Circular mating heuristic for alpacas suri (*vicugna pacos*) reproducers selection

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Keywords : heuristic, supply chain management, combinatorial optimization.

1 Introduction

Peru is the largest producer of alpaca fiber, considered one of the best in the world, the fiber quality is deteriorating by: i) technical care are not appropriate and efficient, such as selection of breeding, breeding or crossing, among others; ii) do not prevent animal inbreeding. One of the most important improvements for animal breeding is thus the selection of reproducers, activity consisting choosing animals with desirable characteristics for the production of fiber, preventing inbreeding. This selection can be performed via the evaluation of DNA and performing a phenotypic evaluation (EF), which is to assess the alpacas based on defined racial standards. Table 1 lists the variables and their maximum scores that are used for the EF in Peru, the minimum score is 75 points.

DESCRIPTOR	SCORE
Evaluation of fleece	**70**
Fiber fineness	**40**
Brightness	**10**
Curlers	**10**
Density	**05**
Uniformity	**05**
Conformation Evaluation	**30**
Head	**10**
Size	**05**
Fit	**05**
Overall appearance	**10**

Table 1 – Variables for the phenotypic evaluation.

2 Methodology

The proposed construction heuristic consists of two stages: i) the phenotypic evaluation is obtained by evaluating the alpaca and ii) control of inbreeding by designating animals geographically distant flocks.

Step 0: Choose a herd of alpacas formed based on the same phenotype.
Make: Male_Reproducer_ = 0, Female_ Reproducer =0, n=number_of_alpacas, evaluated =0;

While (Male_ Reproducer < 3)&&(Female_ Reproducer < 30) || (evaluated == n)

Evaluation of fleece

Step 1. For each alpaca herd, evaluate the fiber fineness, if less than or equal to 22 microns consider the score between 31-40, if the fiber is between 23 and 26 microns giving an opponent score between 11-30, if more case 26 micron to a value of 0 -10.

Step 2. Evaluate the brightness, curlers, density and uniformity, for this score divided into 3 groups for assigning values according to a criterion.

Conformation Evaluation

Step 3. Evaluate the size of the head, if it is greater or equal to 80cm in size and give it a score of 5, if 71cm to 79cm give it a score of 1-4 and if it is less than or equal to 70 cm give it a score of 0.

Step 4. Assess the size to fit, and overall appearance, this divide to the highest score in 3 groups to assign values according to criteria.

Step 5. If the sum of the evaluation of all assigned values greater than or equal to 75 points, consider the alpaca to be part of potential reproducers and if you have better evaluation than another reproducer, replace the lower evaluation. Update data and return to step 1

Step 6. If the whole herd was evaluated, evaluate the following herd starting with Step 0.

Consanguinity Control

Step 7. Apply the scheme "circular mating" which is a closed scheme and involves the passage of a male breeding herd to another herd distant kinship terms.

3 Results

Preliminary results show that this assessment can be successful since the familiar evaluator with phenotypic evaluation variables are well known. Experiences in various producing centers has demonstrated that this method is efficient to prevent alpacas inbreeding.

4 Conclusions and recommendations

The construction heuristic applied to the reproductive system "circular type" (Circular mating) will be effective where every two years a given herd will receive a reproducer from a different family from that existing in the herd, this will allow: to create an effective genetic relationship between the multipliers and control inbreeding. Future work is to perform phenotypic assessment using photographs of the alpacas to heuristically determine the best reproducer of the flock according to morphological features that should have the alpaca.

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