



**ПРОУЧВАНЕ ВЪРХУ ОЦЕНКАТА НА РИСКОВИЯ СТАТУС НА ПОРОДАТА ПИНЦГАУ В РУМЪНИЯ
RESEARCHES CONCERNING THE ROMANIAN PINZGAU RISK STATUS EVALUATION**

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Резюме**

Породата Пинцгау (Pinzgau) или Пинцгауер (Pinzgauer) носи името на областта, от която произхожда – Пинцгауер (Pinzgauer), разположена близо до Залцбург, Австрия. Тя е планинска порода говедо. Създадена е през XIX век на основата на местни планински породи, като селекцията е била насочена в три посоки – работа (теглителна сила), мляко и месо. В Румъния са формирани две разновидности Пинцгау – Червен Пинцгау, чрез поглъщателно кръстосване на местни породи говеда (Сиво степно и Мосница) с Пинцгау от Австрия през втората половина на XIX век, и Черен Пинцгау, наречен “Кравата на Дорна”, получен чрез кръстосване на местни говеда с различни подобрени планински породи (Пинцгау, Мьолтал, Зилертал, Дъкс-Зирелтал, Холандско говедо, Кафяво говедо и др.). Трансилванското Пинцгау има здрава конституция, жив темперамент, спокоен характер. То е средно зряло, с висока жизнеспособност и продължителност на използване, добра адаптивна способност, висока устойчивост към заболявания и лоши климатични условия. Има разнородна продуктивност – мляко, месо, работоспособност. Това са основните причини породата да бъде запазена. Запазването на породата е необходимо и за съхраняване на поминъка и традиционните румънски продукти. За целта се препоръчва да се създаде национален парк за породата.

Abstract

Pinzgau breed or Pinzgauer is called after its region of origin (place Pinzgauer, near Salzburg, Austria) and is a mountain breed of cattle. The breed appeared in the 19th century from local mountain breeds and was developed in three directions: traction, milk and meat. In Romania, Red Pinzgau breed formed after absorption crosses made between local breeds of cattle (Grey Steppe and Mocănița) and Pinzgau of Austria, since the second half of the nineteenth century, and black Pinzgau named “Cow of Dorna” by crossing local cattle with various mountain improved breeds (Pinzgauer, Mölltal, Zillertal, Dux-Zillertal, Dutch, Brown, etc.). Transylvanian Pinzgau breed has a sound constitution, lively temperament, docile character, precocity mediocre, high longevity, good capacity of adaptation, resistance to disease and weather. Has a multilateral skill (milk, meat, traction). These things are the main reasons why race should be kept in a form of active conservation. Moreover, in order to preserve the tradition and traditional products in Romania, is required to maintain this breed and even the formation of its national park.

Ключови думи: Пинцгау, рисков статус, инбридинг, ефективен размер на популацията.

Key words: Pinzgau, risk status, inbreeding, effective population size.

INTRODUCTION

Around 1820, cows of Pinzgau were exported to countries like Romania, Yugoslavia, Czech Republic and Slovakia. Moreover, currently breed is present in over 25 countries worldwide. In South Africa, Canada, USA and Australia, Pinzgau prospered even in the harshest environmental conditions. Resistant hooves, able to cover great distances, even coat color, which allows UV protection, are what made this population of cattle to be

appreciated by farmer's cows on five continents (Kadlecik et al., 2004).

The ancestors of the breed were brought by the Celts around 800 DC. In time, have evolved several types of race, according to the development area (Salzburg, Tyrol, Carinthia, Bavaria and Styria), showing a predominantly mottled coat colour on brown background, but black. In 1857, Baron Freiherr von Mesnil described Pinzgau

specimens with a full coat with a brown or white line on the abdomen and the upper line (Kadlecik et al., 2004).

Unique colour mottled red-brown spots on the body side and white line became race character.

Individuals presenting black and white robe, called the "lucky line" survived like animals that every farmer was proud to have. But breeders associations preferred animals with red-brown with white robe which meant that in time black variety become very rare (Kadlecik et al., 2004).

During the Austrian Empire, the breed was quickly spread to other parts of it and today, can still be found in Austria, Slovakia and Romania. When used as traction animals have lost importance, the breed was developed in two directions: milk and meat, in alpine areas, while exploiting the ability of animals to long marches on rough terrain. This last feature was the main reason for the export of pure-bred specimens. In countries like South Africa, Australia and the United States of America, Pinzgau was raised for one purpose, that meat breed.

In last decades, even in the birthplace, the number of specimens of the breed declined drastically due to changes in "fashion" and intensive agriculture, which caused the race to be in danger. Pinzgau, only Austrian indigenous breed, worldwide famous, should receive special attention through the establishment of national park and through the use of race to achieve its organic productions.

In Romania, Red Pinzgau breed formed after absorption crosses made between local breeds of cattle (Grey Steppe and Mocănița) and Pinzgau of Austria, since the second half of the nineteenth century, and black Pinzgau named "Cow of Dorna" by crossing local cattle with various mountain improved breeds (Pinzgauer, Mölltal, Zillertal, Dux-Zillertal, Dutch, Brown, etc.). The breed is exploited in three areas: NW of Moldavia, SW of Transylvania and W of Transylvania - Apuseni Mountains (Kadlecik et al., 2004; Bocanici, 2007).

Transylvanian Pinzgau is characterized by mixed morphology type, variable body development, meeting three types: hypermetric (size 131cm, body weight 520 kg in the south-western Transylvania), eumetric (127 cm and 460 kg in Suceava County) and hypometric (122 cm and 400 kg in the Apuseni Mountains), mezobrevimorfe profiles and less harmonious conformation. It has a large head, full; strong neck with developed dewlap; trunk not too long, but deep, with left top line, croup narrow at the ischium, big abdomen, globular udder and solid states. The colour is typical for Pinzgau, that dark red with white features drawings. Dorna cow has size less than 1-2 cm than Red Pinzgauer, made more pronounced rectangular body, bones and muscles better developed and the background colour black (in Moldova there is a colour polymorphism of red and black, or black variety of Pinzgau). Black Pinzgau was seen as a distinct type (population), with different

characteristics, although it is or not reproductive isolated (Kadlecik et al., 2004).

The purpose of this paper is to estimate the risk status of Transylvanian Pinzgau breed, according to genealogical analysis.

MATERIALS AND METHODS

Algorithm has been applied to a sample drawn from the entire database provided by ANARZ (Romanian Agency of Animal Recording), on Pinzgau breed. It contains 6133 entries, from which we extracted a sample consisting of 1917 individuals (1852 females and 65 males), since only they had genealogical information. As it is known, in case of Pinzgau breed in Romania, the largest sweight of individuals is found in Section D of the Herd Book (where animals can be registered without specifying parents). For sample under discussion, the genealogical information is known only to the father level, with negative consequences in management of genetic resourses.

The working method was *The Numerator Relationship Matrix*, developed by Henderson and Cunningham in 1976 (Grosu et al., 2005; Popa, 2009).

RESULTS AND DISCUSSION

Self-relatedness of a population is the genetic relationship of all individuals between them, existing at a time. Therefore, for this parameter can describe three components: the genetic relationship of males, of females and between males and females. The last component is the most important because it increases the average inbreeding level at the population in successive generations.

Following construction of additive genetic relationship matrix between individuals, were extracted coefficients of relationship between the 65 bulls and 1903 females. Doing the arithmetic mean between the values extracted (obviously taking into account all possible combinations of individuals), we determined a population average relationship of 0,0077 (0,77%).

Therefore, the average relationship of Transylvanian Pinzgau population, or otherwise the correlation between breeding values of males and females, show a large genetic variability (at least on genealogical information held). It is well known that when relationship is far from cousins (12,5%), the proportion of heterozygote in the population tends to a constant (not zero) that limit. Thus, the population remains, as long as the mating system maintain, in a state of equilibrium. Continue matings between individuals far from cousins, causes only insignificant decrease in heterozygosity in the population (Wright, 1921, quoted by Draganescu, 1979).

Regarding bulls relationship, it is 0 because it can not be emphasized any genetic similarity between them, due to lack of genealogical information.



Таблица 1. Средно генетично сходство в популацията

Table 1. Population average relationship

Population average relationship during the period	1983-1987	0,2450
	1988-1992	0,0294
	1993-1997	0,0126
	1998-2002	0,0156
Средно генетично сходство на популацията по периоди	Total 1983-2002	0,0077

The female genetic relationship in Romanian Pinzgau population is 0,0211 (2,11%).

The average genetic relationship between males and females is presented in table 1.

Average genetic relationship between males and females is a very important indicator in the management of genetic resources, since it influences directly the average inbreeding increase, with all negative consequences. The value of this parameter is required to be determined at any time of population evolution, because it is an indicator of its status.

Total inbreeding (overall genealogical information) on 3,33 generation is 0%. Lack of genealogical information makes it impossible to determine this parameter using recursive method.

As a result of this situation, we will estimate total inbreeding using relation presented by Wright (1921, quoted by Draganescu, 1979) which, although valid only panmictic breeding populations represent an acceptable compromise in this situation.

Thus, according to Wright's relation, inbreeding overall genealogical information is 0,002 (0,2%). The average inbreeding increase per generation is 0,0006 (0,06%), a value much lower than the limit of 1% for non-inbreeding line and even lower than for a local breed. Again express our reservations to these values.

A very important parameter in genetic analyzes, especially those dedicated to small populations is possible inbreeding. Possible inbreeding is inbreeding that can be expected by random mating (without directing mating). It is derived from the population average relationship and has a value of 0,0039 (0,39%). Very small value of this parameter, similar to the genetically stable lines ($\Delta F = 0,2-0,3\%$) or natural breeds ($\Delta F = 0,1-0,3\%$) is a positive, extremely useful in inbreeding management. Basically, this parameter approximates the total inbreeding of future population (descendants of current nucleus), without directing mating. Advancing same reservations, the question is beneficial.

Non-current inbreeding, less than the possible inbreeding, indicates the absence of strain inbreeding. As a result, the index of population subdivision (Lush, 1949, quoted by Draganescu, 1979) and defined as the ratio of non-current and possible inbreeding is 0,1538. So, the population do not have lines reproductively isolated. There is no question of the existence of genetic different eco-types.

Effective size ($N_e = 833,33$), inferred from the average inbreeding per generation is much larger than this parameter value derived from the sex ratio ($N_e = 251,18$).

The number of effective males ($N_m = 208,33$) is also higher than observed number of 65 bulls (overall genealogical information).

Таблица 2. Анализ на генеалогичните параметри на породата Пинцгау в Румъния

Table 2. Genealogical Analysis Parameters of Romanian Pinzgau Breed

Specification Показатели	Male Мъжки	Female Женски	Active population Активна част на популацията
Total inbreeding Общ инбридинг	-	-	0,0020
Number of generations Брой генерации	3,33	3,33	3,33
Inbreeding per generation Инбридинг за генерация	-	-	0,0006
Average relationship Средно генетично сходство	0,0000	0,0211	0,0077
Possible (potential) inbreeding Потенциален инбридинг	-	-	0,0039
Male effective number Ефективен брой на мъжките животни	208,33	-	-
Population effective size Ефективен размер на популацията	-	-	833,33

Values recorded can be caused either by lack of important ancestors, or genealogical data inconsistency.

These values allow the classification of Transylvania Pinzgau population in large populations, with its own evolutionary way.

Values of genetic analysis parameters for Romanian Pinzgau are presented in the table 2.

Based on these values, and according to the classification proposed in Romania by Draganescu C. (quoted by Grosu H., 2003), Pinzgau cattle population in Romania can be classified based on parameters determined during this study, in the category of populations outside of a dangerous situation ($N_e > 25$ males), at least in terms of pedigree analysis (genetic history) and the reservations previously advanced (inconsistence of genealogical information).

As reflected in the parameters analyzed, from the point of view of taxonomy, Pinzgau cattle in Romania is a large population ($N_e = 833.33$), with very small inbreeding per generation ("F E" 0,06%), with own evolutionary way.

Thus, Pinzgau of Transylvania is part of active breeds adapted to local conditions with local origin.

However, despite these results, the Romanian Pinzgau population has a vulnerable status because, as shown in ANARZ data and analysis of field data, the breed losing to other races (Simmenthal, Red Holstein), therefore an aggressive modernization that leads to the loss of traditions. Therefore, in areas where there is mostly Pinzgau (Suceava), it must be propose an active conservation program.

CONCLUSIONS

1. Average relationship in the population is 0.0077 (0.77%), which is a low value, which represent a benefit for the future of population. However, genealogical data inconsistency may make this value questionable.
2. The increase of inbreeding per generation has a small value (0.06%), close to local breed or genetic stabile line specific value.
3. Total genealogical data inbreeding is 0.2%.
4. Possible (potential) inbreeding is 0.39%. This low value in very usefull in management of inbreeding and represent a benefit for the future of population.

5. Effective size by 208.33 males is greater than the observed size (65 bulls overall genealogical information). Values recorded can be caused either by lack of important ancestors, or genealogical data inconsistency.

6. Evaluation of Pinzgau breed in Romania to develop strategies for sustainable management of genetic resources requires a non-genetic analysis also, in terms of economic attractiveness of the breed.

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**Преводът на български език е направен от проф. д-р Васил Николов.

Acknowledgements

This work was cofinanced from the European Social Fund through Sectorial Operational Programme Human Resources Development 2007-2013, project number POSDRU/89/1.5/S/63258 "Postdoctoral School for zootechnical biodiversity and food biotechnology based on the eco-economy and the bio-economy required by eco-san-genesys".

*Статията е приета на 12.12.2012 г.
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