

## DYNAMICS OF THE QUALITATIVE FEATURES OF LAMB PELTS OF KARAKUL TYPE IN A PRODUCTION FARM

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### Abstract

The paper examines the qualitative features of lamb pelts of Botosani Karakul breed from a private farm in which the selection criteria were adjusted according to the market requirements in the fur clothing field. The experimental observations lasted 10 years (2005-2014) examining these qualitative features in their evolution, on the one hand, as regards the physical and morphological characteristics of curling of lamb pelts, and on the other hand, in terms of hair fibre colour. The following trends of selection were profiled concerning the fixing of qualitative peculiarities of lamb pelts in this farm: i) modelling of curl shape from those of heterogeneous type to curls of cylindrical tube, cylindrical tube+grain and grain type; ii) dimensioning of curls from big size to a middle-small size; iii) improving the quality of hair fibres becoming more silky or normal by transforming the rough and soft hair fibres; iv) a significant increase in the incidence of intense lustre of hair fibres but also a considerable frequency of fibres with good+very good lustre; v) decreasing the number of individuals of black variety, maintaining in a constant and high proportion of lambs of greyish variety and an increase in the number of brown lambs and especially of the grey ones; vi) a better framing of lambs in upper zootechnical classes (Record and Elite). Generally, the differences among experimental phases (years) concerning the qualitative features of lamb pelts present significant statistical assurance.

**Key words:** lamb pelts, curling, colour variety, Karakul sheep

### INTRODUCTION

In Romania there is a rich tradition of sheep breeding for skins, especially those of Karakul type, which dates back over a century. Economic activity in the field of animal husbandry determined to put Romania ranks sixth in the world on sheep breeding of Karakul breed. The position of Romania in this hierarchy occurred because the Karakul sheep breeding was conducted in a nationalized framework right from importing the first herds of this breed from Buchara area in our country [1, 3, 4, 7, 8].

After December 1989 because of the decentralization of the entire national economy, especially in the decade from 1990 to 2000, a decline has happened in the sheep breeding for lamb pelts, as for the whole

ovine species, with the abolition of the state sector [7], only unit of this livestock remaining the Research and Development Station for Sheep and Goats Popauti-Botosani which holds the elite farm for breeding this sheep.

Since 1990, the share of Karakul sheep breeding is moved in the private livestock sector [5, 7]. The attributes of market requirements for the production of lamb pelts imposed to private breeders to adjust their farming activity in accordance with the selection criteria and to the improvement standards from an elite farm regarding the two major trends in the breeding of these sheep: 1) improvement of morphological and physical traits of curling of lamb pelts and 2) strengthening of colour varieties and diversifying of their shades.

Following these considerations, this paper had in view the analysis of improvement work into a private farm specialized in the sheep breeding for lamb pelt production and how

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the qualitative parameters of this production type evolve over time.

## MATERIAL AND METHOD

The works were carried out on sheep belonging to Botosani Karakul breed into a private farm ("I.I. Nechifor Ionela-Claudia") affiliated to the *Association of Sheep and Goat Breeders "MOLDOOVIS" Botosani*. The experiments were conducted over a period of 10 years (2005-2014), the herds ranging from year to year, but they were large enough in order to results have statistical assurance. This period was broken down into four phases: the first phase is the longest comprising four years when the farm organization occurs to the imperatives of republican rules regarding the farm animal breeding in private holdings; the following three phases consist of two years each in which the activity of selection and breeding of sheep was carried by the increasingly more stringent criteria.

We have analyzed the main qualitative features of lamb pelts. In their turn, each of these features has more characteristics that define the curling attributes of lamb pelts. The determination of these properties was performed by the multifactorial estimation method, operation carried out to the lamb birth, when the characteristics of these features are the most suggestive (1, 2, 4, 6), as follows:

- curl shape, with characteristics: cylindrical tube, tube+grain, grain, flat tube, miscellaneous (heterogeneous shapes of curls);
- curl size, with characteristics: middle, middle-small, small, big;
- hair fibre quality, with characteristics: silky, normal, rough, soft;
- hair fibre lustre, with characteristics: intense, good+very good, satisfactory, weak-metallic-mat;
- hair fibre colour, with characteristics: black, greyish, brown, gray, pink, white;
- framing in zootechnical classes, with characteristics: Record, Elite, I<sup>st</sup>, II<sup>nd</sup>, III<sup>rd</sup>.

To see the significance of differences in evolution of the qualitative traits of lamb pelts over the years the Hi square test ( $\chi^2$ ) has been calculated by the *R x C contingency table*.

## RESULTS AND DISCUSSIONS

The analysis of production performances from this private farm was based on the description of qualitative features of lamb pelts according to the characteristics of these traits. The results are shown diagrammatically. For a more obvious suggestibility of the dynamics of these parameters along the analysis period, the description also benefited from a graphical representation of linearity (figures 1 - 6).

### *Curl shape* (figure 1)

The hierarchy of curl types is maintained in all observation years. The most common type of curl is the "cylindrical tube". At some distance, they are followed by lamb pelts with combined curls "tube+grain" and then by curls in "grain" shape. The "flattened tube" occurs relatively rarely in curling, the frequency of lamb pelts of this type being approximately 5% on almost the entire experimental period, while in the last stage to be almost nonexistent (0.98%). Outside the three valuable curl shapes ("tube", "tube+grain" and "grain"), the worthless curl shapes of "heterogeneous" type occur with a considerable percentage, especially at the beginning of experimental range, but in its end to be less common.

The most important aspect of this work section is a considerable gradual improvement of valuable curls of lamb pelts. The most obvious evolution is of the "cylindrical tube" which, from 37.50% at the beginning of experiment, has achieved a plateau curve of 43% -44% in 2009-2012, while in the last two years to achieve a peak of 45.93%. The number of curls with combined shapes "tube+grain" registered a very small increase in the first three phases (from 23% to 25%), but the last phase achieved a leap reaching 28%. The curls in the shape of "grain" increase insignificantly in each stage by one percent, from 19% to 22%. The "flat tube" is stationary in the first three stages, but the slight tendency towards the decrease of its incidence (from 5.5% to 4.5%) signifies the sharp decline of its appearance in the last stage (0.98%). The second important aspect of this period is the considerable decrease of lambs with curling of inferior quality. As a result of compliance with a greater strictness of the selection criteria and of application of some

judicious mating schemes, the heterogeneous curl type, economically worthless, which during the period 2005 - 2009 registered a high frequency (14.17%), has sudden drop of its incidence in the next two stages (about 6%), and in the last two years to be met in increasingly rare in lamb pelts (3%). Due to

this activity, very large differences occur among the experiment phases regarding the frequencies of different curl types, designating a very significant positive evolution thereof, the value of  $\chi^2$  test (40.44 \*\*\*) exceeding the most critical significance level (0.01%).

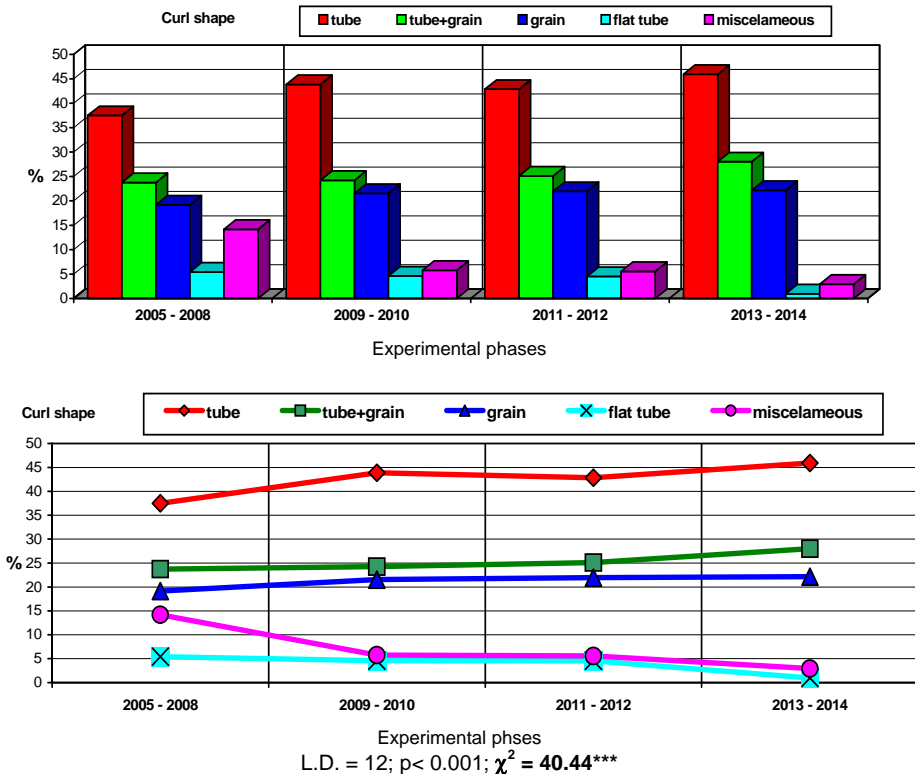


Figure 1 Curl shape in Botosani Karakul lambs in a private farm during 2005 – 2014

**Curl size** (figure 2)

"Middle" and middle-small" sizes of curls are valuable traits getting into the breeder views while the extreme sizes ("small" and "big") depreciates the quality of lamb pelt curling and must be eliminated through selection. Around 55% of lambs have lamb pelts with curls of "middle" size. But the other valuable curl size - "middle-low" - records moderate frequencies (between 12% and 17%). The presence of "small" curls is reduced in the lamb pelt curling (between 3% and 6%), but the high incidence of big curls (24%-28%) is surprising; the "big" curls occupies the second place within this

parameter, after the curls of "middle" size.

In terms of size "middle" curls, the improvement knew no progress, their incidence being equal at the beginning and at the end of this experiment (approximately 56.5%); furthermore, in the intermediate stages there is a slight depression of their frequency of about two percents. Instead, the frequency of "middle-small" curls, although it is not at the desired level, its curve show some climb of about 4-5 percents, aught it means a genetic progress. The frequencies of lambs whose lamb pelts have "small" curls are similar at the beginning and at the end of observations (about 3%). However, in the intermediate

phases, the incidence of "small" curls has some increase (6%). The second positive aspect within this parameter is represented by the gradual decline, resembling to a regressive straight line, with five percents of lamb pelts with "big" curls (from 28% to 23%).

The most significant incongruences on improving the curl size appear in the intermediate stages (2009-2010 and 2011-2012). It seems that decreasing the frequency of "middle" curls was made in favour of increasing the number of "middle-small" curls; but it is possible that some of curls of "middle-small" size to be transformed into "small" curls; on the other hand, it can not be ruled

that some of the "big" curls to have become curls of "middle-small" size. Anyhow, the progress achieved throughout the experimental period (2005-2014) is represented by the gradual increase in the incidence of curls of "middle-small" size and decreasing the frequency of "big" curls to the same extent. However, it should a more assiduous improvement activity for numerical increasing of lambs with "middle" curls and especially of those with curls of "middle-small" size. Because of this sinuousness regarding the evolution of curl sizes, the differences between years are small and insignificant  $\chi^2 = 8.86$ .

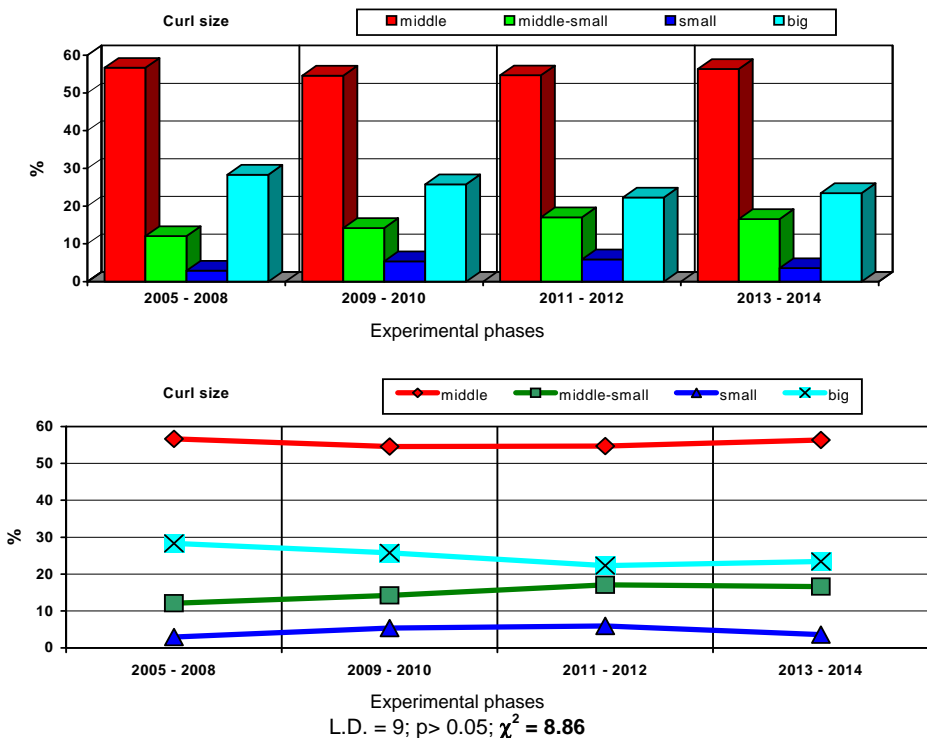


Figure 2 Curl size in Botosani Karakul lambs in a private farm during 2005 – 2014

**Quality of hair fibre** (figure 3)

The "silky" quality of hair fibres is found to almost half of the farm flock lambs. The "normal" hair occurs in the usual note in the Karakul sheep breeding farms, to approximately a third of the population. The inferior qualities of curling occur perhaps in too high proportions, especially the hair

"rough", although nor the incidence of fibres with "soft" hair is not negligible, mostly at the beginning of observations.

Dynamically, there is a gradual increase in incidence of fibres with valuable qualities. If in the case of "silky" fibres the progress is substantial to give a gain of 15 percents, as concern the "normal" fibres the increase of

their frequency is lower, maximum of 5%. The fibres with inferior qualities record a regressive trend. The "rough" hair has from the beginning a high frequency (18.75%), which is maintained in the following two stages too; only in the last phase it makes a sudden drop to 11.73%. The "soft" hair, though at first it has a relatively high incidence (11.76%), it is constantly reduced in each stage, reaching a reasonable proportion (3.58%) at the end of the experiment.

Supposing that the frequency with which the "normal" hair appears is a breed feature of the Karakul sheep, the improvement activity in this regard in this farm should be continued in reducing the share of "rough" and "soft" fibres and in a substantial increasing in the frequency of "silky" fibres. Anyhow, the improvement work regarding the fibre quality during the reporting period is worthy of taking into consideration, the test  $\chi^2$  having a distinctly significant value (25.89\*\*).

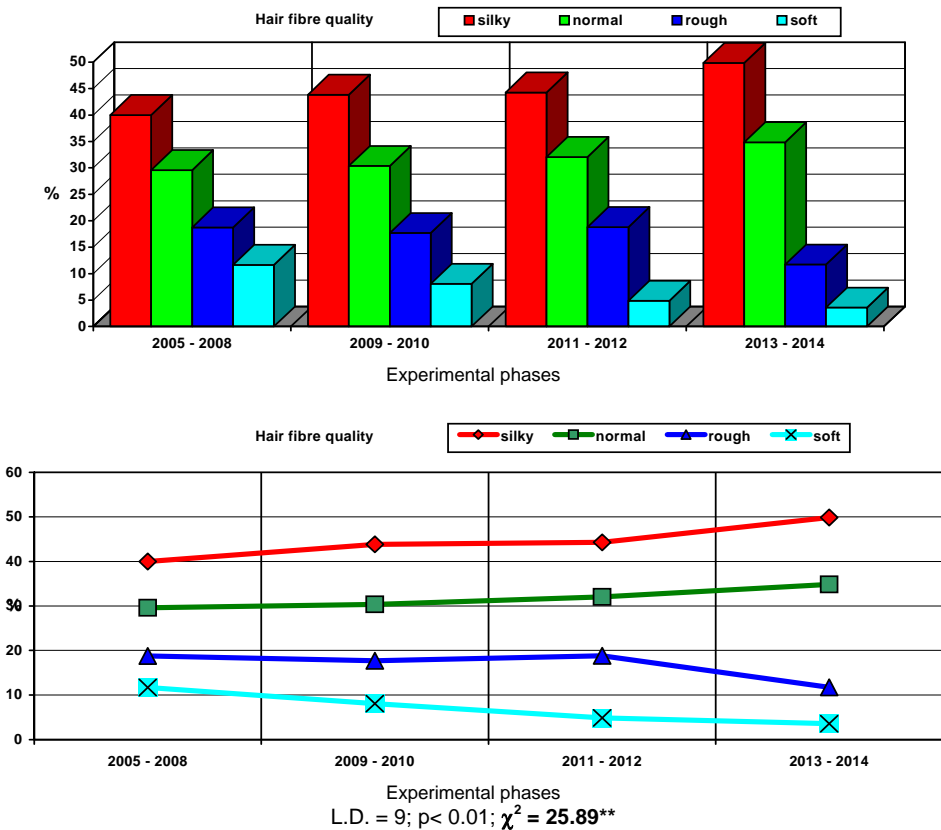


Figure 3 Hair fibre quality in Botosani Karakul lambs in a private farm during 2005 – 2014

**Lustre of hair fibre** (figure 4)

The "intense" lustre, the most valuable characteristic of this trait, is met in a satisfactory rate in this farm, even more than that expected (20%-30%). But most lamb pelts have fibres with "good + very good" lustre (62%-66%), as is usually in Karakul lambs; their incidence should be higher, but it seems that it is compensated by the increased

proportion of fibres with "intense" lustre. The "satisfactory" lustre, less accepted in selection, has some spread in population, especially at the beginning of the experimental period. The other inferior lustre category, "weak-metallic-mat", is inscribed within normal (acceptable) ranges of the breed.

The "intense" lustre has a progressively constant evolution over the years with a

significant increase of 10 percents. The "good + very good" lustre is maintained at the same level in the first two phases and then to register a very slight decrease, especially in the last stage. The frequency of fibres with "satisfactory" lustre is relatively high in the first phase (10%), further it decreases to half, rate at which it is maintained on the period rest. The "weak-metallic-mat" lustre has a low frequency throughout the period, seeing a gradually slight decrease of its incidence from 2.92% to 1.63%. For these reasons, the differences

between different experimental phases on the hair fibre lustre are not significant, although the value of the test  $\chi^2$  (14.08) is very close to the first significance threshold (5%). In the present case, the improvement works should be focused at least on reducing the frequency of fibres with "satisfactory" lustre in favour of those with "good + very good lustre". It is preferable to increase the number of lamb pelts with "intense" lustre, but this feature is getting quite difficult, taking into account also its frequency that is more than satisfactory in this farm.

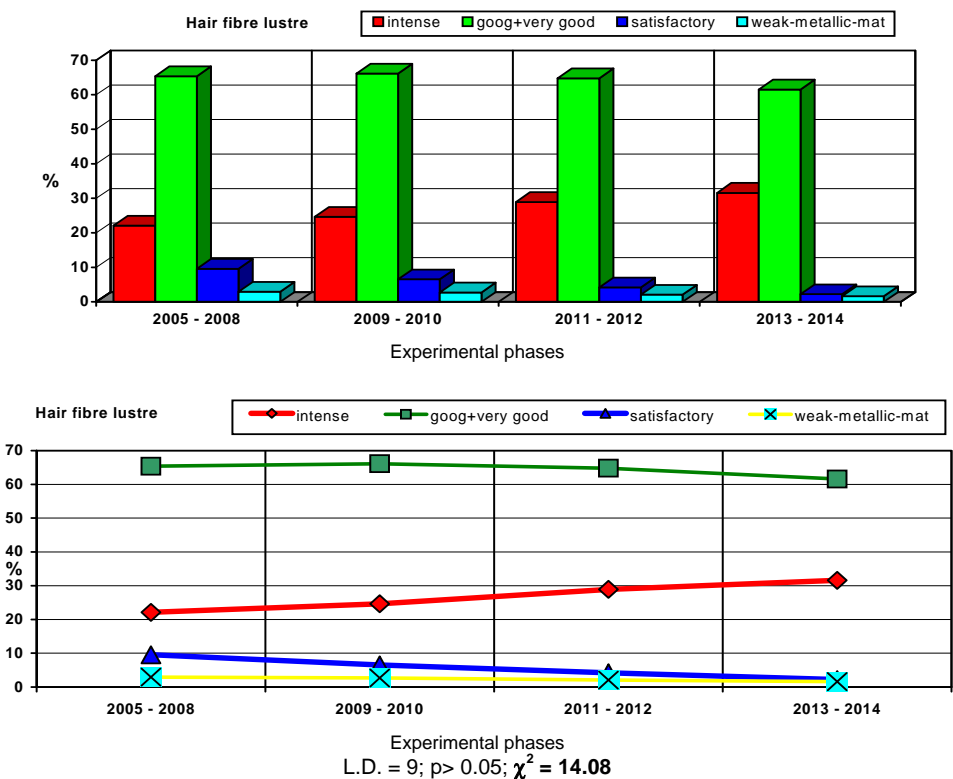


Figure 4 Hair fibre lustre in Botosani Karakul lambs in a private farm during 2005 – 2014

**Colour of hair fibre** (figure 5)

A recent trend in international trade of Karakul clothing is given by the buyer preferences for lamb pelts of different colours and shades thereof which are 3-5 times more expensive than those of black or greyish colours. Such lamb pelts are part of the brown, gray, pink and white varieties. The white lamb

pelts are very required because they have a great pretability to be painted in any colour desired by clothes manufacturer or wearer of this confection type.

The effect of this trend is modifying the structure of sheep populations in terms of colour varieties. The need to increase production of coloured lamb pelts became a

more recent preference of sheep breeders at all levels, in all unite types of Karakul breeding, especially in private farms, trend occurred in the farm under discussion in this study.

In the early years, the farm owned sheep only of traditional varieties (black and greyish), the black individuals being more frequent with 7% than the greyish ones. After four years, individuals of other two varieties (brown and gray) appeared in the farm population, too. This populational dynamics determined reducing the incidence of black individuals (38%), a slight increase in the frequency of greyish individuals (48%) and the brown individuals are somewhat more common than the gray ones, although both categories have a more modest spread (8% and 5.76%). In the next years the downward trend in the frequency of black sheep continues until 22.80%; also the greyish variety shows a slight tendency to fall (44%), but it prevails the panel

of colour varieties; the brown variety gave the impression of numerical stability, but in the two years the number of brown sheep has decreased by almost half compared to baseline; instead, we are witnessing a marked increase of individuals of gray colour, both in the third phase (17.77%), but especially in the last stage (28.34%), these occupying the second place after the greyish ones. For strictly economical and marketing reasons, the farm does not hold individuals of pink or white varieties. The configuration of colour varieties show very big differences among the sheep samples regarding this issue, the test  $\chi^2$  (157\*\*\*) recording the highest value of all the qualitative features of lamb pelts, indicating that changes concerning the population structure on colour varieties have acquired very significant mutations. The value of this test shows that the highest selection pressure was exerted on the colour character.

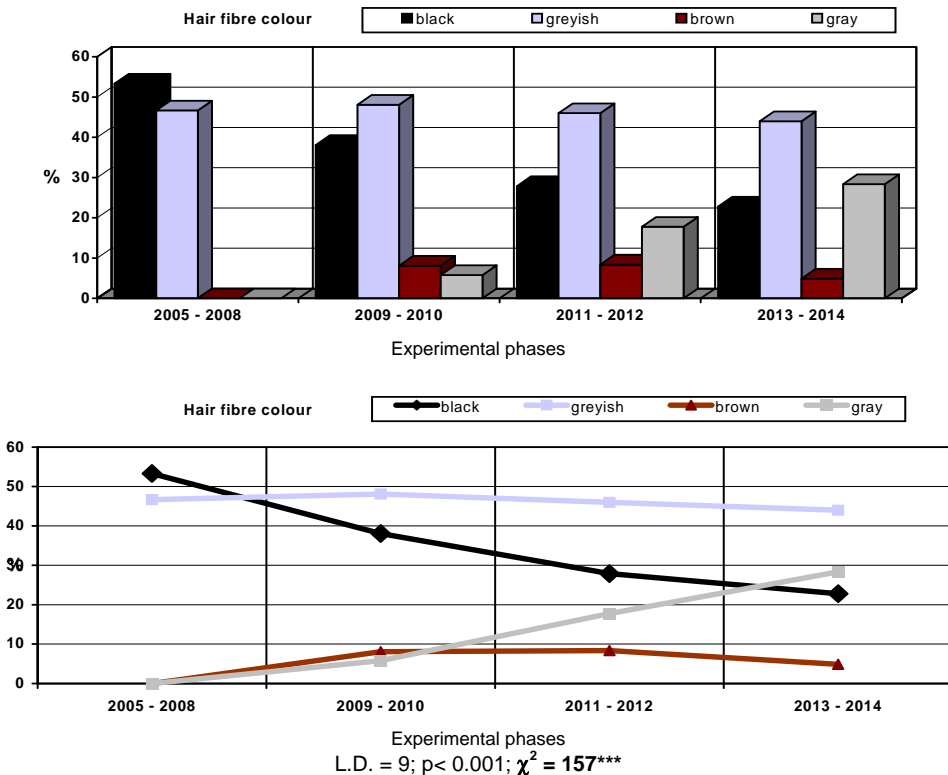


Figure 5 Hair fibre colour in Botosani Karakul lambs in a private farm during 2005 – 2014

**Framing in zootechnical classes** (figure 6)

Depending on the production performances, the zootechnical classes in the Karakul breed are ranked so, in decreasing order of their economic value: Record, Elite, I<sup>st</sup>, II<sup>nd</sup> and III<sup>rd</sup>.

In the first activity phase of this farm, there are individuals belonging to the all zootechnical classes. Something more than half of the lambs were part of the Elite class and with around 30% of the Record class, the overall zootechnical value of lamb pelts being framed in the three inferior zootechnical classes, somewhat less in the II<sup>nd</sup> and III<sup>rd</sup> classes (between 1% and 2%), but a significant proportion in the I<sup>st</sup> class (15%). In the subsequent years the zootechnical value of lamb pelts increases and as a result their framing in zootechnical classes is changed. During the second phase the percentage of Record lambs increases (41.15%) and the number of lambs belonging both to Elite class

(44.62%) and to the I<sup>st</sup> class (12.31%) decreases; but the Elite lambs are still prevalent. The lambs belonging to the III<sup>rd</sup> class disappear and those of II<sup>nd</sup> class record a very low frequency (1.92%). In the third phase we witness at exceeding of the lamb percentage of Record class (48%) in comparison with those of Elite class (40%), thus dominating this panel. Compared to the previous phase, the frequency of lambs belonging to the I<sup>st</sup> class has a slight decrease, remaining the only zootechnical class of inferior economic value. In the last phase the percentage of Record lambs is doubled (61%) compared to the Elite class one (33%) and the presence of lambs of I<sup>st</sup> class is significantly reduced (5.87%). The continuous positive evolution of morphological and production performances of lambs expressed by their progressively framing over the years in superior zootechnical classes presents very significantly statistical assurance, the value of the test  $\chi^2$  being very high (80.34\*\*\*).

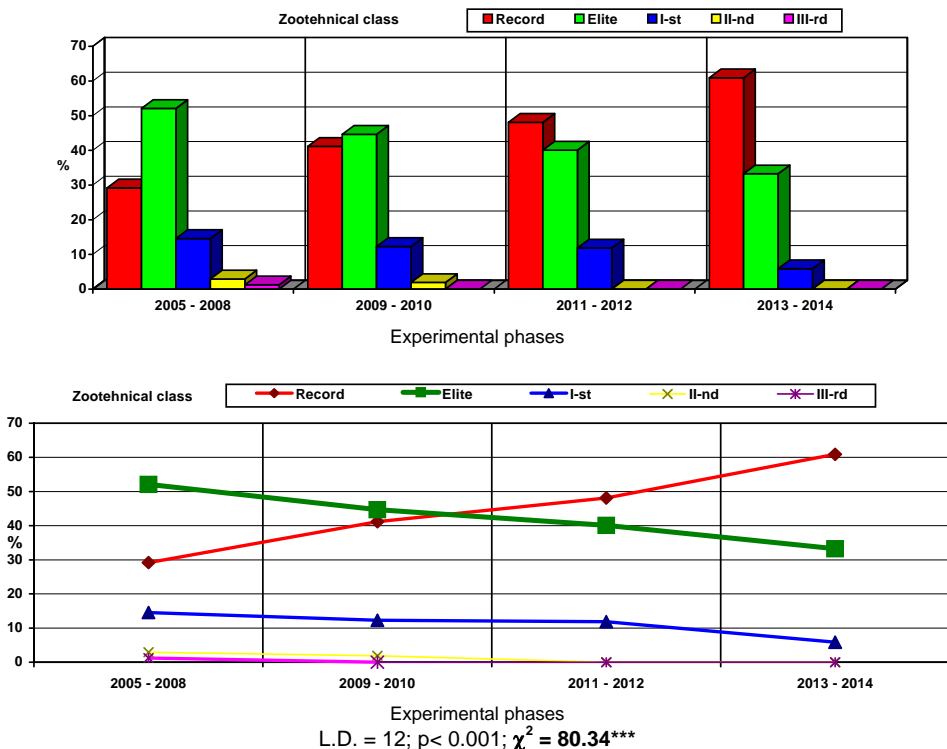


Figure 6 Framing in zootechnical classes of Botosani Karakul lambs in a private farm during 2005–2014



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So, as a result of a judicious improvement activity conducted during a period of 10 years in the private farm, it can find out important progress in terms of productive parameters that define the qualitative traits of lamb pelts. The feature which was undergone to the greatest changes has been the curl shape, especially the type of "cylindrical tube" recording very good frequencies. Also, the lambs with worthless curl types had a considerable decrease. In terms of curl size, it is noted increasing the incidence of curls of "meddle-small" size and decreasing the frequency of "big" curls. Increasing the quality of hair fibres is manifested notably by enhancing of their silky aspect but also by a considerable decrease of "soft" fibres. Important results have been achieved regarding the improvement of hair fibre lustre, even better than expected. The population structure of the farm has undergone significant changes in the respect of colour varieties; from the two traditional varieties (black and greyish) existing at the beginning, the population was enriched with two varieties (brown and gray) which achieved a gradual increase in numbers. Taken individually, not all qualitative features of lamb pelts have the same consistent evolutionary trend. Of these, the curl type, quality and colour of hair fibres had significant positive developments ( $\chi^2$  test having values with different degrees of significance); for other features, such as curls size and hair fibre lustre, the test  $\chi^2$  shows that the incidence fluctuations of these traits were not significant. Although these features, taken separately, even if not at all levels of their characteristics had statistical assurance, overall the improvement activity of all qualitative traits of lamb pelts had a very significant development throughout the experimental period ( $\chi^2 = 246.45^{***}$ ). The progress achieved in private farm as a result of the application of a rigorous selection is reflected in the framing of individuals in zootechnical classes and their structure on benchmark phases. If in the early years, most lamb pelts were framed in the Elite class, and the inferior classes recorded appreciable

percentages, throughout the years more and more lambs became of Record class, dominating towards the end this framework, the Elite class also having an important share, and the lambs of II<sup>nd</sup> and III<sup>rd</sup> classes gradually disappear, remaining only those of the I<sup>st</sup> class in an acceptable proportion. But in order to this farm to reach the attributes of an elite farm the improvement activity should be continued with even greater accuracy and assiduity for fixing in population of the valuable traits of curling and diminishing the frequency of worthless characteristics, even eliminated if it is possible. Not unimportant would be to improve the population structure under the colour variety aspect by the emergence of pink and white individuals.

## CONCLUSIONS

1. In the private farm, the improvement activity of the Botosani Karakul sheep aimed all the qualitative features of lamb pelts (shape and size of curls, quality, lustre and colour of hair fibres), but its effect was not reflected equally and consistently on each of them.
2. The most consistent selection pressure was exerted on the colour of hair fibres, curl shape (especially on "cylindrical tube" type) and quality of hair fibre.
3. Due to the application with more discerning of the selection criteria and judicious schemes of mating matching, the qualitative features of lamb pelts had a positive trend from year to year, contributing to a very significant increase of zoo-economical value of this production trait specifically to Karakul sheep.
4. The improvement activity of sheep from this farm should be continued with even greater accuracy to reach the morpho-productive performances of an elite farm of Karakul type.

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