Small Ruminant Research 129 (2015) 69–76

Contents lists available at ScienceDirect

Small Ruminant Research

journal homepage: www.elsevier.com/locate/smallrumres

Implementation of a cashmere goat breeding program amongst nomads in Southern Iran

J.P. Mueller[a,*], H.R. Ansari-Renani[b], S.M. Seyed Momen[c], M. Ehsani[d], O. Alipour[d], B. Rischkowsky[e]

[a] National Institute for Agricultural Technology (INTA), Bariloche, Argentina
[b] Animal Sciences Research Institute (ASRI), Karaj, Islamic Republic of Iran
[c] Agriculture and Natural Resources Research Center, Kerman, Islamic Republic of Iran
[d] Livestock Office of Agriculture Department of Baft, Kerman, Islamic Republic of Iran
[e] International Center for Agricultural Research in the Dry Areas (ICARDA), Addis Ababa, Ethiopia

ARTICLE INFO

Article history:
Received 8 December 2014
Received in revised form 8 April 2015
Accepted 12 May 2015
Available online 21 May 2015

Keywords:
Breeding structure
Open nucleus
Progeny test
Selection index

ABSTRACT

A breeding program to improve income from Raeini cashmere herds run by nomads in Southern Iran was implemented. Eight nomads agreed on improving fleece weight, body weight and down yield while reducing cashmere fibre diameter of white coated goats. Economic weights were calculated to define a breeding objective. Each nomad established a breeding nucleus selecting visually his best 40 does and two bucks from about 250 goats. Nomads used different systems to ensure separate mating of nucleus and general herd animals. Nomads were also able to identify the progeny of each buck. Nucleus progenies were recorded for weaning weight and fleece weight. Fleece samples were collected for analyses of down yield and down fibre diameter. General herd male progeny was castrated. Formal selection indices were used to select nucleus male replacements. To construct the indices phenotypic and genetic parameters were taken from project data and published figures. Accuracy of indices ranged 0.47 to 0.66 depending on the traits included. The inferior buck based on progeny index average was replaced by the best young buck available. Other high ranked young bucks were used in the general herd. The breeding program is in its fourth cycle and favourable selection differentials were confirmed for selected bucks in all traits of interests, in particular for down weight and down diameter, 62 g and −0.5 μm, respectively. The expected benefit of the program is about 4.0 USD accumulating per goat and per year. Fleece testing is an issue since the region lacks a fleece testing service. If fleece sampling is discontinued the expected benefit reduces to about 2.8 USD per goat and per year. Circular use of bucks to control inbreeding and participation of additional nomad families are planned for the future. This experience shows that a participatory breeding program can be successfully implemented under nomadic conditions through intensive collaboration of nomad herders, regional extension officers and scientists.

* Corresponding author. Tel.: +54 294 422731.
E-mail addresses: mueller.joaquin@inta.gob.ar, joaquinmueller@gmail.com (J.P. Mueller), ansarirenani@yahoo.com (H.R. Ansari-Renani), syeedmoumen@yahoo.com (S.M. Seyed Momen), mehsani3000@yahoo.com (M. Ehsani), omid.alipour@gmail.com (O. Alipour), b.rischkowsky@cgiar.org (B. Rischkowsky).

http://dx.doi.org/10.1016/j.smallrumres.2015.05.011
0921-4488/

1. Introduction

About 20% of Iran's 25 million goats produce cashmere. After China and Mongolia, Iran is the world's main cashmere producer. Most cashmere in Iran is produced from the Raeini goat breed kept by nomads in the Southern Province of Kerman (Ansari-Renani, 2013). Raeini goats produce meat, fibre and milk and are the main contributors to the livelihoods of nomad households (Ansari-Renani et al., 2013a). Milk is transformed into a variety of dairy products and consumed at home. Goats are sold locally when cash is needed or consumed or offered as presents. Some of the goat fibres are used for weaving household fabrics but most fibre is sold as raw cashmere to middlemen who in turn sell them to regional or country dealers. Some cashmere is exported as raw fibre but most is exported dehaired from Iranian dehairing plants (Ansari-Renani et al., 2013b). Goat productivity depends on the ability of the herder to maintain his animals in good condition and health. Productivity and product quality also depend on the genetic merit of the herd. Directional selection or culling policies to increase productivity in nomad goat herds are very rare since the systematic evaluation of animals is not easy to perform and mating of animals in a herd is at random. In the past some herders near the city of Baft have had access to bucks from a governmental breeding station through an artificial breeding program. These bucks were selected for reproduction (total weight of kids weaned per doe joined), growth and fleece weight but not for cashmere quality (Maghsoudi et al., 2009; Mohammadi et al., 2012). Thus, most nomads have no access to improved cashmere producing bucks and have no guideline or model to establish a breeding program in their herds. The characteristics of the nomadic cashmere production system pose a major challenge for carrying out effective genetic improvement plans. This paper describes the design and implementation process of a cashmere goat breeding program among Siahjel nomads of Southern Iran and reports results obtained in its early stages.

2. Materials and methods

2.1. Identification of target population

The surroundings of the city of Baft in Kerman Province were chosen to locate the breeding program since it is the main Raeini cashmere production region of Iran and because Baft has a governmental rural extension service with experienced personnel in goat husbandry. A comprehensive survey undertaken in the region during 2009 located the preferred rangelands where nomads graze their goats. The survey covered 30 nomad settlements within 20 km of Baft and generated basic information on the production system in general (Ansari-Renani et al., 2013a) and cashmere quality in particular (Ansari-Renani et al., 2012). Goats are owned by extended nomad families living in tents. An extended family is typically composed of about 20 closely related persons belonging to two or three individual families that graze their goats as a single herd together with some sheep. On average an extended family runs about 250 goats. Thus, an extended nomad family and its animals will be treated as a unit and referred to as a nomad family. During the summer these nomad families move with their goats in search of adequate grazing ranges in the Baft region and before winter they migrate towards the Persian Gulf to a milder climate and better pastures. Although farmers move up to 100 km within a season, there are family and tribal links and arrangements which help locating a particular farmer at most times. Location of farmers is also facilitated by the recent spreading of cell phones and, in our case, by the assistance of a nomad guide, a member of the Siahjet tribe of the Baft region. In March 2010, eight farmers out of the 30 farmers surveyed by Ansari-Renani et al. (2012) were selected to initiate a breeding program. The criterion to select these eight farmers included the interest to implement a cashmere breeding program which involves animal identification, data recording and fleece sampling.

2.2. Baseline study

In order to establish the baseline cashmere quality of the eight farmers and test for fixed effects on cashmere traits, left midside samples were collected from four randomly selected goats of each sex (males, females) by age (1, 2, 3 and 4 years old) combination in each herd and sent to the Almaty Fiber Laboratory (Kazakhstan) for determination of down yield (DY) and mean down fiber diameter (DD) as described by Ansari-Renani et al. (2012). The data were pooled with records of DY, DD, fleece weight (FW) and down weight (DW) taken the previous year from the same herds contained in the analyses of Ansari-Renani et al. (2012). Least squares means obtained from a mixed linear model (using the Mixed Procedure of SAS, 2008) including year, sex and age as fixed effects and farmer as random effect were compared. Significance of fixed effects was tested with F tests and significance of estimated differences between least square means was tested using adjusted Bonferroni probabilities and considering differences at $P < 0.05$ as significant. Phenotypic correlations were calculated using residuals of the mixed linear model.

2.3. Breeding objective

The breeding objective of the program was discussed with each farmer. All farmers expected to increase their economic return from their goat herds through higher meat, milk and fibre output and through reduced costs. Therefore higher reproduction rate, higher growth rate, higher milk yield and higher fleece weight of the goats are of main interest. Breeding objective traits need to be heritable to be modified through breeding. Reproduction traits such as fertility, prolificacy and kid survival have low heritability (Mohammadi et al., 2012) and therefore depend largely on management issues rather than on genetic differences. Early growth traits and maternal traits such as total weight of kids weaned over a does' lifetime are also of low heritability (Bigham et al., 1993; Maghsoudi et al., 2009). As opposed to reproduction traits, fleece traits and yearling body weights are moderately to highly heritable (Gifford et al., 1990; Bigham et al., 1993; Zhou et al., 2002; Bai et al., 2006; Mohammadi et al., 2012; Wang et al., 2013) and are therefore more obvious candidates to be improved