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# Defining Economic Values of Important Traits in One Hump Camel in Desert Areas Rearing System

Research Article

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## ABSTRACT

In this study production, reproduction, population, management and economic parameters resulted from recording of 7 flocks with size 57 to 400 and 721 heads of camels in a cycle of reproduction, during three years from 2011 to 2013 were used to find out of the economic values of important traits in one hump camel in desert areas rearing system. The economic traits that appeared in profit equation were durability, reproduction and production traits. The economic values, economic weights and the relative importance of traits estimated by increasing one unit and one genetic standard deviation of each trait, using maximizing profit, maximizing efficiency and minimizing cost situations. The results showed that from total annual revenue in each camel (294.10 US$), 66% accounted for sale of calf and 34% resulted from the sale of culling camels. The total annual cost in each camel (72.95 US$), feed, labour and management, facilities, drug and treatment and interest of investment accounted by 40.23%, 34.49%, 7.18%, 1.42% and 16.67%, respectively. The average annual profit and profit to cost ratio in each camel were equal to 221.15 US$ and 3.03, respectively. Relative importance of different group of traits for average of the herds were 58.44% for durability traits (survival rate in camel 14.31%, survival rate in calf to weaning age 34.74% and longevity of camel 9.39%), 24.33% for reproduction traits (conception rate 14.31%, calving interval -8.99%, and age at first calving -1.03%) and 17.23% for production traits (calf weaning weight 13.60%, weight of female replacement -1.09% and weight of camel 2.53%). Relative importance of durability traits resulted from maximizing efficiency and minimizing cost decrease steadily and added to the relative importance of reproduction and production traits. The estimated relative importance of different traits got in this study, could be used to form multiple trait selection indices to one hump camel breeding programs in desert areas rearing system.

KEY WORDS breeding objective, camel, desert areas, economic weight.

## INTRODUCTION

The first step in designing breeding programs is to decide on the breeding objective and the most important reason for inefficiency in breeding programs, will be mislead the breeding goals that increase the emphasis on the incorrect traits to apply (Clarke *et al*. 1991; Goddard, 1998). The breeding goal is a function of the traits that follow the purpose of development and the production system, affecting profitability and their genetic improvement. Breeding ob-

jective and economic values of traits that affect profitability have not been set in none of the most common breeding systems in camel. Arid and semi arid zones constitute a large part of the Iran, which characterized with low rain, prolonged drought, rare vegetation and hot temperature. The camel proved to be the most suitable habituate and the best user of available feed under such circumstances. The most of country's camel is dromedary and scattered in 14 provinces (Salehi and Gharahdaghi, 2013). Nearly 80000 dromedary camels are living in desert areas (South and Central) of Iran; it is 0.29% of the world camel population (FAO, 2014), but the share of camel in meat and milk production is low. The camel is ignored as a source of food supply from the low-quality feedstuffs and no improvement is aimed at increasing its productive capacities. There are two methods selection and mating to achieve genetic improvement. No methods of improvement have been applied to the camel in Iran, except a low selection based on phenotype and a little effect of unintended migration.

Genetic breeding programs in camel faced with the most fundamental problems caused by some reasons such as inadequate recording traits and pedigree, small flock size, no genetic connectedness between flocks and lack of genetic evaluation within and across flocks of camels. To overcome these problems, implement a specific type of group breeding program or open nucleus program proposed by Hermas (1998). We must determine the breeding objective and the relative importance of traits in the breeding objective list at first, to define and fulfil such programs. Thus the objective of this study was cost-benefit analysis and defining economic values of important traits in one hump Camel in desert areas rearing system in Iran.

## MATERIALS AND METHODS

### Data and herd management

In order to estimate of production, reproduction, population dynamics, and economic parameters, needed to find out the profit equation and extract breeding objective and economic values, the number of 7 herds with 1112 camel heads contain 721 female breeding camels rearing in desert regions in Iran (Yazd province) were recorded for a reproductive cycle, from the beginning of December 2012 and March 2014. The management of considered herds was semi-extensive or semi-rural. This means that the camels allowed to move several kilometers up to certain radius in the desert rangelands and looking to take grass of the ranges during days, and kept in a fairly enclosed places or temporary embankments built from local materials (such as clay, old tires, wood), to keep the herd to avoid the grazing crops around and avoid going camels crossing the road and railway track and possible accidents at nights.

Usually the locate of keeping the herd at night was near to the water resource and a person uses a motorcycle to uphold the herd of camel.

For slight fattening calves or complementary feeding at certain times of the year, such as during mating time or during parturition of camels, they bought the feedstuffs planted in alongside farms and the need to concentrate or other feeds that cannot be planted in the area, supplied from the other regions.

### Animal flows and events

Figure 1 shows a diagram of animal events and animal flows of a theoretical herd of 1000 breeding camels assumed for convenience of calculations. This represents the number of camels present over the entire period. The values calculated can rescale to any desired herd size. The four categories were distinguished according to age included calves (0 to weaning age at 6 to 9 months old), replacement (weaning age to 3 yr old), breeding female camels (>3 yr to ≥12 yr old), and breeding male camels (>3 yr to ≥6 yr old). According to equal sex ratio, assumed 50% of calves born were males and 50% females. Usually the mating between males and female breeding camels occurred in Dec. to Feb. in each year and with an average conception length equal to 13 months, the calving occurred in spring. Calves fed with mother's milk and pasture in rangeland to 6 to 9 months of age and extra calves (male and female) sold after weaning and slight fattening when reached more than 4 times of birth weight.

### Profit equations

Total annual profitability (TP) in US$ in each breeding female camel, calculated by the following equation.

$$TP = \sum_{i=1}^{4} R_i - \sum_{i=1}^{4}\sum_{j=1}^{5} C_{ij}$$

Where:

$R_i$: average annual revenue earned from selling of live weight of ith group of animals (calves, replacement, culled female breeding camel and culled male breeding camel).

$C_{ij}$: jth sources of annual costs (feeding, labour and management, equipment, veterinary and drug, the interest of investment) of the ith group of animals.

In this study revenue from milk production excluded from revenue calculations because the observations of considered herds showed the milk produced by female camel be low and consumed by family and labour. The partial revenue (R) and cost (C) equations of profit equation were as follows:

$$R=\left[\left(Src\times Cr\times Srh\times Wth\times Prh\right)\times\frac{12}{Ci}\right]-\left[\left(Frh+Mrh\right)\times Wth\times Prh\right]+\left[Fcc\times Wtfc\times Prcc\right]+\left[Mcc\times Wtmc\times Prcc\right]$$

$$C=\left[\left(Src\times Cr\times Srh\times Wth\times Coh\right)\right]+\left[\left(Frh+Mrh\right)\times Wtrh\times Corh\right]+\left[1\times Wtfc\times Cofc\right]+\left[0.05\times Wtmc\times Comc\right]$$

The unit, abbreviation and mean of production, reproduction, durability and economic traits got from considering herds used in profit equation are shown in Table 1.

**Derivation of economic values**

In the selection index theory, the breeding objective is defined as a linear function of the traits which must be improved, each trait multiplied by it's economic value, which is the value of the unit change in the trait while keeping the other traits in the breeding objective constant (Hazel, 1943). In this study, a deterministic static model that assumes no variation in the characteristics among animals used for calculating of economic values for important economically traits of camel. The economic values and economic weights of traits estimated by increasing one unit and one genetic standard deviation of each trait, while keeping constant the other traits in the breeding objective. The economic values, economic weights and the relative importance of traits considered calculated for the three different situations, including maximizing profit, maximizing efficiency and minimizing cost. The relative importance's (RI) of different traits was calculated as following formula to comparisons between different economic values.

$$RI_i=\frac{EV_i\times GSD_i}{\sum_{i=1}^{t}\left|EV_i\times GSD_i\right|}\times 100$$

Where:

$RI_i$, $EV_i$ and $GSD_i$: relative importance, economic value and genetic standard deviation of ith trait, respectively.

Genetic standard deviations (GSD) estimated by the square root of heritability (taken from literature) multiplied by the phenotypic variance for each trait. For binomial traits, based on the trait probability (p) obtained in the considered herds, phenotypic variance was estimated as p × q (where q=1-p).

## RESULTS AND DISCUSSION

The annual cost-benefit analysis in each category of animals (US$), per breeding camel shown in Table 2.

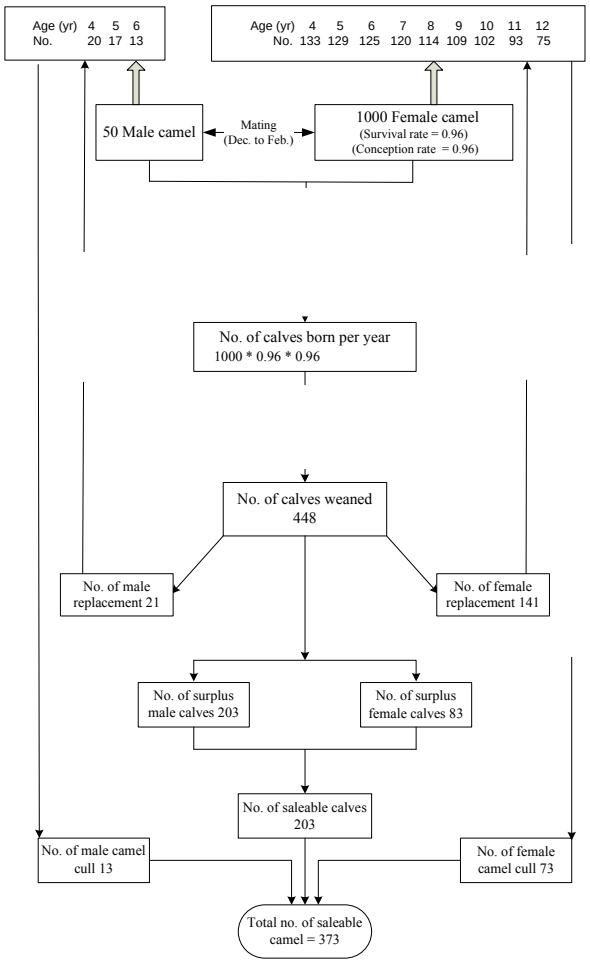


**Figure 1** Herd dynamics for one hump Camel in desert areas

The values in Table 2 are weighted by share of each animal category with respect in each camel. The only source of income in the considered herd was sale of live weight of fattened male and female surplus calves and culled male and female camels. From total annual revenue in each head of camel (294.1 US$), 66% (194 US$), accrued from the sale of surplus calves and 34% resulted from the sale of culling camels.

It should be mentioned that camel milk sales were not common and were not considered a source of income, however, in some of the considered herds the camel milk production consumed by the family. From total annual costs in each head of breeding camel (72.95 US$), feeding, management and labour, equipment and medicine, accounted 40.23, 34.49, 7.18, and 1.42 percent, respectively, and interest of investment used in breeding camel was 16.67 percent (Table 2).

Also, the value of 81.12, -8.25, 21.14 and 5.98 percent of total annual profit in each breeding camel (221.15 US$), resulted by surplus calves, replacement, culled female and male camels, respectively. However, negative profit earned in replacement category.

**Table 1** The characteristic of some traits got from herds of camel used in profit equation

| Trait | Unit | Abbreviation | Mean | Standard deviation |
|---|---|---|---|---|
| | | **Production** | | |
| Body weight of calf at sale | kg | Wth | 185 | 23.74 |
| Body weight of female replacement | kg | Wtrh | 270 | 25.50 |
| Body weight of female camel | kg | Wtfc | 360 | 28.46 |
| Body weight of male camel | kg | Wtmc | 410 | 30.05 |
| | | **Reproduction** | | |
| Conception rate | % | Cr | 96 | 19.6 |
| Calving interval | Month | Ci | 22 | 1.99 |
| Age of camel at first conception | Month | Acfc | 35 | 1.99 |
| | | **Durability** | | |
| Survival rate of camel | % | Src | 96 | 19.6 |
| Survival rate of calf | % | Srh | 89 | 31.3 |
| Longevity | year | Lon | 7.09 | 1.99 |
| | | **Economic** | | |
| Price of kg calf live weight | $ | Prh | 3.33 | - |
| Price of kg cull camel live weight | $ | Prcc | 2.88 | - |
| Cost of kg calf live weight | $ | Coh | 0.87 | - |
| Cost of kg replacement live weight | $ | Corh | 0.38 | - |
| Cost of kg female live weight | $ | Cofc | 0.09 | - |
| Cost of kg male live weight | $ | Comc | 0.16 | - |
| | | **Management** | | |
| Female calf replacement rate | % | Frh= 1/Lon | 14.1 | - |
| Male calf replacement rate | % | Mrh | 2.1 | - |
| Female camel culling rate | % | Fcc | 7.3 | - |
| Male camel culling rate | % | Mcc | 1.3 | - |

**Table 2** Annual cost-benefit analysis of animals in each category (US$) per breeding camel

| Relative to female camel | Group of animal | | | | | | | | | Total | Proportion of total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Calf | | | Replacement | | Female camel | | Male camel | | | |
| | Weaned | Surplus male | Surplus female | Male | Female | Breeding | Culled | Breeding | Culled | | |
| | 0.448 | 0.203 | 0.083 | 0.021 | 0.141 | 1 | 0.073 | 0.05 | 0.013 | | |
| **Revenue (R)** | | | | | | | | | | | |
| Sale live weight | 194.00 | | | - | | 83.22 | | 16.88 | | 294.10 | 100 |
| **Costs (C)** | | | | | | | | | | | |
| Feeding | 5.87 | | | 7.34 | | 14.67 | | 1.47 | | 29.35 | 40.23 |
| Management and labor | 5.03 | | | 6.29 | | 12.58 | | 1.26 | | 25.16 | 34.49 |
| Equipment | 1.05 | | | 1.31 | | 2.62 | | 0.26 | | 5.24 | 7.18 |
| Veterinary and drug | 0.21 | | | 0.26 | | 0.52 | | 0.05 | | 1.04 | 1.42 |
| Interest of invest-ment | 2.43 | | | 3.04 | | 6.08 | | 0.61 | | 12.16 | 16.67 |
| Total costs | 14.59 | | | 18.24 | | 36.47 | | 3.65 | | 72.95 | 100 |
| Profit (P=R-C) | 179.41 | | | -18.24 | | 46.75 | | 13.23 | | 221.15 | - |
| Efficiency (P/C) | 12.29 | | | -1 | | 1.28 | | 3.62 | | 3.03 | - |

The last row of Table 2 shows economic efficiency (profit divided by total cost) for each category of animals. The highest economic efficiency saw for calves (12.29), adult male camel (3.62), adult female camel (1.28) and replacement (-1), respectively. The negative sign of economic efficiency got for the replacement shows the value of revenue of this category of animals was less than their total costs.

The total annual economic efficiency in each breeding camel (3.03) earned in this study shows that rearing of camel in a desert area in Iran is a profitable enterprise because the profit was more than 3 times of the costs.

The profit equation modelled in this study showed the production traits (calf weight, replacement and adult camel weight), reproduction traits (conception rate, calving interval and age of camel at first conception) and durability

traits (survival rate of camel, the survival rate of calf and longevity in camel) were as breeding objective of rearing camel in the desert area of Iran, because these traits affected profitability directly and had non-zero genetic variance.

Economic values, economic weight and relative importance of camel traits of maximum profit situation shown in Table 3. The absolute economic values of traits show that with an increase of one unit in each trait, while the other traits kept constant at the average level of the herds, how much profit will increase? The economic weight of each trait shows the change in profits resulted from an increase of one genetic standard deviation of the desired trait, and the relative importance shows the weight of each trait with an increase of one standard deviation genetic trait expressed as a percentage. Economic values, economic weights and the relative importance of considered traits are comparable by sign and value. The positive sign shows the trait will increase profitability and reverse negative sign suggests a decrease in profitability by increasing the relevant trait. For example, one kilogram increase in calf body weight leads to increased 9.68 dollars in profits, while one month increase in calving interval will decrease profitability as much as 13.19 dollars. Thus, the increase in traits such as body weight in calf and camel, conception rate, survival rate in calf and camel and longevity increase profitability and on alternative, increase in replacement body weight, calving interval and age at first conception will lead to reduce profitability. Among considered traits, longevity had the highest economic value (13.78), but when adjusted to one genetic standard deviation, the calf survival rate is the most important trait affecting profitability (with relative importance equal to 34.74). The durability traits accounted to the major part of total relative importance (58.43%) and to maximize the profitability, should focused on improving these traits at first and then improve reproduction traits (24.29%) and production traits (17.23%), respectively (Table 3).

The values shows that an increase of one unit in each trait, while other traits kept constant on the average values, benefit-cost ratio (efficiency rate) will change by the values given for the economic value for each trait (Table 4). With an increase of one unit in the traits that have positive economic value, the profit to the cost ratio increase and for traits that have negative economic value, the benefit-cost ratio will reduce by economic values. For example, one kilogram increase in calf body weight leads to improve 1% in the ratio of profit to the cost, while by increasing one month in calving interval, benefit-cost ratio will reduce by 18.08%. Again, similar to the results got by the maximum profit situation, the survival rate of the calf had the highest relative importance (29.81%) among considered traits on the economic efficiency.

Also, in maximizing efficiency situation, durability traits, reproduction traits and production traits with relative importance 56.10%, 25.54% and 18.36% were the most important traits which should be improved, respectively.

An increase of one unit in each trait, while other traits kept constant on average values, the cost - revenue ratio will change by the values given for the economic value for each trait (Table 5). With an increase of one unit in the traits that have positive economic value, the cost-revenue ratio increase and for traits that have negative economic value, the cost-revenue ratio will reduce by economic values. In this situation unlike to maximizing profit and efficiency situations, the values with negative sign are favourable. For example, one kilogram increase in calf body weight will reduce cost-revenue ratio by 0.06%, while increasing one month in calving interval, leads increase 1.17% in cost-revenue ratio. Again, similar to the results got by maximizing profit and efficiency situations, the survival rate of the calf had the highest relative importance (29.81%) and durability traits, reproduction traits and production traits with relative importance 55.31%, 26.21% and 18.48% will be the most important traits which should improve, respectively.

Although the study covered only 7 herds for direct recording and interviewed to take information, but the results for average production, reproduction and durability traits, as well as the dynamic camel population resulted in this study can be as a measure for comparison with other herds rearing under conventional systems in desert areas. It was found in the literature review that there is little information on the performance of different traits in the camel breeding under conventional farming systems and out of the station. The average weight of adult camels (360 kg), average calving interval (1.83 yr) and the average age at first calving (4 yr), obtained in this study were slightly less than the values 390 kg, 1.86 yr and 4.13 yr reported by Hermas (1998) and Hermas (1998). The calf mortality rate, especially in arid areas is high and sometimes reaches to 25% (Hermas 1998), which is more than mortality rate estimated in this study (11%). The average calving interval was 2.6 yr in camels dual-purpose breed developed under the nomadic system in Ethiopia (Simenew *et al*. 2013), which is higher than the amount obtained in this study, but in agreement with values obtained in this study (4 yr) the first calving occurred in 4 to 5 years of old. The average of economic or productive life resulted in this study (7.09 yr or 5 calving) was equal to the reverse of replacement rate (0.141). Due to differences in genetic potential and environmental causes, this is not agree with results reported in Afar and Issa camel breeds, which can experience 8 ± 3 calving in their lifetime (Tefera and Gebreah, 2001; Simenew *et al*. 2013).

Table 3 Economic values, economic weight and relative importance of camel traits of the maximum profit situation

| Trait | Economic value ($) | Genetic standard deviation | Economic weight ($) | Relative importance (%) |
|---|---|---|---|---|
| **Production** | | | | **17.23** |
| Body weight of calf at sale (kg) | 9.68 | 13 | 12.58 | 13.60 |
| Body weight of female replacement (kg) | -0.07 | 15 | -1.01 | -1.09 |
| Body weight of female camel (kg) | 0.13 | 18 | 2.34 | 2.53 |
| **Reproduction** | | | | **24.29** |
| Conception rate (%) | 3.01 | 0.044 | 13.24 | 14.31 |
| Calving interval (month) | -13.19 | 0.63 | -8.31 | -8.94 |
| Age of camel at first conception (month) | -1.52 | 0.63 | -0.96 | -1.04 |
| **Durability** | | | | **58.43** |
| Survival rate of camel (%) | 3.01 | 0.044 | 13.24 | 14.31 |
| Survival rate of calf (%) | 3.24 | 0.099 | 32.13 | 34.74 |
| Longevity (year) | 13.78 | 0.63 | 8.68 | 9.38 |

Table 4 Economic values, economic weight and relative importance of camel traits of the maximum efficiency situation

| Trait | Economic value (%) | Genetic standard deviation | Economic weight (%) | Relative importance (%) |
|---|---|---|---|---|
| **Production** | | | | **18.36** |
| Body weight of calf at sale (kg) | 1.00 | 13 | 12.97 | 10.38 |
| Body weight of female replacement (kg) | -0.37 | 15 | -5.59 | -4.48 |
| Body weight of female camel (kg) | -0.24 | 18 | -4.36 | 03.49 |
| **Reproduction** | | | | **25.54** |
| Conception rate (%) | 3.49 | 0.044 | 15.34 | 12.28 |
| Calving interval (month) | -18.08 | 0.63 | -11.39 | -9.12 |
| Age of camel at first conception (month) | -8.21 | 0.63 | -5.17 | -4.14 |
| **Durability** | | | | **56.10** |
| Survival rate of camel (%) | 3.49 | 0.044 | 15.34 | 12.28 |
| Survival rate of calf (%) | 3.76 | 0.099 | 37.23 | 29.81 |
| Longevity (year) | 27.77 | 0.63 | 17.49 | 14.01 |

Table 5 Economic values, economic weight and relative importance of camel traits of the minimum cost situation

| Trait | Economic value (%) | Genetic standard deviation | Economic weight (%) | Relative importance (%) |
|---|---|---|---|---|
| **Production** | | | | **18.48** |
| Body weight of calf at sale (kg) | -0.06 | 13 | -0.80 | -10.46 |
| Body weight of female replacement (kg) | 0.02 | 15 | 0.35 | 4.51 |
| Body weight of female camel (kg) | 0.02 | 18 | 0.27 | 3.51 |
| **Reproduction** | | | | **26.21** |
| Conception rate (%) | -0.21 | 0.044 | -0.94 | -12.29 |
| Parturition interval (month) | 1.17 | 0.63 | 0.74 | 9.64 |
| Age of camel at first conception (month) | 0.52 | 0.63 | 0.33 | 4.27 |
| **Durability** | | | | **55.31** |
| Survival rate of camel (%) | -0.21 | 0.044 | -0.94 | -12.29 |
| Survival rate of calf (%) | -0.23 | 0.099 | -2.28 | -29.80 |
| Longevity (year) | -1.60 | 0.63 | -1.01 | -13.22 |

Despite of the low reproductive traits in the camel given in this study, the cost-benefit analysis results show a high economic efficiency in rearing camel under considered breeding system. The most important causes affecting profitability in camels are attributable to lower feed costs, low labor requirements and adaptation to the most difficult areas. Due to the high dependence of camels to the desert pastures, feeding costs were low and complementary feeding was done only for fattening calf and during parturition of camel, slightly.

There was not any study on the cost-benefit analysis to compare with the results in this study, in the literature review. Ponzoni (1986) has shown that determination of the breeding objective must be before the determine the selection criteria and design of the performance traits recording in animals. Determination of breeding objectives, is deciding which traits affected profitability and should be improved. The profit function formed in this study showed that breeding objective or camel breeding traits that affect profitability under a current rearing system in Iran, will

including durability traits (survival rate in calf and camel, and longevity), reproduction traits (conception rate, calving interval and age at first calving), and production traits (body weight of calf, replacement and adult camel), respectively. So, it can concluded that rearing camel in this system is not dual-purpose and it's main purpose is just meat, because milk production consumed by family and did not appear in profit function.

The economic values, economic weight and relative importance estimated for the different group of traits in this study, could be used to track and identify the breeding camel's direction in the desert areas of Iran. The economic weight estimated for each trait shows the changes in profit by increasing one genetic standard deviation of the trait while the other traits remain at the mean values. The economic weight is more reliable than economic value for each trait and can be relied upon in practice. Because the economic value is estimated for a trait that may be too high, but genetic variation of this trait is low and genetic improvement is not possible for many years, and conversely, it may be the economic value of a trait is low, but due to it's high genetic variation a significant progress is possible in a short time. Therefore, since the genetic standard deviation of traits with accuracy and intensity of selection are the key causes in response to selection (Falconer and Mackay, 1996), the economic weight can show better the importance of the traits. Among the studied traits, influencing profitability in this study, the relative importance of survival rate in a calf given in different situations was the highest due to low survival rate and high variation (standard deviation) for this trait. Basically, two causes that affect the economic value of a trait will include the average value as well as average prices (Weller, 1994). Because of low mean of calf survival rate and high standard deviation (phenotypic, 0.31 and genetic, 0.099), an increase of one standard deviation genetic of this trait will improve profitability significantly. Since it was difficult and costly to measure individual feed consumption and the rate of feed intake is associated with body weight (Bedier *et al*. 1992), rather than as feed intake, body weight of camels and replacement considered in this study. It is reported that in beef cattle and sheep breeding programs (animal producers of meat) due to the difficulty of recording inputs, the outputs incorporate more preferred in the selection criteria (Pitchford, 2001). The relative importance of the durability traits resulted in all three situations being the highest, and the relative importance of reproductive traits was higher than production traits, but relative importance of durability traits partially reduced in maximizing efficiency and minimizing the cost situation in comparison to the maximizing profit situation (from 58.44% in maximizing profit situation to 55.31 in minimizing cost situation). Smith *et al*. (1986) concluded that income to cost and minimizing cost situations are more proper to estimate the economic value in the comparison maximum profit situation. In the other words, if the aim is to increase efficiency as well as in limited resources (such as capital) with the aim of minimizing costs, the relative importance of productive and reproductive traits in comparison to the durability traits increased slightly.

There was not any study on the defining breeding objective and economic values in camel to compare with the results in this study, in the literature review, because the estimation of economic value for important traits is needed to establish an economic total merit index. However, in the desert areas detailed assessments of costs and revenues are scarce as well as estimates of economic values for important traits are rare, which could be due to lack of recording, farmers illiteracy and small flock sizes. There are some reports in sheep and dairy cattle in village system, for example, in accordance with the results obtained in this study the sum of relative emphasis for various group of traits with different milk production levels in dairy cattle were 38.15 to 36.05 percent for durability traits, 34.80 to 36.59 percent for reproduction and health traits and 27.05 to 27.80 percent for production traits, respectively (Vatankhah and Faraji Nafchi, 2016). The sum of relative emphasis for reproductive traits, durability traits, growth traits and greasy fleece weight for Lori-Bakhtiari sheep in village system resulted from maximum profit situation were 57.09, 23.39, 19.32 and 0.19; from maximizing efficiency situation were 55.54, 22.98, 21.29 and 0.19 and from minimizing cost situation were 55.05, 23.06, 21.69 and 0.19, respectively (Vatankhah and Akhondi, 2015). Kosgey *et al*. (2003) reported that for the fixed feed resource situation the economic values (US$ per ewe per year) for traits of meat sheep in medium to high production potential areas of the tropics, were 12.94 for litter size, 10.18 for lambing frequency, 0.19 for pre-weaning lamb survival, 0.24 for post-weaning lamb survival, 0.36 for ewe survival, 1.02 for 12-month lamb live weight, 0.14 for mature ewe live weight, 0.51 for consumable meat, 0.08 for kg of manure DM sold (per ewe per year) and −0.04 for residual DM feed intake. Rahimi *et al*. (2015) showed that economic values per unit increase in the traits of birth weight, daily gain from birth until weaning, daily gain from weaning until end of period, conception rates of ewes, littre size, lamb survival, lifetime for ewes, milk yield and wool yield were 0.66, 0.51, 0.03, 0.66, 0.25, 0.85, 0.93, 0.53 and 1, respectively, in Makui sheep.

Although there is a variation between herds in the parameters used in profit equation, but the economic values resulted in this study could be used in all of the herd rearing in desert areas, because assumes the average values of the information got from 7 herds are as representative of all the herds. Also, in agreement with Vatankhah and Akhondi

(2015) the relative emphasis resulted from different situations for various traits were equal relatively and if the relative emphasis is used instead of absolute economic values, the result of each different situations could be apply.

## CONCLUSION

Despite of the low reproductive traits, rearing camel in desert areas has been a high economic efficiency, and due to the significant variation in performance traits, especially for the calf survival rate to weaning, there is high capacity to increase profitability through genetic improvement in the population of camels in desert areas. Although economic values, economic weights and the relative importance of various traits resulted from different situations were not identical, but the breeding objective that affects profitability in camels under a current rearing system in Iran, will including durability (survival rate in calf and camel, and longevity), reproduction (conception rate, calving interval and age at first calving) and production traits (body weight of the calf, camel and replacement), respectively.

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