



## GOAT BREEDING IN IRAN: SITUATIONS, PROBLEMS AND APPROACHES

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**Abstract:** Goat and sheep breeding observe all together by rural and nomadic people as a traditional work for their livelihood and income earning in many arid and semi-arid regions of Iran. Goats traditionally had a strong influence on the socio-economic life of human populations, especially in rural and less favored regions of the world. In these regions this livestock constitutes an important source of proteins by converting different natural resources of lower quality. Due to their high tolerance to heat stress goats can be survive and produce in the most marginal regions of the world. On the other hand goats when are managed well contribute on the preservation of the ecosystems and can be used as an ecological tool for controlling the noxious weeds, reducing the incidences of wildfire, improving the rangelands and wild life habitat. Goats are raised principally for their meat, milk, fibre and skin. Goat farming can be very suited to production with other livestock such as sheep and cattle on low-quality grazing land. The impact of this breed on the carpet and meat industries in the areas where it is farmed is large which make it attractive to study to attempt to understand and potentially improve production and production efficiency. The aim of this article was to study the present situation and the trends of goat production and rearing as an essential tool for sustainable livelihood of rural and nomadic people in arid and semi-arid regions, with emphasizing on the cashmere-producing goats in South Khorasan province, east of Iran.

**Keywords:** Goats, Breeding structure, Raeini, Cashmere, South Khorasan, Iran

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### 1. Introduction

12,000 year old paintings of goats have been found on the walls of caves in Europe. Goats were the first animals domesticated by human in 10,000 B.C. (McKenzie-Jakes, 2007).

Goats were the first animals to be used for milk by humans. There are over 210 breeds of goats in the world. There are approximately 450 million goats around the world (McKenzie-Jakes, 2007).

In the developing countries, goats make a very valuable contribution, especially to the poor in the rural areas. The importance of this valuable genetic resource is underestimated and its extent of contribution to the livelihood of the poor is inadequately understood. They are often neglected in comparison with cattle and sheep. Part of this attitude towards them can probably be due to a recognition of their capability, rather any prejudice against them, as it is believed that goats are intelligent, independent, agile, and tolerant to many diseases and parasites and can look after themselves much better than other livestock species (Abdel Aziz, 2010).

The geographical and ecological conditions of Iran are well-suited to small ruminant production. The relatively low cost of sheep and goat farming (local breeds – well adapted to their environment plus extensive free communal grazing areas) and the increasing demand for expensive organic products in domestic and regional

export markets encourages nomads to shift to organic production livestock production (Ansari-Renani, 2016).

Goats traditionally had a strong influence on the socio-economic life of human populations, especially in rural and less favored regions of the world. In these regions this livestock constitutes an important source of proteins by converting different natural resources of lower quality (Skapetas and Bampidis, 2016).

Due to their high tolerance to heat stress goats can be survive and produce in the most marginal regions of the world. On the other hand goats when are managed well contribute on the preservation of the ecosystems and can be used as an ecological tool for controlling the noxious weeds, reducing the incidences of wildfire, improving the rangelands and wild life habitat (Skapetas and Bampidis, 2016).

Goats are remarkably agile and will climb trees to browse. As with other herbivores, the number of animals that a goat farmer can raise and sustain is dependent on the quality of the pasture. However, since goats will eat vegetation that most other domesticated livestock decline, they will subsist even on very poor land. Therefore, goat herds remain an important asset in regions with sparse and low quality vegetation (FAO, 2013).

Nowadays goats and sheep face serious environmental challenges (degradation of rangelands, competition for



land use, less water availability etc.). On the other hand climatic changes creates additional difficulties on the small ruminant farming. Thus the needs of policy on more research, organization and extension are increased (Skapetas and Bampidis, 2016).

Agricultural sector accounts for about 1/3 of the Iranian GDP and 1/4 of the country workforce. More than 90% of the Iranian food requirements are produced in the country. Animal agriculture covers over 40% of the agricultural activities. More than 57% of the available animal units in the country are sheep and goats. Iranian goat and sheep industry is characterized by owned by small farmers, based on extensive grazing, highly influenced by the environmental variables, its increment rate is declining in comparison with the past decades because of urbanizations industrialization and low income. Iranian goats are not grouped well according to their products importance. More than 20 breed of goats have been recognized in Iran but the two typical breeds are Marghoz and Raeni goats which produce attractive and expensive mohair and kashmir fiber (Mueller et al., 2015).

The overall reproduction performances of Iranian sheep and goats are lower than the exotic pure breeds. It seems the variability in environmental patterns such as low rainfall and feed shortage, uncertainty in farmers' income and market conditions will be the most important factors in pushing the compulsory transition in Iranian sheep and goat industry. This transition may have critical effects on the animal-based food security mainly red meat. Therefore, more attention is required from the government and non-governmental organizations for handling this trend to the well-managed right direction (Abdel Aziz, 2010).

Similar to sheep, goats are kept for producing different products including, meat, milk, fiber, hide, etc. The two main breeds are known for their Mohair and Kashmir production. Hide or skin marketing mainly of small ruminants is an open and real ongoing market throughout the year in all Iranian cities. Nearly all of the produced skins are exported (Valizadeh, 2008).

Goats and sheep breeding all together in many rural areas of Iran. During author visiting from very disadvantaged villages near city of Sarbisheh, close to Afghanistan borders, with 295 km distance to city of Birjand, center of South Khorasan province, and east of Iran. Their main employment are rearing of goats, sheeps and chicken, plus carpet weaving in their peasantry and traditional houses (Figure 1).

## 2. Material and Methods

In this study, Information were collected through face-to-face interviews with the rural and nomadic people that their main employment are rearing of goats and sheep or one of his/her household members that author could access to them in Iran. Statistical unit is an agricultural holding with livestock units' activity, which at least has two heads of small livestock (sheep and goats). The

information is collected by interview in case of availability of the holders of goats and sheep, otherwise, by interview with the local informants. Also the data of goat number, goat milk, meat and raw skins etc. in the different continents and countries were taken from the FAO data base, Jihad Agriculture Organization of Iran, National Bureau Statistics of Iran etc. These data are processed statistically and analyzed further in order to arrive in appropriate conclusions. Also author utilized scientific journals and sites, his experiences, observations, interviews, pictures etc. that gathered them during two decade work and visiting rural and nomadic regions in various parts of Iran, specially in main locations of research namely South Khorasan province, east of Iran and Chaharmahal and Bakhtiari Province and its situation in south west of Iran (Figure 2).



Figure 1. Goats and sheep breeding all together in many rural areas of Iran (Pictures by author. Autumn, 2017).



Figure 2. Map of main locations of research namely South Khorasan province, east of Iran (A) and Chaharmahal and Bakhtiari Province in south west of Iran (B).

### 2.1. Worldwide Trends and Orientation of Raising Goats

The general trends of goat production systems are increasing size of farms, while reducing their number, decreasing pastoral practices in the milk production,

enlarging the stocks of major milk producing breeds and increasing the number of projects for the conservation of local breeds (Chetroui, et al., 2014).

Currently worldwide, raising goats sector tends to become increasingly important for the national economies, being even a factor of economic development, particularly for rural areas. In all countries, due to accelerated increasing of human population number, resorts to more efficient exploitation of animal resources, applying more efficient technologies for breeding and exploitation of zootechnical interest animals. Competitiveness and profitability of goat milk on the world market are closely linked with seasonal production, livestock and productivity.

Over two thirds of the goats are grown in tropical and subtropical areas of the world, but yields from these are much lower compared to that of goats in temperate regions. This is due to poor feeding conditions and exploitation of less productive breeds (Chetroui, et al., 2014).

### 2.2. Fibre Production from Goats

Cashmere is the fine, undercoat fibre (down) of cashmere goats. Cashmere is a luxury fibre regarded as one of the softest and warmest animal fibre principally used for clothing. Main producing countries of cashmere are China and Mongolia (60-70%) and Iran and Afghanistan (20-30%) (Ansari-Renani et al., 2013).

Being expensive, cashmere necessarily have a market which is limited to wealthy consumers who buy luxury goods not only for its intrinsic qualities of appearance, softness, warmth, handle and comfort but also simply because they are rare and expensive.

Of the 25 million goats in Iran, 5 millions are cashmere producing and the remaining goats produce small quantities of cashmere. Exact quantity of cashmere production and export of Iran is not known but it can be estimated that 5 million cashmere goats produce about 2000 tons of cashmere annually. This quantity of cashmere is exported either as raw unde-haired (70%) or processed (30%).

More than 90% of the Iranian cashmere is produced by Raeini and Birjandi goats in Kerman and South Khorasan provinces respectively (Ansari-Renani et al., 2013).

In South Asia, cashmere is called "pashmina" (from Persian pashmina, "fine wool"). In the 18th and early 19th centuries, Kashmir (then called Cashmere by the British), had a thriving industry producing shawls from goat-hair imported from Tibet and Tartary through Ladakh. The shawls were introduced into Western Europe when the General in Chief of the French campaign in Egypt (1799-1802) sent one to Paris. Since these shawls were produced in the upper Kashmir and Ladakh region, the wool came to be known as "cashmere".

The quality of Iranian cashmere being long and highly curved ranks third after China and Mongolia. At present no price differential is paid to the producers for fine cashmere, as a major portion of cashmere is exported with some added value through processing (Ansari-

Renani et al., 2013).

A major portion of cashmere is exported without any added value through processing. As a result of the marketing system, Iranian producers do not achieve good prices and have little incentive to produce better quality cashmere (Ansari-Renani, 2018).

### 2.3. Housing and Stocking Rate within Nomad Pastoralists in Southern Iran

Tethering of livestock is prohibited in organic farming. Basically, there was no tethering of any kind of livestock among nomads. When nomad livestock returned from grazing, adult and young animals were penned separately near the tent in circular-shaped pens made up of wood, fenced overnight and milked in the morning before being taken out for grazing (Ansari-Renani, 2016).

In organic farming, it is obligatory that ruminants should graze on pastures ('free-range') and not fed in stables as long as the animal, weather and pasture conditions are suitable. If grazing is not possible, a permanently accessible open-air run is obligatory. Free-moving stables with permanent access to open-air runs are the principle of ruminant keeping. Only with permanent summer pasture grazing is an outdoor run not necessary, as long as the animals are not tethered.

The nomad livestock were not fed in stables or in restricted areas, but moved and grazed freely in extensive open grazing areas. Nomad families used the northern highland rangelands in spring and summer for grazing and migrated to the warmer southern Persian Gulf provinces in autumn and winter (Figure 3).



Figure 3. Nomadic goat raising.

The nomadic pastoralists had no fixed homesteads and covered great distances with their livestock following pasture availability throughout the seasons. The transhumant pastoralists followed a regular seasonal movement between set areas. Their movement was vertical where pastures at high altitudes are used in summer and pastures in the lowlands are used in winter or horizontal in the surroundings. Consequently, the livestock density (stocking rate) in Baft varied throughout the year, with the highest number of livestock and people in summer (Ansari-Renani, 2016). Establishing a wind water pump for producing new, safe, cheap and renewable energy resources and extracting

groundwater resources for goat and sheep herds of nomad people, for improving their life conditions plus watershed management and pasture planting activities by CSP (International project of Carbon Sequestration) near cities of Sarbisheh and Nehbandan in South Khorasan Province- East of Iran (By CSP. 2009 to 2012) (Figure 4).



Figure 4. Establishing a wind water pump.

### 3. Results and Discussion

Agricultural sector accounts for about 1/3 of the Iranian GDP and 1/4 of the country workforce. More than 90% of the Iranian food requirements are produced in the country. Animal agriculture covers over 40% of the agricultural activities. More than 57% of the available animal units in the country are sheep and goats (Bureau statistics of Iran, 2019).

Goats and sheep form the most important group of ruminants in Iran mainly in rural areas. More than 57% of the available animal units in the country are sheep and goats. Most of the sheep and goats keepers which are mainly small farmers regard this enterprise as a complementary enterprise to plants culture or horticulture (Valizadeh, 2008).

In developing countries, much of the milk produced by goats is for family consumption, but goat milk can also be further processed into a variety of marketable products. Marketing of goat milk and its products is still in its infancy. So far, there have been no marketing efforts attempted on a broad scale (Abdel Aziz, 2010).

The development of a professional marketing system is part of the challenge to benefit from the fact that many people consuming dairy products prefer products from goats (Abdel Aziz, 2010).

The potential of goats for sustainable supply of milk and meat for human consumption is unquestioned, and their contribution to improved nutrition of rural people is likely to increase. At the same time, goat cheese

consumption is likely to increase also in developed countries. This is attributed to the image of goat cheese being a product of natural farm conditions compared with milk and milk products from high yielding dairy cattle in large industrial farms. Regarding goat meat, rising living standards in some parts of the world and the migration of people preferring goat meat to the developed countries, have increased the demand for goat meat in these areas (Abdel Aziz, 2010).

Government programs to support goat farming should focus on research and education in the areas of breed improvement, farm management, control of infectious diseases, milk collection, processing and marketing (Abdel Aziz, 2010).

In developed parts of the world goats are considered, usually, as specialty or exotic livestock, whereas in the developing countries, especially those in South - East Asia and Africa goats constitute the major source of meat production (Ivanovic et al 2016).

Goat meat is a good source of proteins and also has health benefits when is consumed in appropriate portions. In comparison of beef, has similar protein, lower fat, higher calcium, magnesium, potassium, similar iron and lower B12 and folate contents. On the other hand goat meat contains low amount of saturated fatty acids and cholesterol and it is a healthier alternative compared to other types of red meat (Ivanovic et al 2016).

Goat meat contains low amounts of saturated fatty acids and cholesterol. It is considered to be a healthier alternative to other types of red meat.

Leather from goat skin is used for bags, boots, gloves and other products that requires soft hide. Traditionally has been a preferable material for leather bookbinding. Untanned goat skins are used in different countries as containers for water, kefir, wine etc. High quality goat skins are provided from Black Bengal breed in Bangladesh.

On average every sheep or goat keeper has 38 and 25 heads of animals respectively.

Iranian sheep and goat industry is characterized by:

- 1) Owned by small farmers
- 2) Based on extensive grazing
- 3) Highly influenced by the environmental variables (rain fall, weather, feed supply, drought etc)
- 4) Economic variability due to uncertainty in feed availability, weather, rainfall, market, export and import animal products mainly food materials.
- 5) Its number or increment rate is declining in comparison with the past decades (because of urbanizations industrialization, low income, etc).
- 6) Genetic structure and physiological characters of the most Iranian sheep and goats are not clear.
- 7) No comprehensive standard investigation had been carried out on distinguishing different breeds of these animals. What is known as breed of sheep or goat is based on the apparent physical conformation and.

- 8) All of the Iranian sheep breeds, except one (Zel breed) are fat-tail types.
- 9) Although Iranian sheep and goats are grouped according to their main product, but generally they are kept for providing different products or sources of income including meat, milk, fiber and hide.
- 10) These small ruminants are resistant to high level of inorganic minerals in feeds and forages.
- 11) Iranian sheep and goat live and produce over a remarkable wide range of environments from the desert type dry and warm climate to the mountainous cold zones.
- 12) Iranian sheep and goats appear in different color from white to the completely black and many classes between.
- 13) Iranian sheep produce mainly coarse fiber which is suitable for Iranian carpet industry.
- 14) Most of Iranian breeds are high-set animals which is a suitable character for grazing over the rocky and mountainous areas. (Valizadeh, 2008).

The main obstacles of Iranian agriculture which affects its animal agriculture as well as other agricultural disciplines can be outlined as follows:

- A. Desertification
- B. Deforestation
- C. Water shortage
- D. Erosion
- E. Low efficiency and out-put
- F. Mostly illiterate small farmers (Valizadeh, 2008).

Goats, especially dairy ones, are an ideal species for poverty reduction and economic development for the poor in developing countries. Several reasons make goats particularly attractive for poverty reduction and improvement of family food security and livelihood of the poor in developing countries:

- 1) Goats are easily acquired by the poor as they require modest starting capital.
- 2) They can easily be tended by the weak, women or children.
- 3) They provide people by valuable nutrients.
- 4) Many people cannot drink cow milk as they are allergic to it. Several studies indicated that people with cow's milk allergy could tolerate goat's milk.
- 5) The growing demand for goat meat presents an opportunity for goat fattening (Abdel Aziz, 2010).

During the research in a nomadic region – as a main source of overgrazing and destruction and pressure to pastures by their goats and sheep herds etc.- in lake Choghakhor near (7 km) city of Boldaji and near lake Choghakhor, Chaharmahal and Bakhtiari Province, south west of Iran. Plus changing pasture lands toward agricultural lands during three past decades in mountains and field of this lake by nomadic and rural people (Figure 5-6).



Figure 5. Destruction and pressure on pastures.



Figure 6. Pasture for goat and sheep raising together (August 2, 2013).

During research in Gol village (50 km distance from Birjand, centre of South Khorasan province). As observe in these field research pictures, small and peasantry farmers raising goats and sheep all together in their rural homes plus horticulture, farming etc. (Figure 7).



Figure 7. Goat raising in Gol village (Spring 2015).

Visiting of author from Jihad- Agriculture Organization near the city of Sarbisheh and its Cashmere Goat Breeding Research Station that is located in the 15 km distance to city of Sarbisheh, - and near boundary regions with Afghanistan - 90 km east of Brjand, center of South Khorasan Province, east of Iran. This Cashmere Goat Breeding Research Station established in 1998 and presently has 182 mature cashmere goats for research goals and preserving and breeding them (Figure 8).



**Figure 8.** Sample view of Cashmere Goat Breeding Research Station (By author, autumn 2019).

#### 4. Conclusion

In the nomadic system of sheep and goat production, one objective was to achieve animals' wellbeing through animal welfare-oriented husbandry and appropriate use. Curtailing freedom of movement, sensory deprivation and unsocial ways of husbandry; not allowing any contact with animals of the same species, or forcing too close a contact were not permitted in the nomadic farming system (Ansari-Renani, 2016).

Husbandry management practices, transport and slaughtering, management of livestock among nomads was a social process, and they did their utmost for the wellbeing of their animal and to avoid animal cruelty of any kind. In the nomadic system, there were no tail ducking, dehorning and tethering.

A country rich in indigenous animal genetic resources like Iran is very much suitable for adopting this farming system. Moreover, the nomadic farming system with well-diversified livestock populations in terms of species and breeds is ideal for organic livestock production.

Although the nomadic type of livestock keeping provides an excellent and 'green' alternative to industrial production, nomad pastoralists need to overcome some challenges and harness strengths and opportunities, while developing their capacity in terms of knowledge, skills, infrastructure, animal feeding, hygiene, sanitation, disease control and assured certified supply chain required for organic livestock production.

Nomad farmers need to be oriented and educated about the organic standards and how to overcome the risks they might face in adoption of organic livestock standards. The livestock advisors should be trained and skilled in providing services in livestock management

and permitted therapies in organic rearing systems. Research on the locally adaptable management and disease-preventive measures needs to be emphasized by the government and organic-promoting agencies as well as NGOs.

The potential needs to be recognized of Iranian nomad farmers to meet the requirements of organic livestock product demand, not only locally but also globally in the near future.

Organic livestock production can be encouraged through research and development efforts, including establishment of model organic livestock farms, processing units, traceability tools and capacity-building measures (Ansari-Renani, 2016).

Goat farming systems are diverse, both intensive and semi-intensive and extensive, reflecting the ability of these animals to adapt to a wide range of environmental conditions. A simplified description of the different operating systems, based on eco-regional criteria, shows that both loose housing - feeding with forage crops or on cultivated pastures and grazing meadows, or on areas that are not part of the agriculture circuit are practiced (Chetroui, et al., 2014).

The geographical and ecological conditions of Iran are well-suited to small ruminant production. The relatively low cost of sheep and goat farming (local breeds - well adapted to their environment plus extensive free communal grazing areas) and the increasing demand for expensive organic products in domestic and regional export markets encourages nomads to shift to organic production Livestock organic production (Ansari-Renani, 2016).

The severe damage that goats have caused in some regions is usually associated with high stocking density and mismanagement. Heavy goat damage is usually localized (Abdel Aziz, 2010).

Goats have a good appetite for and the ability to utilize effectively many trees and shrubs not available or not palatable to sheep and cattle. Therefore, they can be more damaging to perennial vegetation and soil stability. This is greatly realized during drought in arid zones, as goats have a reputation for being good survivors. Clearly, goats require careful management to avoid irreversible damage to the vegetation (Abdel Aziz, 2010).

Socioeconomic and political stability, availability of veterinary services, and adequate infrastructure and logistic supports are essential for implementing effective control programs. Inadequate infrastructure in most of developing countries is one of the major elements that conflict with effective implementation of building herd immunity (Mirzaie et al., 2015).

There are still the great deal that are not well understood concerning the different aspects of sheep and goat husbandry, interactions between industrialization, urbanization and the trends of small ruminants production in Iran. This fact is well known that Iranian sheep and goat population will be decreased and changed dramatically with respect to their systems, locations,

herd sizes and specialization in the future but at the same time the price of their products mainly meat will be increased. It seems the variability in environmental patterns such as low rainfall and feed shortage, uncertainty in farmers' income and market conditions will be the most important factors in pushing the compulsory transition in Iranian sheep and goat industry. This transition may have critical effects on the animal based food security mainly red meat from small ruminants which is popular for Iranian consumers. Therefore, more attention is required from the government and non-governmental organizations for handling this trend to the well-managed right direction (Valizadeh, 2008).

On average, 50% of sheep and goat population are kept under nomadic and semi-nomadic system and the remaining 50% are managed under composite system. Traditional shepherding and displacement of livestock by nomads is common countrywide. Nomads displace their herds between different provinces and within a particular province (Ansari-Renani et al., 2013).

Iran is one of the main producers and exporters of cashmere in the world, third after China and Mongolia. Of the 25 million goats in Iran 5 million are cashmere producing goats. Nomads play an important role in sheep and goats production mainly because they keep 58.5% of sheep and 39.7% of goat population of Iran. Approximately 70% of goats in Iran are of mixed breeds and their crosses, which are mainly kept for meat production, while other types are known for their cashmere (Raeini, Birjandi, Abadeh and Nadoushan), mohair (Markhoz), milk (Najdi) and meat (Tali, Adani and Native black) production (Ansari-Renani et al., 2013).

More than 90% of Iranian cashmere is produced in the eastern part of the country mainly by two breeds of goat namely Raeini in Kerman and Birjandi (Baluchi) in South Khorasan provinces. However Raeini goats mainly kept by nomad farmers is the most important cashmere producing breed both in terms of population and volume of cashmere produced (Ansari-Renani et al., 2013).

Converting extensive, range-based nomadic system to organic production could become economically attractive, if price premiums could be captured for organic meat and livestock products. Development of business models will definitely attract commercial interests and ensure that vulnerable nomadic communities receive attractive returns for their untapped treasure of organic principles. Systematic studies need to validate the animal husbandry practices of nomads with respect to organic certification, so that revision or improvement can be made wherever necessary. In this way, organic livestock products will have considerable potential for high-value niche markets (Ansari-Renani, 2016).

Also, following facts must be considered for goat milk, meat and raw skin production:

Goats continues to play a significant role in the human

nutrition. Their number is increasing more rapidly in comparison with the sheep, especially in the less developed parts of the world, indicating an increased role of this livestock in food production.

In the developing countries of the world, during the period 2000-2019 goat milk production was increased significantly.

The same thing can be said and for the goat meat and raw skin production.

### Author Contributions

All tasks have been done by single author.

### Conflict of Interest

The author declared that there is no conflict of interest.

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