

## Local differentiation of Albanian rabbit populations

A. Daija<sup>1</sup> L. Papa<sup>2</sup> K. Kume<sup>1</sup>

<sup>1</sup> Centre for Agricultural Technology Transfer, Fushe Kruja, Albania

<sup>2</sup> Animal Production Department, Agricultural University, Tirana, Albania

Six measures of body conformation of six rabbit subpopulations were analyzed to determine the quantity of local differentiation of Albanian rabbit population. Data analyses showed that: (i) the local rabbit breed is classified in medium breed group with harmonic body development, (ii) the Albanian local rabbit population is distinguished for considerable level of local differentiation (iii) the main factor of this differentiation is the isolation in distance of rabbit subpopulations (iv) local differentiation can contribute on genetic variability conservation of Albanian local rabbit population that is actually under the pressure of genetic erosion.

**Key word:** Local differentiation, discriminate analyses, cluster analyses, local population, rabbit.

### Arnavutluk Tavşan Populasyonunda Yerel Farklılaşma

Arnavutluk tavşan populasyonlarındaki yerel farklılaşmaların miktarını belirlemek için altı tavşan alt populasyonunun vücut kon formasyon ölçümleri analiz edilmiştir.

Verilerin analizleri aşağıda hususları göstermiştir. (i) Arnavutluk yerel tavşan ırkı harmonik vücut gelişimli orta büyüklükte ırk olarak sınıflandırılmıştır. (ii) Arnavutluk yerel populasyonları önemli ölçüde farklılaşma göstermektedir. (iii) Yerel Populasyonlar farklılaşmasın da en önemli faktör tavşan alt populasyonları arasındaki mesafe izolasyonudur. (iv) Yerel populasyonların farklılığı genetik erozyon baskısı altındaki Arnavutluk yerel populasyonları korunması sürecindeki genetik çeşitliliğe katkıda bulunmaktadır.

**Anahtar kelime:** Farklılaşma, Diskriminant analizi, küme analizi, yerel populasyon, tavşan

### Introduction

The origin of Albanian local rabbit breed is difficult to be defined (Toro, 1981) It might be originated from: (i) domestic animals, during the last period of Medievalism, in the region of southeastern Europe, France, Italy, Spain etc., which have been brought, during XIX century and later, in Albania from travelers who had visited these region, (ii) it is a population created as a result of the spontaneous process of the domestication of the wild rabbit that still lives in the different regions of Albania or (iii) actual population originates from a casual mixture of the animals domesticated in Albania those brought from other regions of Europe (Daija, and al. 2006). Albanian local rabbit breed might be classified in the middle group of size breeds (Toro, 1981, Piu, and Daija, 2005). The local population production in Albania is characterized from a great diversity of the morph -biologic characteristics. It is distinguished for a great variation of mantel color, quality of coat, body size, head and other external features.

### Material and methods

Six different indicators of body conformation of 271 adult rabbits were measured : body length,

chest circumference, width at hocks, thigh circumference, head circumference and live weight. The rabbits are reared in family farms of Poshnje and Kutalli of Berati region, Fier region, Libonik e Braçanj of Korca region and Blinisht of Lezha region. The rabbit production is more frequent in these regions and is carried on as an alternative production activity of small scale family farm. The rabbits are of a local breed and are reared in extensive conditions with low inputs. To prevent inbreeding in flock, breeders males were changed or purchased breeding fams.

. In general the farmers do not buy reproducing males in neighboring farms. They considered to choose the males with well developed body without any preference for their coat color. Discriminates analyses is used to evaluate the level of local differentiation of rabbit breeds. The hypothesis we tried to verify was: (i) the local rabbit breed population is constituted from subpopulations that differ from each other (ii) the level of this differentiation is due to geographical distance between regions where are located the subpopulations. Geographic region of subpopulations of local rabbit breeds was used as

differentiation criteria. According to the *Discriminates Analysis's procedure* 5 linear combinations of the 6 input variables that best discriminate amongst the 6 groups was constructed. The form of *j-th* discriminate function was as following:

$$D_j = d_{j1}Z_1 + d_{j2}Z_2 + \dots + d_{jp}Z_p$$

where the *Z*'s are the standardized input variables *X*, creating by subtracting the sample means and dividing by the sample standard deviations.

The first information on existence and the level of rabbit subpopulation differentiation was taken from graphical presentation of their distribution on the plan between the first two

discriminate functions. Euclidian's distances between corresponding centroides centers of subpopulations in the study were used for cluster analyses. The dendrogramme of cluster analyses was compared with distances between regions to judge on possible links of geographical regions and subpopulations.

Statistical data analyses were done with STATGRAF Centurion XVI.

## Results and Discussion

The evaluation of mean values of conformation features are given in the Table.1.

Table.1 The means of conformation characteristics by regions mean values of morph-biometric features.

Characteristics	REGIONS					
	Poshnje	Kutalli	Fier	Korçë	Devoll	Lezhë
Body length	44.2±2.02 <sup>a</sup>	45.0±1.66 <sup>a</sup>	41.8±1.36 <sup>b</sup>	48.9±2.49 <sup>c</sup>	50.5±1.36 <sup>c</sup>	41.6±1.88 <sup>b</sup>
Chest circumference	32.3±1.65 <sup>a</sup>	32.5±1.21 <sup>a</sup>	30.6±0.95 <sup>b</sup>	29.1±3.58 <sup>b</sup>	31.1±1.78 <sup>ab</sup>	29.5±1.82 <sup>b</sup>
Width at hocks	13.3±1.36 <sup>a</sup>	13.7±1.28 <sup>a</sup>	12.7±1.19 <sup>b</sup>	14.1±0.64 <sup>a</sup>	13.7±1.23 <sup>a</sup>	17.3±2.51 <sup>c</sup>
Thigh circumference	19.5±1.31 <sup>a</sup>	20.0±1.10 <sup>a</sup>	19.4±1.71 <sup>a</sup>	20.9±2.46 <sup>ab</sup>	21.5±0.89 <sup>b</sup>	16.8±2.88 <sup>c</sup>
Head circumference	22.1±1.40 <sup>a</sup>	22.5±1.31 <sup>a</sup>	21.5±1.17 <sup>a</sup>	23.8±2.25 <sup>b</sup>	23.2±1.86 <sup>b</sup>	22.3±1.19 <sup>a</sup>
Live weight	4.3±0.23 <sup>a</sup>	4.4±0.18 <sup>a</sup>	3.9±0.12 <sup>b</sup>	4.7±0.55 <sup>c</sup>	4.7±0.30 <sup>c</sup>	3.4±0.24 <sup>d</sup>

a,b,c,d means within a column with no common superscript differ significantly, P<0.05

Pearson correlation coefficients used to evaluate stochastic relation between the conformation features are given in Table 2

Table 2. Evaluation of phenotypic correlation coefficients.

Characteristics	Body length	Chest Cicumference	Width at hocks	Thigh circumference	Head circumference	Live weight
Body length	1.0	0.68	0.59	0.61	0.61	0.68
Chest circumference		1.0	0.45	0.60	0.63	0.71
Width at hocks			1.0	0.45	0.51	0.45
Thigh circumference				1.0	0.63	0.61
Head circumference					1.0	0.64
Live weight						1.0

Comparisons of above data with corresponding values of other different rabbits breeds of Mediterranean countries (Anonymous, 2002, Nikodemus, N. and al. 2002) showed that the local rabbit breed population of Albania could be classified in the group of middle breeds. Referring mean indexes ( $I_{\text{mean}}\text{-chest circumference/width at hock} = 0.46$ ), Albanian local rabbit breed has a harmonic body development, approximately of cylindrical form. It is not distinguished for great development of

musculature and it has relatively big head in comparison with body length ( $I_{\text{mean}}\text{-head circumference/body length} = 0.51$ ). The chest circumference and body length affect more on live weight than other conformation features. The Pearson correlation are respectively  $r = 0.71$  and  $r = 0.68$

The differences between local rabbit subpopulations were evident in graphical presentation on the plans of first two discriminate functions (Figure.1).

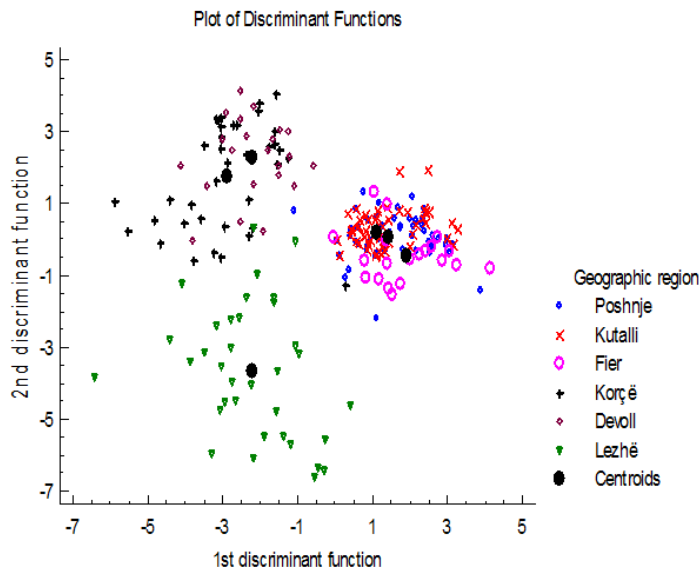


Figure.1 The distribution of local rabbit subpopulations on the plan of first two discriminate functions.

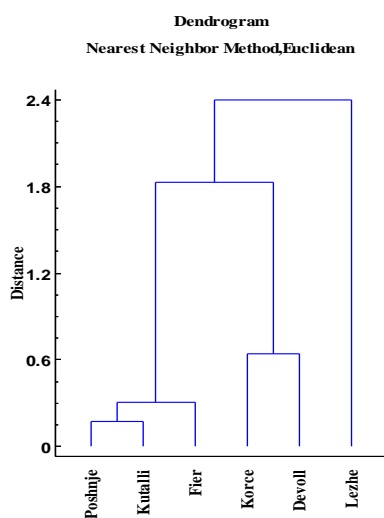


Figure.2. The dendrogramme of local rabbit subpopulations groups in their geographical regions.

Poshnje-Kutalli-Fier, Korçë-Devoll and Lezhë. Inside groups the distribution of individuals of rabbits was greater in Lezhë region. The differences between rabbits reared in Kutalli and Poshnje farms were not significant.

Using Euclidian's distances between corresponding centers of centroids of rabbit

subpopulations, cluster analyses gave the dendrogramme presented at Fig 2. In addition that, it is presented the map of Albania with the regions where farms with local rabbit population are located.

Comparisons of the distances between the groups evidenced by cluster analyses and respective

distances of geographical regions of farms with rabbit subpopulations made possible the below affirmations:

- (i) Albanian local rabbit population could be divided in subpopulations with discrete groups between them.
- (ii) The difference between groups goes up with increasing of geographical distances between farms with local rabbit breeds.

In general the local **differentiation of animal population belonging to the same breeds** or originates from the same population, is result of a number of factors. Increase the value of this differentiation with increasing geographical distance between subpopulations can be explained with known effect of "isolation in distance". Management of rabbits in Albania, is carried on only in small scale family farms. It is not developed or implemented any rabbit breeding program. Selection of breeding male is an empiric action of the farmer. In general he uses as **male reproducer** the animals of other farms of the same region. This action reduces the genetic exchange between farms with great geographical distance. According to Bajrami, and

at.(1992), the result of "isolation in distance" factor is the creation of isolated subpopulations. The same situation **is** identified by the above analyses of local rabbit population in Albania. As we mentioned, the rabbit management is a limited activity in Albania while the study of nowadays trend of this activity has shown the growing interest of market for rabbit meat (Daija, and at. 2009) The first tendencies to invest in rabbit farms to produce meat for the market have started. In this conditions the conservation and development of autochthones genetic funds of rabbits is current. Not only breeding programs development but the supports for farmers to implement them are both needed. In the case of local populations threatened from negative effects of genetic erosion and other economic factors, the lack of genetic programs affect more the reduces of genetic variability inside the population. As long as these programs are not functioning, the isolation in distance that increases local differentiation of rabbit population. The main recourse used to conserve and develop the local rabbit genetic fund in Albania.

## Conclusions

Albanian local rabbit breeds classified in the group of medium breeds, with harmonic body development. A major factor that causes this differentiation is distance isolation of rabbit

subpopulations. Local differentiation factor has a positive effect on genetic variability conservation of Albanian local rabbit population that actually is under pressure of the genetic erosion.

## References

- 1 Daija A., K. Kume, and L. Papa, 2006. Rabbit growing in small family farm conditions., *LRI, Tirana*.
2. Daija A., K. Kume, and L. Papa, 2009. Farming of rabbit local breed as an alternative activity in small scale farms in Albania. *IV International Symposium of Livestock Production, Struga, Macedonia, 9-12 September*.
3. Anonymous 2002 Rabbit genetic resources in Mediterranean Countries, *Options Mediterranean's, Vol 38, CIHEAM*
4. Bajrami, Z. K. Kume. and I. Mikerezi, D. Vyshka 1992. Local differentiation of Albanian Goat populations related with kariotype diversity. *Journal of Genetic and Breeding, Italy, Vol.46 p.347-350*
5. Nikodemus, N., I. Gurierres, J. GARCIA, R. Carabano, and C. De Blas, 2002 The effect of remating interval and weaning age on the reproductive performance of rabbit does. *Anim. Res., 51, 517-523*.
6. Piu Th. And A. Daija, 2005 Farm management of rabbit. *LRI, Tirana*
7. Toro S., 1981. Rritja e shpendeve dhe lepujve . *Tekst mesimor.(UBT)*
8. CIHEAM Options Mediterranean's, Vol. No.38, 2002, Nikodemus, N. and al. 202)