar, but have personal and working relations with the Rafighs, because the

<table>
<thead>
<tr>
<th>Name of pastoralist</th>
<th>Social role</th>
<th>Number of animals</th>
<th>Cost of wages in spring (Rial)</th>
<th>Cost of wages in summer (Rial)</th>
<th>Cost of wages in autumn (Rial)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. G. Mir</td>
<td>Pishkar</td>
<td>140</td>
<td>3 920 000</td>
<td>5 880 000</td>
<td>5 880 000</td>
</tr>
<tr>
<td>A. Sab</td>
<td>Rafigh and Pāniry</td>
<td>220</td>
<td>6 160 000</td>
<td>9 240 000</td>
<td>9 240 000</td>
</tr>
<tr>
<td>M. Sab</td>
<td>Rafigh</td>
<td>120</td>
<td>3 360 000</td>
<td>5 040 000</td>
<td>5 040 000</td>
</tr>
<tr>
<td>T. Sha</td>
<td>Rafigh</td>
<td>140</td>
<td>3 920 000</td>
<td>5 880 000</td>
<td>5 880 000</td>
</tr>
<tr>
<td>A. Sha</td>
<td>Rafigh</td>
<td>91</td>
<td>2 548 000</td>
<td>3 822 000</td>
<td>3 822 000</td>
</tr>
<tr>
<td>Total</td>
<td>–</td>
<td>711</td>
<td>19 908 000</td>
<td>29 862 000</td>
<td>29 862 000</td>
</tr>
</tbody>
</table>

^AOne US dollar was equal to 10527 Rials in June 2011.

<table>
<thead>
<tr>
<th>Name of pastoralist</th>
<th>Social role</th>
<th>Number of animals</th>
<th>Fee in spring (Rial)</th>
<th>Fee in summer (Rial)</th>
<th>Fee in autumn (Rial)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. G. Mir</td>
<td>Pishkar</td>
<td>140</td>
<td>2 956 800</td>
<td>56 000</td>
<td>1 971 200</td>
</tr>
<tr>
<td>A. Sab</td>
<td>Rafigh and Pāniry</td>
<td>220</td>
<td>4 646 400</td>
<td>88 000</td>
<td>3 097 600</td>
</tr>
<tr>
<td>M. Sab</td>
<td>Rafigh</td>
<td>120</td>
<td>2 534 400</td>
<td>48 000</td>
<td>1 689 600</td>
</tr>
<tr>
<td>T. Sha</td>
<td>Rafigh</td>
<td>140</td>
<td>2 956 800</td>
<td>56 000</td>
<td>1 971 200</td>
</tr>
<tr>
<td>A. Sha</td>
<td>Rafigh</td>
<td>91</td>
<td>1 921 920</td>
<td>36 400</td>
<td>1 281 280</td>
</tr>
<tr>
<td>Total</td>
<td>–</td>
<td>711</td>
<td>15 016 320</td>
<td>284 400</td>
<td>10 010 880</td>
</tr>
</tbody>
</table>

^AOne US dollar was equal to 10 527 Rials in June 2011.
*Pishkar* is responsible for the financial management of the flocks under him.

The *Rafighs* are those herd owners who are the main collaborators in handling the herd together with the *Pishkar* during spring, summer and autumn. One of the most important duties of *Pishkar* and *Rafigh* during the milking seasons (spring and summer) is to make arrangements for the milking of the herd in which every owner will milk his own livestock and those animals that are entrusted to him by the *Taraz*.

In the winter season, the kind and intensity of the relationships change because the livestock are in the village and kept in the buildings of their individual owners and the intensity of working and financial relationships slows down because the activities are shifting from a participatory to an individual mode. The intensity of these relationships during the dairy off-season depends on the level of friendship and kinship relations between those pastoralists who stay on in the village.

**Traditional cooperation and roles among pastoralists in milking and dairy production**

The *Pániry* plays an important role in dairy production. He is one of the *Rafighs* or the *Pishkar*, usually young, powerful and literate, who buys the milk of all the other pastoralists belonging to his herd and makes cheese in the spring and pays them every 5 days. Older members are generally not interested in becoming *Pániry* because this job is judged to be hard and boring by the herd owners. After having bought the milk from the other pastoralists, the *Pániry* starts to make cheese in one of the temporary camps, which lasts for ~2 h. Hard cheese and *Loor*, a soft cottage cheese-like dairy product, are the main dairy products in spring. This cheese and *Loor* are sold to consumers who live near where the dairy production takes place. After measurement of the milk, the *Pániry* records all the amounts and the money paid in a notebook. The amount of daily milk is 204 kg in a herd with 430 lactating livestock, i.e. 600 g of milk per day per animal in spring (Table 4 shows the milking accounts of one of the Nariyan herds).

**Shirvâreh – a seasonal communal institution**

The people who are seasonally organised in one united herd and manage its milk production are called *Hamvâregan*. They practice mutual milk lending in order to make cheese in these months when the amounts of milk, particularly of the smaller herd owners, have diminished (Figs 3 and 4). This mutual borrowing is called *Vâcerding* (collective action). It is usually done in 5–6 periods of between 8 and 40 days (see Table 1) and

**Table 4. Milking accounts of one herd on 7 April 2011**

<table>
<thead>
<tr>
<th>Name of pastoralist</th>
<th>Daily amount of milk in <em>Man</em> and <em>Chârák</em> (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ak-Ra</td>
<td>12 <em>Man</em> and 2 <em>Chârák</em> 37.5</td>
</tr>
<tr>
<td>S. Al-Mir</td>
<td>9 <em>Man</em></td>
</tr>
<tr>
<td>Ta-Sha</td>
<td>11 <em>Man</em> and 2 <em>Chârák</em> 34.5</td>
</tr>
<tr>
<td>As-Mir</td>
<td>11 <em>Man</em> and 2 <em>Chârák</em> 34.5</td>
</tr>
<tr>
<td>Ho-Sab</td>
<td>7 <em>Man</em></td>
</tr>
<tr>
<td>Ma-Mir</td>
<td>13 <em>Man</em> and 2 <em>Chârák</em> 40.5</td>
</tr>
<tr>
<td>Total</td>
<td>63 <em>Man</em> and 6 <em>Chârák</em> 195</td>
</tr>
</tbody>
</table>
is based on the principle of reciprocity in which the richer herd owner gets the others’ milk in the early cycles in order to be able to make cheese. He supports the other members of the Shirvâreh subsequently when their amount of milk decreases to enable them to make cheese from a sufficient amount of milk that is returned to them. The total daily amount

Fig. 3. Pishkar and Rafigs in the mid-rangelands. Pishkar is marked by a circle in the foreground. Paniry is marked by a circle in the background.

Fig. 4. Hamvâregan measuring milk in mid-rangelands.
of milk of the herd is given to one pastoralist to make cheese and bequeath (or Loor). In return, he must hand over his milk to other pastoralists for a distinct period of time later in the milking season. This process of mutual milk-receiving and milk-giving among Shirvâreh members has a de facto regulatory effect with regard to the amount of processed dairy products.

In this mutual exchange process, the member whose animals provide most of the milk will be, according to customary law, elected by the herd owners who participate in the Shirvâreh system and is called SârVâreh (the head of Shirvâreh). Mostly the SârVâreh is either one of the Rafghis or the Pishkar. For example in one herd of the Nariyan village, the Shirvâreh system comprises of ~5 or 6 periods that last for a total of 96 days, starting on 19 June and finishing on 22 September. In the first period, the member who has the least number of livestock will receive milk for some days and in return this member’s milk is handed over to other members for some days during the next period of Shirvâreh. If this member receives the daily milk of the herd for 2.5 days in the first cycle, the milk will be given to the head of Shirvâreh on 1 day. In the first period, the number of days on which milk is given to the SârVâreh by the other members of the Shirvâreh are only few. Instead, more milk will be given by the SârVâreh in this first period, which lasts usually less than 10 days, to members who have but a few livestock. Regarding Table 1, it is important to notice that on average the amount of daily milk obtained from the herd in every period is less than in the previous cycle, for example, 60 Man in the first period, 1, 28, 52, and 20 and 18 Man in the second, third, fourth, fifth and sixth periods, respectively. In Table 1, line 6 the number of lactating livestock and non-lactating livestock are 439 and 174, respectively, and the total number of milking days in each cycle is 9.5, 19, 38, 20, 8.5 and 1, respectively. Each milking day has two milkings (morning and afternoon), so that the total number of milkings on these days is 19, 38, 76, 40, 17 and 2, respectively.

Based on the amount of milk borrowed in one period, that amount will be returned in the next period. Therefore, it is important to record the daily milk yield of every member’s animals separately to know the exact amount of milk that was borrowed and returned with respect to the total daily amount of milk, and the amount of milk given to each member during the various periods. For example, in the first period, milk is given to Mr Ta-Sha from 1.5 days or three milkings (see Table 1), because those herd owners who have more animals than others in the same herd should get less milk than the others in the first cycle. Mr Ta-Sha is an owner who has the second highest number of animals in the herd. Therefore, he receives less milk than other pastoralists in the first cycle. The calculation of milking days depends on the amount of milk borrowed and also on the amount of milk produced on all days. Mr Ali-Sab has received milk for 5 days. These days were measured based on the total amount of milk produced daily and also the amount of milk that he handed over to other pastoralists in the first period. The calculation of days depends on the liability of the members that have the least number of livestock.

After the second period finishes, the third period starts, which is when the amount of milk produced is decreasing and, therefore, the head of the Shirvâreh should receive milk for 12 days and the last person will receive milk of the herd for 5 days. In the fourth period that starts on 24 August, the days of milk-sharing for every member decrease. As illustrated in Table 1, the days of the fourth period for every member are approximately half of the days of third cycle and in the fifth cycle they decrease further. On the last summer day (22 September), one milking is given to the head of Shirvâreh and another milking is given to the all the other members.

The cooperative exchange among Vâcerding members is meticulously recorded in the notebook of the SârVâreh. It shows the accuracy and delicacy of this process in which equity and equilibrium among the Shirvâreh members is the highest priority. The total amount of produced milk measured in Man in every cycle is calculated by multiplication of the average daily milk yield and the number of milking days during the six periods. These amounts decrease from the first to the last period due to the animals’ physiological response to the decreasing forage quality in the rangeland. Therefore, the total produced milk in every period comes to 570, 855, 1064, 440, 170 and 18 Man, respectively.

During the summer milking season, interviewed respondents explained that they organised themselves into a Shirvâreh in order to make better use of the limited amount of milk of each member, to earn a higher income due to the processing of milk into various dairy products, and to save time, which they may spend on their fields and in their garden work.

Management and use of rangeland resources

In this section, the mechanism of rangeland use, which was analysed in more detail in Ghorbani et al. (2013), is described briefly. Following their traditional calendar, on 30 March the pastoralists move their livestock to the lowland winter rangelands outside Taleghan, close to the Savojbolagh region (all dates given are approximate, within the range of a day or two). If the Pishkar can find a shepherd, then he will accompany the herd after the arrival of the livestock to the lowland rangelands, and take it to the rented rangelands every day. Nariyan pastoralists have to rent lowland rangelands for about 2 months in a grazing season, because the lowland rangeland located outside the Saman-Orfi of Nariyan belongs to another village. The Pishkar rents these rangelands for the entire Chakaneh. There are three herds in Nariyan village. The herds stay in the lowland rangelands until 25 May and are then taken to the rented rangelands of Middle Taleghan and, thereafter, move to Nariyan.

Nariyan village is located in Upper Taleghan, a distance that is covered by the herds in 4 days. The livestock grazes here until 16 June. These rangelands are called Beyne Rahi and are rented by the Pishkar. By the 17 or 18 June, the herds have moved to the rangelands of Saman-Orfi, i.e. the customary boundary of Nariyan village. The Saman-Orfi consists of several divisions: the high commons or Sar Kooh (Sar means up and Kooh means mountain), the middle commons or Paeen Kooh (Paeen means own) and Harim or Alaf Chin (Alaf means forage and Chin means cutting) (Ghorbani et al. 2013). The herds stay in the middle rangelands for 15 days from 22 June onwards if this area is ready for grazing. Certain rangelands close to the village, known as the Harim or Alaf Chin, are allotted by the Islamic Village Council to pastoralists
for grazing a limited number of larger animals, such as cows, and for cutting grass to be stored for winter feeding. The fact that these rangelands are close to the village and are easily accessible makes it hard to avoid overgrazing them. In autumn, the herds may stay there for 40 days.

The arrival time in the high rangelands is the same for all herds, usually 6 July. On 12 September, the herds are brought down to the middle rangelands and stay there for 13–16 days. After that, the herds arrive at the Alaf Chin rangelands and stay there for ~1 month in October. When the livestock are in the middle rangelands, every villager harvests forage from the Alaf Chin and stores it in his house, usually on the second floor of the building, for winter feeding indoors. In November and until late December, the herds are moved to the Beyne Rahi rangelands of Middle Taleghan and stay there for 2 months. In January, the herds go back to Nariyan village. Every pastoralist keeps his animals in his buildings and feeds them three times a day. In winter, livestock is fed on gathered forage and concentrates, which are procured from outside the valley before winter sets in.

Discussion

The results of this study demonstrate the role of mutual help, co-management of natural resources, such as rangelands, animals and pasture land, and social cohesion with respect to the persistence of the dairy production chain in Nariyan village. Being one of the few empirical works (e.g. Ghafari 1991; Eskandari and Chavoshi 2002; Farahpour 2002; Hedjazi 2007; Abolhassani 2011; Ghorbani et al. 2013) that have been done on communal institutions concerned with pastoral societies in Iran after the Iranian rangeland reform of 1963, it thus adds to other recent research on grassland ecosystems that have been done elsewhere (Berkes et al. 2000; Gemedo-Dalle and Maass 2006). Although there is much variability, there are distinct cultural performances in each geographical region that differ from one region to another with respect to the relationships between people and their use and management of their distinct environments, not only inside Iran. These are nevertheless unique, because the social compositions of the actors involved in the dairy production chain reflect the cultural continuity of a local cooperative rationale that provides all involved stakeholders with a security of social inclusion.

Pastoralists’ cooperation, based on reciprocity, is achieved through seasonal interactions that build up trust, reliance and responsibility. The one-herd management system in Nariyan village described naturally forms a hierarchy and a hierarchical reciprocity of milk exchange, which characterise the relationships between pastoralists and their rangelands. This exchange practice enables all, and in particular the small herd owners, to make cheese and Looor throughout the milking season. Furthermore, Shirvâreh has become a survival necessity in times of restricted rangeland access due to the dependence on grazing permits issued by the Islamic Village Council and the seasonally decreasing availability of milk during the summer months.

Participation in the Shirvâreh is an institution of traditional cooperation between different occupational roles, as group involvement and participation improves motivation and also increases efficiency in the organisation of working obligations. The Shirvâreh system of reciprocal milk-sharing and cooperation in dairy production is a form of integrated co-management, temporarily bringing small herds into a larger one for a ranching period of 9 months that provides all livestock owners with an increasing amount of milk to be shared among themselves and more time at their individual disposal as well as with an increased income from the sale of several value-added dairy products in summer.

Increased productivity, based on pastoralists’ reciprocal cooperation, is one of the characteristics supported by findings from prior research showing that indigenous institutions are apt to increase ecosystem productivity rather than only maintaining it (DeWalt 1994; Bollig and Schulte 1999). The full potential of the rangeland ecosystem productivity might be at stake if the communally based co-management of the pastures would cease to exist and individual grazing with smaller herds would be performed without or with marginal coordination only or the rangelands would become wastelands. This could happen once land use by rural pastoralists becomes economically unviable or not attractive due to other socioeconomic reasons. Shirvâreh, as a socioeconomically relevant institution among pastoralists, is essential for the livelihood of all, not only the pastoralists in Nariyan. It functions as a sort of social insurance institution that is based on a traditional hierarchy but likewise on equity, equilibrium and social justice, and is, therefore, locally taken as a form of customary law that is rarely violated, but seriously controlled by local stakeholders with a good reputation.

The emergence of social cohesion in the summer dairy production chain is a form of social capital at the community level that is transformed into economic capital at the individual level. Social capital and the institution of Shirvâreh are, as this example shows, important for the sustainable management of renewable natural resources (Altman and Cochrane 2005; Plummer and FitzGibbon 2006). This, however, is again largely dependent on the co-management of rangelands together with the involved government agencies in Iran (Abolhassani 2011) who have taken the formal lead in land management after the land reform of 1963.

Conclusions

Rangeland management in the Taleghan Valley of northern Iran happens in an ecological niche that provides the semi-sedentary pastoralists with income. Based on customary forms of collective action, it keeps social cohesion and local institutions, such as Shirvâreh, Hamvâregan and Vâcerding, as being the local form of collective action; Pâniery fulfilling a social role, and Chakaneh, providing an amalgamated herd – alive and economically functional for the pastoralist community in the Taleghan Valley. The interaction between a livestock-oriented culture and the various livestock owners and their managers in it, sustain an environmentally relevant sector in the animal husbandry and dairy sector in this particular region of Iran. This contributes to the rural livelihood of pastoralists besides providing a small income from subsistence agriculture and horticulture.

Iran is composed of various distinct regional cultures with longstanding traditions of locally based communal production. Pastoralism in rural Iran, being largely a tribal society with a nomadic legacy for thousands of years, has, however, been
wanning over the past decades. This has paved the way for modern food production industries, but the local ethnic identity in traditional dairy cooperation remains a hallmark of persistence of regional identity.

With a possible decline of such local forms of communal cooperation in dairy production, rural cultural traditions in the co-management of natural resources of pastoralist communities and the economic living standard of an entire region, such as Taleghan, would probably be diminished. Whether an equally efficient system of dairy production could replace the traditional one and work as well with a modern cooperative system is an open question. Whether such a modern system would be able to address cultural issues, social cohesion and the use and management of rangelands and the benefits it renders to the pastoralists in a similarly well adapted way remains to be seen. Yet, it seems that, despite the politically induced changes in the 1963 Iranian land-use regime, the dairy production system in the Taleghan region has not been negatively affected in its salient features. So far, the traditional mode of production has been able to counterbalance adverse effects on the degradation of rangelands that could have hampered the local dairy production culture. Thus an important source of income has been proven to be a robust and well adapted system to cope with uncertainty in society and the environment. With regard to a comparison of this, as far as the authors’ knowledge could trace, with similar systems of reciprocity in the exchange of milk for the local dairy production chain, this is a unique form of cooperation. It is an outstanding example of persisting practices. It was able to carry on against an overwhelming current that has been eliminating many a local production tradition during the recent decades.

Iran is, according to its self-consciousness that boosted modernisation processes in many of its economic sectors after the Iranian Revolution of 1979, different from other cultures in arid and semiarid regions where rangeland management and dairy production have an age-old tradition as well. Economic modernisation, even in an Islamic country, follows the rationale of competition and raising the respective entrepreneurs’ shares in productivity and market access, which almost automatically would lead to dissolving traditional economic ties of social cooperation, mutual aid and reciprocity. However, this case study shows how an economic sector that is inspired by traditional knowledge and certainly not favoured by the economic modernisation strategy of the state, maintains a self-reliant local subsistence economy. It thus keeps the local cultural identity of a pastoral community institution alive, providing evidence that sustainable dairy production is possible and economically viable even under conditions of an enforced societal transition from an archaic pastoralism to an officially declared rapidly modernising economy. As far as future research is concerned, it seems essential to have more such information on local knowledge as was provided above of the communal institutions of rangeland co-management taking their distinct ethnic patterns into account. As a policy recommendation, the responsible government institutions should enable, facilitate and support regional and local forms of resource-use traditions that have given evidence of their social, environmental and economical sustainability for such a long period of time, particularly under often an adverse political framework.

Glossary

- **Bãrrah Vã**: shepherd who takes care of animals below the age of 6 months.
- **Bãrrimãl**: an enclosed place with a fence or wall for livestock milking.
- **Chakaneh**: a traditional institution in which small herds are united to form a larger one.
- **Eil**: tribe.
- **Gãlleh Vã**: shepherd who takes care of animals above the age of 6 months.
- **Hamvãregan**: a seasonally organised group that unites individually owned smaller herds into a big one.
- **Khanevar**: the lowest social class in societal structure of nomads.
- **Loor**: a cottage cheese-like dairy product.
- **Mas**: unit of 3 kg of milk.
- **Pãniry**: a pastoralist who weighs and documents the amounts of milk belonging to each livestock owner in spring.
- **Pishkar**: the head of a united herd.
- **Olad**: the fourth class in the social structure of each Eil.
- **Saman-Orfi**: a local geographic area, which is well known and recognised traditionally according to legal and social aspects by the villagers.
- **SãrVãreh**: the head of Shirvãreh.
- **Shirvãreh**: a social institution for the management of the milk of each herd during the milking season.
- **Rafigh**: a herd owner who works together with the Pishkar in the management of the herd during the milking season.
- **Taraz**: owner of a few animals or a small herd who mostly stays in the village and gives them to the one herd cared for by the Pishkar and Rafighs.
- **Tayye**: the second class in the societal structure of an Eil.
- **Tire**: the Third class in the societal structure of an Eil.
- **Vãcerding**: mutual borrowing of milk during the milking season.

References


Communal institutions of dairy production


