

## STUDY OF THE GROWTH AND FATTENING ABILITIES OF MALE LAMBS IN DIFFERENT TYPES OF BIRTH FROM THE ILE DE FRANCE BREED

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### Abstract

*Subject of a scientific experiment were 16 male lambs of the Ile de France breed, divided into 2 groups of 8, with different types of birth, fattened for a period of 60 days. The aim of the experiment was to study the growth and fattening abilities of lambs with different types of birth. Live weight was recorded at birth, at 60, at 75, at 90, at 105 days and pre-slaughter live weight at 120 days. The average daily gain by groups and subperiods was calculated. The quantities of feed consumed and the residual quantities were reported daily. The data were processed by the methods of variation statistics with Data Analysis, EXCEL, 2016 by Microsoft. It was found that male twin lambs of the Ile de France breed started the experiment with 12.81% lower average live weight, but in 60 days achieved 8.74% significantly higher absolute gain of 25.312 kg, compared to the group of singles – 23.100 kg. The twins achieved a 7.42% higher average daily gain of 0.445 g compared to singles for the entire experimental period. The twin lambs achieved 1 kg increase with lower consumption, respectively by 5.57% of dry matter, 6.36% of energy and crude protein by 7.18% of the group of singles, which shows better feed utilization and the indication of compensatory growth in lambs born as twins.*

**Key words:** average daily gain; live weight; sheep breed Ile de France; type of birth.

### INTRODUCTION

The French meat breed Ile de France has valuable characteristics - high intensity of growth at an early age, excellent carcass conformation and taste of meat, polyestrous, high fertility and high milk yield in the first period of lactation. These qualities make it increasingly popular and widespread throughout the world and in our country.

The phenotypic manifestation of the genetic potential of the breed in our conditions have been studied after the first import in 1968 to 2005 by Bulgarian authors (Dimitrov, 1978; Dimitrov et al., 1982; Dimitrov et al., 1987; Tyankov et al., 2000; Slavov et al., 2004; Raycheva et al., 2005, etc.).

To establish the level of selection traits of the breed, experiments and comparative analyzes with other meat breeds were conducted by scientists in our country and abroad with different ages and with different types of birth

(Laleva et al., 2006; Popova et al., 2019; Bianchi, G. et al. 2003). Laleva et al. (2021) conducted studies to establish the genetic parameters of selection traits.

The intensity of growth of the Ile de France offspring and the ability to achieve high gain at an early age are important for the economic results of rearing this breed.

The main revenues in meat breeds come from the sale of lambs for meat and breeding animals with high genetic potential according to the main selection traits. The selection limits for the Ile de France breed in Bulgaria were described by Dimitrov et al. (2016).

Assessment of the main productive traits of sheep of the Ile de France breed in Bulgaria and the effect of various sources of influence on live weight and daily gain were made by Achkakanova et al. (2019), and the fattening and slaughter qualities of lambs in our country and abroad were studied by a number of

authors (Ivanova, 2021; Raicheva et al., 2010; Moreno et al., 2010, etc.).

The aim of the present study was to investigate the growth abilities and fattening qualities of male lambs of the Ile de France breed in different types of birth.

## MATERIALS AND METHODS

The scientific experiment was conducted in a livestock farm under real production conditions, to monitor the weight development of lambs of the Ile de France breed at different types of birth.

The practical part of the study was conducted in 2021 on a farm under the selective control of the breeding organization "Association for breeding the Ile de France breed in Bulgaria" (ABIDFBB) in the Dobrudja region. A total of 16 male lambs at 2 months were included in the experiment for a period of 60 days.

For this purpose, 2 groups of 8 male lambs were formed, equal in type of birth (singles, twins), age and live weight. The live weight trait was registered at birth, in the formation of groups at 60 days, at 75 days, at 90 days, at 105 days and pre-slaughter live weight at 120 days. Live weight was monitored in the morning before meals.

A total of 96 individual measurements of live weight of lambs were made, based on which the average daily gain by periods in different types of birth was calculated.

The animals have constant access to drinking water and salt for licking. The quantities of feed and residues were recorded daily from the start of the experiment until the end.

The concentrate mixture contained the following components in optimal proportions: corn, barley, oats, sunflower and soybean meal, alfalfa flour, corn germ, wheat bran, vitamin-mineral premix, calcium carbonate and sodium chloride. The average daily consumption of feed by types and groups is given in Table 1.

Table 1. Average daily feed consumption

Ingredients, kg	1st group: Singles	2nd group: Twins
Alfalfa hay	0.467	0.504
Concentrate mixture	0.739	0.725
Straw	0.060	0.063

Data on the chemical composition and nutritional value of the used feed are shown in Table 2.

The primary information was processed by the methods of variation statistics using Data Analysis, EXCEL, 2016 of Microsoft. The significance of the differences between the studied groups was established by the t-test of Student.

Table 2. Chemical composition and feeding value of feeds

Items	Forages		
	Concentrate mixture	Alfalfa hay	Straw
Dry matter, %	89.22	85	90.2
<b>% of the DM</b>			
Crude protein	18.38	13.3	5.7
Crude fibers	5.66	17.5	22.43
Crude fats	2.43	1.85	1.11
NFE	56.54	40.2	38.03
Ash	6.47	7.5	8.87
Ca	0.76	1.7	1.4
P	0.7	0.9	0.32
<b>1 kg DM contain:</b>			
ME, MJ	12.11	8.35	6.05
CP, g	181.1	79.71	29.3
FUG	1.24	0.74	0.45

## RESULTS AND DISCUSSIONS

The data in Table 3 show that the group of twins started with 12.81% lower average live weight ( $P < 0.05$ ) compared to singles. The same trend was maintained in the next live weight controls, as the differences in the mean values by groups move in a downward direction.

On the 15th day after starting the experiment, singles outperformed twins by 7.89%, on the 30th by 7.28%, on the 45th by only 2.79% and on the 60th by 3.11%. We observed a tendency for a compensatory effect, in which the group of twin lambs gradually narrows the differences in the average weight by reporting periods (subperiods) and shows a faster growth rate than the single ones. This trend was confirmed by the results for the realized absolute gain for the whole experimental period, which was on average 25.312 kg for twins and 23.100 kg for single lambs ( $P < 0.05$ ). The group of twins gave a significantly higher increase in kg by 8.74% for a fattening period of 60 days.

Breeders of the Ile de France breed in our country present similar data from live weight controls. The annual edition of the Institut de l'Elevage (IDELE), INRAe, Races de France, (2020) reports close to our results for the weight of male lambs with different types of birth at 70 days, respectively 30.5 kg for those born as singles and slightly lower - 25 kg for those born as twins. Dimitrov et al. (1982) and Ivanova et al. (2017) reported lower average weights at weaning at 70 days.

The results of Laleva et al. (2006) and Raycheva et al. (2005) are similar to ours, who found a lower average live weight at 70 days (20.750 kg) compared to our results. Dimitrov (1978) and Achkakanova et al. (2020) established values close to ours for the studied trait in lambs with different types of birth, and Achkakanova and Staykova (2019) reported observations and established average results for the live weight trait at 70 days - 23.736 kg with 1115 female lambs Ile de France.

Table 3. Live weight, kg

Items	I <sup>st</sup> group: Singles, n = 8			II <sup>nd</sup> group: Twins, n = 8		
	x	Sx	CV %	x	Sx	CV %
Live weight on admission, kg	30.263 l	1.188	11.1	26.388 l	1.074	11.52
First period - 15 <sup>th</sup> day, kg	36.9	1.266	9.7	33.988	1.453	12.09
Second period - 30 <sup>th</sup> day, kg	42.038	1.107	7.45	38.975	1.678	12.18
Third period - 45 <sup>th</sup> day, kg	47.138	1.354	8.13	45.825	1.75	10.8
Live weight on the 60 <sup>th</sup> day, kg	53.363	1.231	6.52	51.7	1.73	9.47
Total gain for the whole period, kg	23.100 m	0.629	7.71	25.312 m	1.17	13.1

Significance of differences within rows – when symbols identical: A to Z - P< 0.001; a to k - P< 0.01; l to z - P< 0.05

The results in Table 4 are similar, where the data show a higher average daily gain by periods for lambs born as twins, except for the second reporting period (15-30 days), where the values are very close and without statistical significance.

The animals from the second group had a more significant advantage during the period 30-45 days, when they gave 25.46% higher average daily gain than the singles (P <0.01). The logical explanation for these results is related to the fact that the Ile de France breed is characterized by a significant reduction in the amount of mother's milk during this period and the offspring begins to rely more on feed consumption to achieve gain. With this adaptation, the twins are likely to be able to show their compensatory growth abilities. The variation is more significant in the group of singles, where it reached 28% in the second subperiod. The group of twins realized 7.42% higher average daily gain in total for the whole period of the experiment (P <0.05).

The annual edition of the Institut de l'Elevage (IDELE), INRAe, Races de France, (2020) reported lower than ours for the first control period, in terms of the average daily gain for single lambs - 0.333 kg. No results have been

reported for lambs born as twins. Achkakanova and Staykova (2021) reported confirmed results for an average daily gain of male lambs from 30 to 70 days - 0.387 kg. Dimitrov, (1988) published data on high intensity of 366-407 g average daily gain in individual fattening from 30 to 90 days of male lambs Ile de France in Bulgaria.

Studying the weight development of offspring of both sexes born in Bulgaria by mothers of French and Bulgarian reproduction, Dimitrov (1978) gives data on lower average daily gain of lambs Ile de France at 70 days (0.279 kg for male lambs and 0.251 kg for female lambs). Dimitrov et al. (1987) published values for the trait from 30 days to 70 days - 0.313 kg.

Ivanova and Raicheva (2017) published data on the average daily gain of male lambs Ile de France with different lineage from 0.240 kg to 0.261 kg, noting that singles gained more up until the 30 days, and twins increased the intensity of growth after the 30<sup>th</sup> day until the 70<sup>th</sup> day.

The results obtained for average daily gain confirmed the good adaptation of the breed and the ability to realize its potential for high intensity of growth at an early age.

Table 4. Average daily gain, kg

Items	I <sup>st</sup> group: Singles, n = 8			II <sup>nd</sup> group: Twins, n = 8		
	X	Sx	CV %	x	Sx	CV %
Gain start - 15 <sup>th</sup> day	0.443	0.041	26.26	0.507	0.046	25.88
Gain - 15 <sup>th</sup> - 30 <sup>th</sup> day	0.367	0.036	28.05	0.356	0.028	22.62
Gain 30 <sup>th</sup> - 45 <sup>th</sup> day	0.319 a	0.024	21.48	0.428 a	0.027	17.91
Gain 45 <sup>th</sup> - 60 <sup>th</sup> day	0.508	0.03	16.85	0.514	0.023	12.83
Average daily gain for the whole period	0.412 l	0.01	7.19	0.445 l	0.2	12.54

Significance of differences within rows – when symbols identical: A to Z - P< 0.001; a to k - P< 0.01; l to z - P< 0.05

The results in Table 5 show that the group of twins achieved 1.94%, 1.12% and 0.26% higher intake of dry matter, metabolic energy and crude protein, respectively. Ivanova (2020) reported higher than our values for the indicators - respectively 1.349 kg DM, 12.69 MJ ME and 166.25 g. CP, in an experiment to test the effect of a supplement in the ration of female Ile de France lambs in a control group. Regarding the utilization of the feed, the lambs born as twins managed to create 1 kg gain at the expense of less accepted nutrients and energy by 5.57% for the dry matter, 6.36% for the energy and 7.18% for the crude protein from the consumed feed.

Table 5. Intake of dry matter, energy and protein per day and utilization

Items	I <sup>st</sup> group	II <sup>nd</sup> group
	Singles, n = 8	Twins, n = 8
Dry matter intake - total, kg	1.11	1.132
Energy intake - total ME, MJ	11.62	11.752
Protein intake - CP, g	152.566	152.956
Dry matter per 1 kg gain, kg	2.694	2.544
Energy per 1 kg gain, ME, MJ	28.204	26.409
Crude protein per 1 kg gain, g	370.306	343.721

## CONCLUSIONS

Male twin lambs from the Ile de France breed started the experiment with 12.81% lower average live weight but in 60 days realized 8.74% significantly higher absolute gain of 25.312 kg compared to the group of singles - 23.100 kg.

The twins achieved a 7.42% higher average daily gain of 0.445 g compared to singles - 0.412 g in total for the entire experimental period.

The twin lambs achieved 1 kg increase with lower consumption, respectively by 5.57% of dry matter, 6.36% of energy and crude protein by 7.18% of the group of singles, which shows

better utilization of feed and the indication of compensatory growth in lambs born as twins.

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## REFERENCES

- Achkakanova, E., & Staykova G. (2019). Evaluation of the main productive traits of Ile de France sheep in Bulgaria, *Bulgarian Journal of Agricultural Science*, 25, Suppl.1, 69-72.
- Achkakanova, E., Minkova, T., & Nikolov, V. (2020). Growth of lambs of the Ile-de-France breed from birth to weaning and factors affecting it. *Scientific Papers: Series D, Animal Science*, 63(1), 13-18.
- Achkakanova, E., & Staykova, G. (2019). Effect of Different Sources of Specific Variance on Live Weight and Daily Gain of Ile-de-France Sheep in Bulgaria 1-1017. Agricultural Academy. *Journal of Mountain Agriculture on the Balkans*, 22(2), 1-267.
- Achkakanova, E., & Staykova, G. (2021). Evaluation of the effect of abiotic factors on the weight development of young male breeding animals of the Ile de France breed in Bulgaria. Agricultural Academy, *Zhivotnovadni Nauki/Bulgarian Journal of Animal Husbandry*, LVIII/2, 20-27.
- Bianchi, G., Garibotto, G., & Bentancur, O. (2003). Características de crecimiento de corderos ligeros hijos de ovejas Corriedale y moruecos Corriedale, Texel, Hampshire Down, Southdown, Ile de France, Milchschaaf o Suffolk. *Archivos de Zootecnia*, 52(199), 339-345.
- Dimitrov, I., (1978). Characteristics of selection signs of the Ile-de-France breed, bred in Bulgaria, I. Fertility, weight development and meat properties of lambs, *Animal Sciences*, 4, 58-67.
- Dimitrov, I., Slavov R., & Achkakanova - Dimitrova Ev. (2016). *Selection programme for breeding the Ile-de-France*, Stara Zagora, ISBN 978-619-90142-1-9.
- Dimitrov, I., Georgieva, E., & Ivanov, I. (1982). Phenotypic parameters of basic productivity qualities of sheep from the Ile-de-France breed, bred in the

- Institute of Cattle and Sheep Breeding – Stara Zagora. *Animal Sciences*, 3, 20-26.
- Dimitrov, I. (1988). Development of a specialized synthetic line and use of the Ile-de-France breed for improving the meat properties of lambs. *Dissertation*. Sofia, Bulgaria, 347.
- Dimitrov, I., & Kaleva, S. (1987). Analysis of the traits of live weight and fertility of sheep of the Ile de France breed, *Animal Sciences*, 10, 3-9.
- Institut de l'Élevage /IDELE/, INRAe, Races de France, Campagne (2020). *Bilan du Contrôle de Performances Ovins Allaitants*.
- Ivanova, T. (2020). Effect of the inclusion of palm oil in the diet of female lambs. Agricultural Academy, *Zhivotnovadni Nauki/Bulgarian Journal of Animal Husbandry*, LVII/6, 39-41.
- Ivanova, T. (2021). Assessment of the Effect of the Type of Birth on the Weight Development of Ile de France Lambs. *Journal of Mountain Agriculture on the Balkans*, 24(5), 52-62.
- Ivanova, T. (2021). Assessment of the effect of the year of birth on the growth performance of Ile de France lambs. Agricultural Academy, *Zhivotnovadni Nauki/Bulgarian Journal of Animal Husbandry*, LVIII/1, 3-8.
- Ivanova, T., & Raicheva, E. (2017). Analysis of the live weight and the gain of lambs from the flock of ile de france breed according to genealogical lines. *Zhivotnovadni Nauki/Bulgarian Journal of Animal Husbandry*, 2, 3-9.
- Laleva, S., Slavova, P., Ivanova, T., Kalaydzhiev, G., Popova, Y., Slavova, St., Ivanov, N., & Metodiev, N. (2021). Study of the genetic parameters of selection traits in Ile de France sheep. *Zhivotnovadni Nauki/Bulgarian Journal of Animal Husbandry*, 58(4), 12-18.
- Laleva, S., Slavova, P., Popova, J., Boykovska, G., & Krastanov, J. (2006). Study of fertility and live weight in lambs Mouton Charolais, Ile de France, Thracian fine-fleece breed and its crosses, International Scientific Conference of Sofia University-Stara Zagora, Stara Zagora, *Volume II, Veterinary Medicine, Livestock*, 384-387.
- Moreno, G.M.B., Silva Sobrinho, A.G.D., Rossi, R. C., Perez, H.L., Leão, A. G., Zeola, N. M.B.L., & Sousa Júnior, S.C.D. (2010). Desempenho e rendimentos de carcaça de cordeiros Ile de France desmamados com diferentes idades. *Revista Brasileira de Saúde e Produção Animal*, 11(4) 1105-1116.
- Popova, Y., Ivanov, N., Slavova, P., Laleva, S., Slavova, S., Kalaydzhiev, G., & Achkakanova, E. (2019). Efficiency of fattening lambs from Bulgarian dairy synthetic population and its F1 crosses with meat sheep breeds. *Bulgarian Journal of Agricultural Science 25 (Suppl. 1)* Agricultural Academy, 78-81.
- Raicheva, E., & Ivanova, T. (2005). Effect of lambing, type of birth and sex on the live weight and the gain of Ile de France lambs. *Zhivotnovadni Nauki/Bulgarian Journal of Animal Husbandry*, 5, 222-226.
- Raicheva, E., & Ivanova, T. (2010). Live Weight and Gain at Sheep from Ile de France Breed According to Some Factors. *Zhivotnovadni Nauki/Bulgarian Journal of Animal Husbandry*, 5, 10-15.
- Slavov, R., Slavova, P., & Laleva, S. (2004). Genetic structure of Ile de France sheep breed in Bulgaria according to the transferrin and haemoglobin polymorphous genetic system. *Trakia Journal of Sciences*, 2(2), 38-40.
- Tyankov, S., Dimitrov I., Stankov I., Slavov R., & Panayotov, D. (2000). *Sheep and goat breeding*. Stara Zagora, 588.