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Description of a breeding scheme for the D'man breed in Southwestern Morocco

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SUMMARY - Within a climate of increasing popularity for the breed, the present breeding scheme for D'man sheep is reviewed in the light of genetic and economic factors. Evidence is presented that only 22.4 percent of rams used in the multiplier flocks came from the nucleus. In view of the importance of feed costs under oasis conditions and to improve the efficiency of the breeding scheme, D'man breeders should obtain a financial reward for their efforts.

Key words: Breeding scheme, breed structure, population dynamics, D'man sheep, prolific breeds.

RESUME - Dans un climat de popularité croissante pour la race, le présent schéma de sélection pour la D'man est examiné à la lumière de facteurs génétiques et économiques. Il est prouvé que seulement 22,4% de béliers utilisés dans les troupeaux multiplicateurs sont originaires du noyau. En raison du coût élevé des aliments dans les conditions des oasis et pour améliorer l'efficacité du schéma, les éleveurs de D'man devraient être récompensés pour leurs efforts.

Mots-clés : Schéma de sélection, structure raciale, dynamique de population, ovins D'man, races prolifiques.

Description of D'man breed

The general survey conducted in 1962 in Morocco pointed out that "the ewe fecundity was variable from one region to another, and attained on average 62 percent in the cereal crop areas, and 115 percent in the southern oases". The publication of the results of the survey generated considerable interest for the oasis sheep, i.e. the D'man breed, because of its high prolificacy.

The name D'man came from the general black colour of the breed although animals can be black, brown, white, or variegated. Both male and female are polled, and the neck sometimes carries wattles. The fleece of variable quality is covering mainly the back, the face always being completely bare. The D'man ewe is essentially aseasonal (no seasonal anoestrus) often lambing twice within the year. The litter size at birth averages 2, and the total lamb weight at weaning produced by the D'man ewe amounts to about 70 percent of its own weight which is estimated to be in the order of 30-35 kg, being of small size (Bourfia and Touchberry, 1993a,b).

The hairy fleece, the small size, and the colour pattern led Mason (1980) to suggest an important contribution to D'man ancestry from the Fouta Djallon breed of Cameroon. Evidence for this origin is however lacking (Bourfia, 1989).

Description of the production systems

The D'man breed is located in the oases, mainly in the valleys of Draa (south-west), Ziz (south-east), and Dades (between the two regions). This geographical distribution probably created different types within the D'man which is still considered as the same breed. D'man breed represents only 3% of the total sheep population of Morocco (Bourfia, 1989), the number of head being in the order of 400 thousand. The majority of this population (75%), which will be considered herein, is in the sub-area of the breed located within the Regional Agricultural Office of Ouarzazate district (ORMVAO).

The D'man is not a range sheep. The animals are kept indoors in very small numbers, generally 1 to 5. Feed including alfalfa (green or as hay) and culled dates is brought to the sheep daily. In D'man breed area, most farms (70%) are of small size (less than one hectare). This led to an intensive system of production in which forage (alfalfa) and other crops are grown underneath palm trees. The D'man breed fits into the system by using by-products.

Technical description of the genetic improvement programme

While looking for a prolific and aseasonal breed, improvement in weight of lambs at weaning appears to be a reasonable objective. But this may run into complications through an increase in mature body size and the associated increase in maintenance requirements. Given the limited resources of feed, the outcome of this kind of selection does not ensure that the overall economics of production under oasis conditions will be improved for D'man breed.

Since early attempts to develop breeding schemes for D'man breed had limited success, a preliminary assessment of production under better management conditions is a step forwards. In view of the importance of feed costs under oasis conditions, it is necessary to increase the total weight of lambs produced per ewe and per year. The task is not easy, since this is a composite trait. However, it is possible to operate through its components. This objective has wide acceptance from the breeders of D'man sheep; after all, the achievement of the goals capitalizes on their contribution.

There would appear to be opportunities for forming a co-operative scheme designed to overcome the disadvantage of small flock size by subjecting the co-operating D'man flocks to a single breeding plan. This was the reasoning behind the present breeding scheme that was initiated by the ORMVAO. The scheme embraces many oases of Draa and Dades valleys with small flocks that are not able to organize a recording system without a financial support.

Available infrastructure

The breeding scheme for the D'man breed in southwestern Morocco as it is currently structured was not the result of a predetermined improvement programme. A station with a flock of about 100 ewes was built by the ORMVAO some twenty years ago. It was merely created to evaluate the performance of the D'man breed. In the mid 1980's the station started to act as a source of breeding stock and supplied a group of pilot farms which in turn played the role of multipliers and passed on improved stock to commercial producers after signing a contract to keep the subsidized stock for at least three years. This operated as a closed nucleus breeding scheme with a structure that recalled the traditional three-tier system. Since the service of performance recording does not expand to the producers only the two-tier structure including the station and the multiplier flocks will be considered herein.

Manpower

A technician acting as a nucleus manager is being helped by several workers. In each of the eight participating oases, a technician is doing the performance recording. In the ORMVAO head-quarters, a person holding a Master degree is supervising the system. And recently, scientists from Hassan II Agronomy and Veterinary Medicine Institute (IAV Hassan II) are being involved.

Scientific and technical support

A group breeding scheme is usually formed by identifying high performing animals within a breed and raising them in a central nucleus that will provide sires to the contributing flocks for genetic improvement.

Even though breeders depend on scientific institutions for investigating their problems and giving them advice, scientists have been only involved recently, thus no precise guidance exists for the build-up years of the present scheme. It is known that the initial screening of ewes and the genetic merit of the foundation sires are important steps in the early years of the improvement programme. Since the station was merely created to evaluate the performance of D'man breed, the foundation animals were more likely chosen at random. From 1992 onwards, the IAV Hassan II is carrying out a contract for scientific backing of the breeding scheme.

Organization

A performance recording is essential to implement adequate selection programme. The way in which performance recording is organized depends on the trait and the management of the breed. Even though records useful in breeding are of interest, some attention is also given to recording as an aid to flock management (body

condition). Since the area of D'man breed is spread, the creation of a recording scheme involving the whole area would be an expensive undertaking. This led to the establishment of 'sheep units'. The ORMVAO has developed eight such units on the main oases of Draa and Dades valleys, that were operated under its direction and financial assistance.

The efficiency of a recording scheme that operates as an on-the-farm recording service can be assessed by its continuity. The level of continuity has been quite high, with 75 percent of the flocks that used the service in 1990 continuing to use it through 1994. The number of participating flocks has not grown over the years due to a policy of restricting entry to breeders thought to be strongly committed to the improvement programme. The number of such flocks is in the order of 50 with a total of approximately 1,000 ewes. In addition to recording the sire and dam of every lamb born, the breeder (through an ORMVAO technician) supplies a lambing list giving tag numbers of lambs born to each ewe and their date of birth, sex, birth weight and type; for some flocks, the weaning weight is also provided.

The evolutionary trend in organizing livestock breeding seems to start with the formation of a breed association before forming a larger body grouping several breed societies. For historical reasons, this trend is reversed in Morocco where the National Association of Sheep and Goats (ANOC) was first established. The D'man breeders joined the ANOC in the last quarter of 1994, after attempts to form an independent association failed. At least for now, the ANOC becomes responsible for performance recording in the case of D'man breed.

As an aid to selection, the D'man sheep were inspected by a panel from the ORMVAO and ANOC for structural soundness and breed faults. To convince breeders of the genetic and economic benefits of the use of superior sires, a climate of innovation in extension procedures is important. Although genetic gain is highest through rams, a selection procedure involving ewes is a well accepted concept for ordinary breeders and can help in the breed screening.

In a meeting held at the end of 1994, a decision was made to raise the flock size to at least 10 ewes in the multiplier flocks and to open the nucleus. While many organizational solutions have been found, there are still several areas of concern where further investigation is required.

Financing

As water and arable land are valuable, sheep production under oasis conditions has attracted government support in the form of various direct and indirect subsidies. The observed deficiencies in the recording system resulted from the fact that the technicians in charge of data collection had several other tasks and that the means were not sufficient. To some extent, the present breeding scheme was the initiative of the ORMVAO and operated under its direction and financial assistance since the early 1970's. In the early 1990's, the Livestock Branch of the Ministry of Agriculture signed a contract with the IAV Hassan II for scientific assistance and invited the ANOC to be responsible for performance recording. With the financial support of the Livestock

Branch and the ORMVAO, the traits recorded are done free of charge. For profitable use of these limited funds, the improvement programme must be carried out, however, on an adequate scale and have clear-cut aims.

Results obtained

The data collected in the station over a period of twenty years and in the sheep units for a decade were computerized by the IAV Hassan II. This involved more than 10,000 records. Preliminary analyses were done in several Master of Science theses and the results are partially reported herein.

There was need to examine the structure of the breed and the population dynamics. Over a period of eight years (1986-1993), the nucleus provided the multiplier flocks with 69 rams and 151 ewes, with a yearly variation of 5 to 13 for males and 0 to 62 for females. For the same period, the multiplier flocks passed on a total of 271 animals to the layer of commercial producers; the yearly variation was from 2 to 91. Over the same period, the nucleus supplied directly the commercial producers of the scheme by a total of 735 animals and provided other areas of the country with 93 animals. While no animal was received by the nucleus, 25 animals were interchanged between the multiplier flocks.

An inquiry has been made to find out the proportion of rams from the station that were given to each sheep unit over a period of eight years (1986-1993). The results varied widely, the highest proportion (41.3%) being received by unit No. 4 (Ouarzazate), and the lowest (0%) by unit No. 5 (Skoura). Three units out of eight received 80% of these rams. On the whole, only 22.4 percent of rams used in the multiplier flocks came from the station that is supposed to play the role of nucleus.

In the flocks of the sheep units, 24.8% of the animals were not identified and 6.5% were from unknown sire. The best results were found in unit No. 7 (Boumalene) where 90% of the animals were identified and 99% were from known sire, while in unit No. 5 (Skoura) the proportion of identified animals represented only 54.5%, and in unit No. 4 (Ouarzazate) 13.5% of the animals were from unknown sire.

The proportion of lambs with recorded weaning weight amounts to 46 percent with variation from one unit to another. The growth recording system is satisfactory in unit No. 1 (Zagora) with 69% of lambs being recorded for weaning weight, whereas only 15% of lambs had a recorded weaning weight in unit No. 6 (K. Maggouna).

Surveys have been conducted among D'man flocks in Ouarzazate district to assess the average age of rams used in breeding. In the station and over a period of twenty years (1975-1994), rams were culled on the average at 7 years of age, the extremes being 2 and 10 years. Whereas, in the sheep units the average age of rams used varied between 2 and 4 years; the reasoning behind this was to make profit from the sale of younger rams. With regard to the number of ewes exposed to ram at mating, the values reached 25 to 30 ewes/ram in the station and varied from 1 to 27 in the sheep units.

Judging from the information available, it would appear that the genetic gain is low, owing to a long use of rams in the nucleus and to the use in the sheep units of rams from outside the nucleus. The performance of multiplier flocks varied considerably depending on the quality of genetic material with which they started and on the skills involved with flock management and selection procedures. But on the whole, there is little difference between the nucleus and the multiplier flocks.

Discussion

Most flock owners fix their horizon near at hand and cannot wait long for profits. In the past it has been often difficult for a single D'man breeder to obtain a financial reward for his breeding efforts, because he had little impact on the market and because supplies by small farmers are irregular. There is a trend towards the emergence of large flocks (multipliers) and the economic pressure is being overcome by the formation of a breeding scheme where improved stock can be better marketed.

As it is the case for many foreign breeds, export markets will be useful in fixing breeding aims. Organized exportation of D'man breed started in 1987 and concerned Gulf countries, and the last shipping was towards Tunisia in 1994.

The results obtained so far were achieved with little conscious use of modern techniques of animal breeding. In flocks forming an open nucleus breeding scheme, it is expected to have an avoidance of inbreeding which may arise with small breeding units and with long use of rams in a closed nucleus, as it is currently the case for D'man breed.

As new information comes to hand, it is used to improve the efficiency of the scheme. In this regard, artificial insemination techniques are being adapted to the circumstances of D'man sheep, with the possibility of obtaining performance-tested rams; and although no selection indices have been used so far, growth correction factors developed in the station will be applied to animals born as multiples and being the progeny of maiden ewes.

Even though a major extension effort for twenty years has had some success at the flock level, there is need for an advisory service that is fully involved in the operation of the breeding scheme in order to improve the efficiency. Recent experience has shown undeniably that encouraging interested breeders to make visits to the station is a worthwhile extension activity.

The litter size at birth for D'man breed averages 2, mainly because of the existence of a large proportion of single births, 36.6% in the station and 42.3% in the sheep units, even though the litter size varied from 1 to 5. However, although the breeding programme is mainly practised on traditional way, there is reason to expect that this will change with time and a better set-up of the breeding scheme. Within a climate of increasing popularity for D'man breed, there is a plan to build up a new stratification of the breeding population, based on performance testing, in which only rams from recorded flocks must be used. At present, attention is being paid to screening the population to identify the highest performing animals. The lack of this operation in the

past and the fact that the nucleus was closed resulted in a little difference between the nucleus and the base. To survive, a breeding scheme needs to be market oriented and should not be primarily concerned with breeding but with production and marketing. This suggests that equal economic loading should be given to breeding and management with a concerted policy involving as much as possible the breeders.

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