# THE INFLUENCE OF AGE AT FIRST CALVING ON THE EVOLUTION OF MILK PRODUCTION OVER THREE YEARS IN LAPTE PALAS SHEEP BREED

**D. Nadolu[1*], Z. C. Zamfir[1], A. H. Anghel[1,2], A. Enciu[1], L. Marinică[2,3], E. Ilișiu[1], C. V. Ilișiu[1], M. Stanciu[1]**

*[1]ICDCOC Palas, Constanța, Romania*
*[2]Ovidius University, Constanța, Romania*
*[3]ANCC Caprirom, Constanța, Romania*

***Abstract***

*Sheep farming is an old tradition of the Romanians, and interest in sheep's milk and its derivatives has increased in recent decades. In 2010, ICDCOC Palas, Constanța, homologated the Lapte Palas breed, created over 35 years by crossing the East Frisian and Awassi breeds with the Merino Palas breed. The advantages of creating the Lapte Palas sheep breed are lower acquisition costs, very good adaptability to the geo-climatic conditions specific to our country and to traditional exploitation conditions, as well as a greater capacity to capitalize on food resources compared to imported breeds.*

*This study follows the evolution of the milk quantity in 52 Lapte Palas sheep, over 3 years, exploited in a traditional way, with the establishment of the correlation between milk production and age at first calving. In group 1 (n= 26 sheep that calved before the age of 2 years) there were no significant differences ($p>0.05$, $p=0.107486$) between milk production in the first 3 lactations, while in group 2 (n=26 sheep that calved between 2 and 3 years of age) there were significant differences between the 3 lactations ($p<0.05$, $p=0.042287$).*

***Key words:*** *milk production, age of sheep at first calving*

## INTRODUCTION

The centuries-old tradition of sheep breeding in Romania has continued despite the changes in the agricultural economy that occurred depending on the market demands at a given time. Sheep represent the species with the most exploitation directions, namely wool and skins (until around the 1930s, wool and skins production was paramount), meat and milk [1]. Over time, the proportion of different breeds of sheep exploited worldwide has varied depending on existing needs and trends. Thus, a reorientation of sheep breeders is observed to meet consumer demands and to increase the profitability of their own farms. Both in our country and worldwide, a reduction in the number of sheep raised for wool and skins production is observed, with production halving in the last 20 years due to the increasing use of natural or synthetic textile fibers [2]. In the 19th century, the same trend of decreasing interest in wool fibers in favor of newly emerging textile fibers (cotton, hemp) is reported, highlighting the reorientation of sheep breeding for meat production [1].

In line with the general trend, in our country too, there is a decrease in interest in wool fibers, while interest in meat and milk production is slightly increasing. In Romania, there is no increased interest in the consumption of sheep meat, which has annual variations related to traditional Easter customs and depends greatly on the higher price than poultry, pork and even

* Corresponding author: dorinanadolu@yahoo.com
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beef. On the other hand, the exploitation of sheep for meat has intensified in the conditions of the increasing demand for export to Arab countries, knowing that Romanian breeds have a high resistance to infectious and contagious diseases and the need for prophylactic immunizations is reduced. Interest in sheep milk and its derivatives has always existed for the Romanian population, the only impediment being the high price and the relatively small quantity existing on the market. Under these conditions, sheep farmers have reoriented themselves towards the exploitation of sheep for meat and milk production, with a 25% increase in sheep meat production in 2015 compared to 2007 [3]. As for sheep milk production, in 2018, at European level, a production double the world average (91 l/sheep) was recorded, with the countries bordering the Mediterranean and Black Sea regions producing 41.4% of the world's sheep milk, and Romania ranks 4th (14.7%, 89 l/sheep) after Turkey (21.6%; 60 l/sheep), Greece (16.6%; 106 l/sheep), Syria (15.2%; 56 l/sheep) [4]. In order to increase the productivity of local breeds, specialized sheep breeds for meat and milk production were imported, with controlled crossings with local breeds and, to a lesser extent, imported sheep were bred as purebreds due to the difficult acclimatization and additional costs of their exploitation.

The expansion of food trends was anticipated and capitalized on by Romanian researchers, who took steps to create new breeds of sheep specialized for meat, milk or high-fecundity production.

Thus, between 1975 and 1987, crosses were made between the East Frisian (imported from Germany) and Awassi (imported from Israel) breeds with the Palas Merino breed, followed by reproductive isolation and selection to increase milk production, resulting in the homologation of the Palas Milk breed in 2010 [5]. The main morpho-productive and reproductive parameters of the Lapte Palas breed are: total milk production of 200-220 liters (of which 140-150 l of milked milk) in 200-220 days of lactation, a fecundity of 92-97% and prolificacy of 117-128%. The major advantage of creating new breeds through repeated crossings with specialized breeds of sheep from local breeds is the very good adaptability to the geo-climatic conditions specific to our country and to the traditional exploitation conditions, namely grazing and a greater capacity to capitalize on fodder resources compared to imported breeds.

The present study follows the evolution of the quantity of milk in a batch of 52 sheep, over 3 years, exploited in a traditional way, with the establishment of the correlation between milk production and age at first calving.

## MATERIAL AND METHOD

The study was conducted in the experimental farm of the Research and Development Institute for Sheep and Goat Breeding Palas, Constanța, over three consecutive years. The sheep from the ICDCOC Palas farm, Constanța, are exploited in a traditional system and in the last two years analyzed, greater emphasis was placed on reducing CO2 emissions at the farm level and monitoring productive and reproductive parameters. To reduce carbon emissions, stricter management of animal pasture feeding and the use of rotational grazing were applied, under the conditions that adult sheep are kept on pasture for 7-8 months and in stables for a maximum period of 5 months (from December to March, April), respectively the last months of gestation (the 4th and 5th month) and the lambing period (70-90 days). The use of the pasture is possible due to the favorable weather in the Dobrogea plateau, respectively mild winters. The impediment of the specific semi-arid climate is kept under control through specific agro-technical works (scarification, use of drought-resistant plant varieties) complemented by judicious grazing with plot rotation.

Rotational grazing according to a well-established schedule allows pasture regeneration and over-seeding of pastures is not necessary.

Furthermore, all animals are dewormed following parasitological analyses so that targeted deworming active substances are used and not broad-spectrum ones, and deworming is always carried out before entering the grazing period, respecting the times for eliminating adult parasites, larvae and eggs so that the pasture is protected and additional pasture deworming treatments are not resorted to, thus ensuring the protection of the animals from reinfestation.

The sheep belonging to ICDCOC Palas are formed into separate flocks according to their breed. Milking is carried out manually using the same team of milkers for each turn and during the grazing period all lactating adult sheep receive a supplement of cereal mixture before morning milking.

For the present study, we selected 52 Lapte Palas sheep that had their first three complete lactations during the period 2021-2024. The selection of animals was done according to the date of entry into mating, creating 2 batches: batch 1 consisting of 26 ewes that were mounted at the age of 15-19 months (age at first calving 20-24 months) and batch 2 consisting of 26 ewes mounted at 20-31 months (age at first calving 25-36 months). After the lambing period (60-80 days), milk production control was performed monthly, on the same day for the entire herd, through two weighings of milked milk: morning and evening, the daily production being obtained by summing the two quantities. Three such checks were carried out at intervals of 28-34 days, starting a maximum of one month after weaning the kids. The calculation of total milk production was established based on the values obtained from the control of milk production and the duration of lactation, which varied between 175 and 190 days, by using the Fleishman formula: $SM = I0M1 + I1\ ((M1 + M2)/\ 2) + I2\ ((M2 + M3)/2) + I3M3$, where SM represents the total quantity of milk, $I0$ is the interval in days from calving to the first measurement, $I1$ - the interval between the first and second weighing, $I2$ - the interval between the second and third weighing and $I3$ - the interval in days from the last weighing and weaning of the ewe, and $M1$, $M2$. $M3$ are the daily milk quantities corresponding to the three controls.

The experimental data were entered into an Excel database, first ordering the animals by age at first calving, then applying a filter on values less than 24 months. The number of sheep calving by the age of 2 years was 26, these constituting batch 1. The lowest value of the calving age was 20.9. In batch 2, the first 26 sheep with an age at first calving of over 24 months were selected, the highest age selected being 35.9 months. After the establishment of the 2 batches, the milk productions (Fleishman formula) of each sheep were estimated and the performances of the 2 batches were compared by the ANOVA test with a single factor.

## RESULTS

The ewes in batch 1 had a first lactation duration of between 155 and 217 days (190,654 lactation days on average) and those in batch 2 recorded a first lactation duration of between 154 and 231 days, with an average of 195.615 days.

The analysis of average total milk production in the Lapte Palas breed sheep in the first batch (figure 1) highlights an increase in average production at group level in the 3 years analyzed, from 167,476±19,974 kg of milk in 2022 to 172,854± 18,236 kg of milk/ 2023 and 177,896±17,309 kg/2024. Statistical analysis of milk production values from the 3 years in ewes that calved before 2 years shows that there are no significant differences ($p>0.05$).

Comparative analysis between individual milk productions of ewes from batch 1, from the first two consecutive years indicates insignificant differences (2022/2023, $p=0.316$ and 2023/2024, $p=0.311$) but between lactation rank 1 (2022) and 3 (2024) there are weakly significant differences ($p=0.049$).

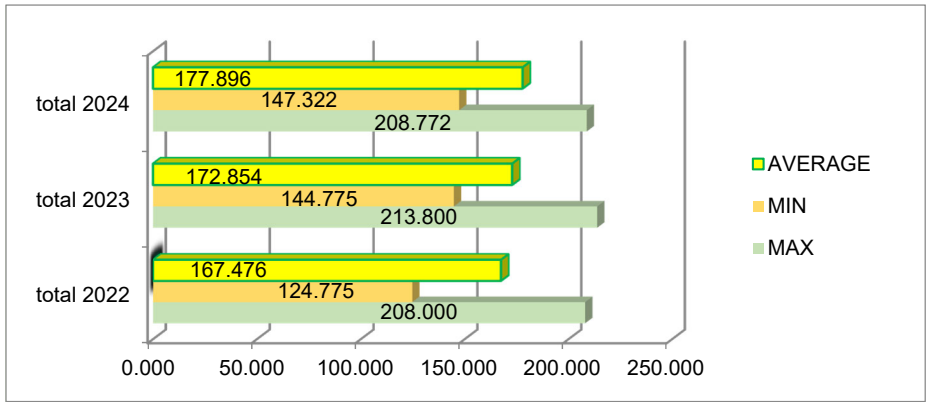


Fig. 1 Evolution of the average quantity of milk in batch 1 of Lapte Palas sheep breed (kg milk/ year)

Figure 2 shows a decrease in the average milk yield in the three consecutive years in the ewes in group 2 that had their first lactation after the age of 2 years. The statistical analysis indicates insignificant differences between the 3 consecutive years (p=0.07671).

Therefore, ewes mounted at the age of 15-19 months recorded a slightly increasing milk production during the three successive lactations and reduced variations between extreme values, with minimums of 124.775 kg/ewe (first lactation), 144.775 kg (lactation 2) and 147.322 kg (lactation 3) and maximums of 208 - 213.8 - 208.772 kg/ewe, respectively.

Analysing the average individual milk production of the ewes in group 2, for 2 consecutive years, it is observed that there are no significant differences between the first two lactations (p>0.05), while between the milk productions in the 2nd and 3rd year of lactation the differences are strongly significant (p=0.0131). Between the first and 3rd lactation the differences are weakly insignificant (p=0.070).

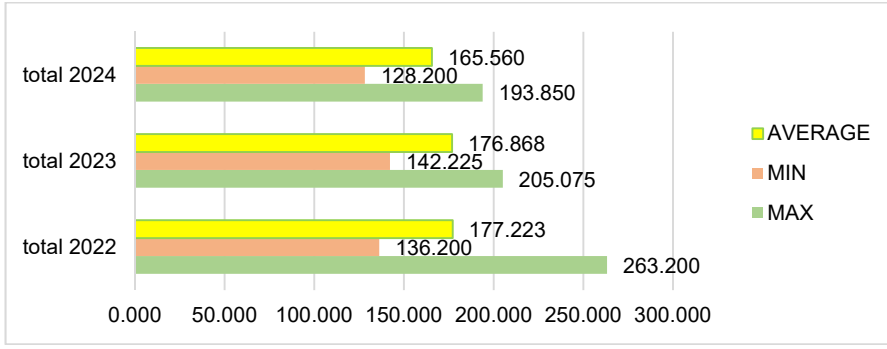


Fig. 2. Evolution of the average quantity of milk in batch 2 of Lapte Palas sheep breed (kg milk/ year)

Analysing the individual milk production of the sheep in the two control groups, in the first and second year of lactation it is observed that the differences are not significant (in the first lactation, p=0.1555 and in the 2nd lactation p=0.4026). In the 3rd year of lactation, highly significant differences are observed between the two groups of sheep, p=0.0097.

From figure 2, it can be seen that in group 2, in ewes mounted after the age of 19 months, there is greater heterogeneity in terms of individual milk production values, with milk production values between 136,200 and 263,200 kg being recorded in the first lactation. During the 3 lactations, a decrease in the minimum and maximum values of milk production is also observed.

## DISCUSSIONS

The sheep in this study are part of a herd of 390 Lapte Palas sheep, of which 206 sheep with different lactation ranks, from the first to the 5th lactation, were monitored for milk production in 2023. The average individual production value in the 2nd lactation (in 2023) was higher than the 37 sheep that were monitored, obtaining a value of 187.78 kg/ ewe/ year [6].

The milk production of sheep of the breed created at ICDCOC Palas, Constanța is superior to the milk production of other native sheep breeds. Thus, Țigaie sheep record in the first three lactations productions of 98.78±0.84 kg/ewe (first lactation), 139.67±0.38 kg/ewe (2nd lactation) and 132.27± 1.55 kg/ewe (3rd lactation) [7] and other authors have reported 108.62 kg/ewe in the first lactation and 111.2 kg/ewe in the second lactation [8].

The Palas Merino breed, which is the basis for the formation of the Palas Milk sheep breed, records, according to various authors, lower values than the newly formed sheep breed, the average production being 84.21±3.4 – 117.51±3.1 kg milk/ewe [9], 117.51±3.11 – 98.91± 4.15 kg milk/ewe [10], 80.15-52.15 kg milk/ewe [8].

The superior milk production of the Palas Milk sheep breed is due to the infusion of genes from breeds specialized for milk production, such as the Awassi breed which records average milk production of 297.15 kg milk/ewe [11] and other authors assess the production of Awassi sheep depending on the rearing system, reporting values of up to 80 kg in 150 days of lactation in the traditional system and a maximum of 504 kg in 214 days of lactation in improved Awassi sheep [12].

## CONCLUSIONS

The analysis over three years of lactation of the Lapte Palas sheep breed highlights that the achievement of mating after the age of 2 years when it is considered that the body development is complete is not a prerequisite for a higher milk production. Moreover, late mating and delayed entry into production may limit later performance even though milk production values are higher in first lactation.

The newly created breed at ICDCOC Palas Constanța, through the productions obtained, is competitive with specialized sheep breeds (Awassi), obtaining higher values regarding milk production compared to the native Tigaie and Merinos de Palas breeds.

Comparative analysis of individual productions shows that rigorous selection and judicious exploitation are key factors for maintaining high and constant levels of milk production. This confirms the potential of the Lapte Palas breed and contributes to increasing the competitiveness of the Romanian sheep sector.

Correct reproduction management, with planning matings at the optimal age of 15-20 months and entering the productive cycle at 20-25 months, maximizes the economic efficiency of sheep farms and ensures the chance of stable production in the following lactations, respecting the specific lactation curve.

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