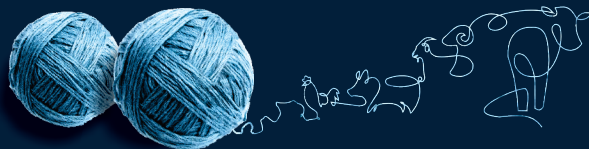


12th
INTERNATIONAL
SYMPOSIUM

MODERN
TRENDS
IN LIVESTOCK
PRODUCTION



P R O C E E D I N G S

9 -11 October 2019, Belgrade, Serbia

Institute for Animal Husbandry

Belgrade - Zemun, SERBIA

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SOME NON-GENETIC FACTORS AFFECTING LAMBS BIRTH WEIGHT IN F1 GENERATION OF MIS X ILE DE FRANCE

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Invited paper

Abstract: The study aim was to know the non-genetic factors and the interaction effect on birth weight of lambs F1 generation crossed Mis x Ile de France. The data of lambs birth weight (in kg), month of birth, year of birth, season of birth, sex, birth type from progeny (F1 generation) of crossing Mis x Ile de France with a total of 388 lambs born during 2018 to 2019 recorded. The General Linear Model (GLM) procedure was used to analyze the data. The analysis of variance has shown that month of birth significantly affects lambs birth weight ($P < .005$). Results shows a highly significant effect of year on lambs birth weight ($P < .001$). The highest mean average birth weight of lambs showed on the second year. Regarding of season, lambs had the highest body weight in spring and winter, and the smallest in autumn but despite the differences in weight, season did not show any significant effect on lambs birth weight ($P > .005$). Sex of lambs showed no significant effect on lambs birth weight ($P > .005$). The birth type significantly affects birth weight of lambs ($P < .001$). The highest body weight are have single, then twins, triplets and quadruplets.

Key words: crossbreeding, non-genetic factors, lambs, birth weight

Introduction

The birth weight is the first observed trait in the life of an animal of which growth, production, and reproduction, are dependent (*Thiruvankadan et al., 2008*). Likewise, the birth weight of lambs has an essential role in satisfying sheep production (*Caro Petrovic et al., 2013*). The birth weight of lamb has highly

influenced by both genetic and non-genetic factors. The understanding of the non-genetic factors which influence the development and growth of lambs may help for changes in the breeding plans and management practices to minimize the influence of factors which reduce production performance (Petrovic, 2000; Siddalingamurthy et al., 2017). Birth weight as an early measurable trait is of great interest because of its positive genetic correlation with further live weights (Mellado et al., 2016). The non-genetic factors must be corrected before starting a genetic analysis. In several studies, the effect of non-genetic factors on growth performance in sheep has been investigated (Tohidi et al., 2016). Environmental factors such as age, sex, type of birth, and year of birth influenced the estimation of breeding value (Momoh et al., 2013). Body weight of the lambs at birth has an important role in achieving a better sheep production (Petrović et al., 2011). By knowing the factors affecting the birth weight, it will lead changes in breeding and management schemes (Caro Petrovic et al., 2013). For several years, it has identified that in lamb production programs, body weight at birth of lambs depends on the genetic type, sheep age, sex, type of birth (single vs. multiple), season and year of birth are factors exert influence on sheep growth (Catalan, 2018)

The study aim was to know the non-genetic factors and the interaction effect on birth weight of lambs F1 generation crossed Mis x Ile de France.

Materials and Methods

The data of lambs birth weight (in kg), month of birth, year of birth, season of birth, sex, birth type from progeny (F1 generation) of crossing Mis x Ile de France with a total of 388 lambs born during 2018 to 2019 recorded at the experimental farm of the Institute of Animal Husbandry were utilized in this study. All animals had the same diet and care conditions. The General Linear Model (GLM) procedure of the SPSS version 20 was used to analyze the data. The following mathematical procedure was applied.

$$Y_{ijklmn} = \mu + M_i + Y_j + S_k + G_l + T_m + e_{ijklmn}, \text{ where:}$$

Y_{ijklm} - birth weight of lambs of m birth type, l sex, k season, j year, i month

μ - Overall population mean

M_i - effect of month

Y_j - effect of year

S_k - effect of season

G_l - effect of sex

T_m - effect of birth type

e_{ijklmn} - other undetermined impacts

Based on the results obtained, certain conclusions were drawn and a discussion was conducted.

Results and Discussion

The birth weight of lambs on the month of birth showed that most lambs were born on March, having the lowest and the highest birth weight while the least born lambs were on April born (Table 1).

Table 1. The average birth weight of lambs, standard deviation, standard error of mean and variances in four different month

Month of birth	Mean	N	Std. Deviation	Std. Error of Mean	Minimum	Maximum	Variance
January	4.86	59	.891	.116	3.10	6.50	.794
March	4.44	237	.976	.063	2.10	6.80	.953
April	4.67	23	.784	.163	3.60	6.10	.614
October	4.30	69	.940	.113	2.50	6.70	.883
Total	4.48	388	.962	.048	2.10	6.80	.925

The highest mean average birth weight of lambs showed on the month of January, and the lowest average birth weight was on the month of October. The differences for the average of birth weight were 0.42kg, 0.19kg, and 0.56kg between January to March, January to April and January to October month of lambs' birth.

The analysis of variance has shown that month of birth significantly affects lambs birth weight ($P < .005$).

The effect of year on lambs birth weight performances have shown in table 2.

Table 2. Average birth weight, standard deviation, standard error, variance of weight of lambs F1 generation of Mis x Ile de France per year

year	Mean	N	Std. Deviation	Std. Error of Mean	Minimum	Maximum	Variance
1.00	4.3180	228	.97767	.06475	2.10	6.70	.956
2.00	4.7206	160	.88929	.07030	2.50	6.80	.791
Total	4.4840	388	.96175	.04883	2.10	6.80	.925

In table 2 results show a highly significant effect of year on lambs birth weight ($P < .001$). On the second year have a higher mean average birth weight of lambs in comparison on the first year. The difference in average birth weight was 0.40 kg between year 2 and year 1.

The season is one of the important factors affecting the body of animals and therefore the body weight of lambs at birth. Results of Average birth weight of lambs, standard deviation, standard error of mean during winter, spring and autumn are presented in the next table.

Table 3. Average birth weight of lambs, standard deviation, standard error of mean during winter, spring and autumn

season	BWB Mean	N	Std. Deviation	Std. Error of Mean	Minimum	Maximum	Variance
Winter	4.5271	166	.98832	.07671	2.10	6.70	.977
Spring	4.5392	153	.93339	.07546	3.00	6.80	.871
Autumn	4.2580	69	.93987	.11315	2.50	6.70	.883
Total	4.4840	388	.96175	.04883	2.10	6.80	.925

The lambs had the highest body weight in spring 4.53 kg and winter 4.52 kg, and the smallest in autumn 4.25kg. However, despite the differences in weight, season did not show any significant effect on lambs birth weight ($P > .005$).

Table 4. Effect of sex on average birth weight of lambs

sex	BWB Mean	N	Std. Deviation	Std. Error of Mean	Minimum	Maximum	Variance
Male	4.50	189	.948	.069	2.50	6.80	.900
Female	4.46	199	.976	.069	2.10	6.70	.953
Total	4.48	388	.962	.048	2.10	6.80	.925

In the table above clearly seen that there is a mild difference of 0.04kg in body weight at birth between the male and female lambs F1 generation of Mis x Ile France. Result in this study showed that sex of lambs no significant effect on lambs birth weight ($P > .005$). Unlike with ours, the research study by *Rahimi et al. (2014)* their results showed that non- genetic factors have an important role in expressing of genetic potential in the lambs

that male lambs were heavier than females and their difference was significant ($P < 0.01$).

Table 5. Effect of birth type on average birth weight of lambs

Birth type	Mean	N	Std. Deviation	Std. Error of Mean	Minimum	Maximum	Variance
Single	5.39	117	.877	.081	2.60	6.80	.770
Twin	4.25	215	.624	.043	2.50	6.10	.390
Triplet	3.52	52	.564	.078	2.50	5.10	.318
Quadruplet	2.75	4	.519	.259	2.10	3.30	.270
Total	4.48	388	.962	.048	2.10	6.80	.925

The birth type significantly affects the birth weight of lambs F1 generation of Mis x Ile de France ($P < .001$). One can see the biologically expected difference in lamb weight depending on the type of birth. The highest body weight has seen on single, then twins, triplets and quadruplets. Similar results have presented, by *Gbangboche et al.*, (2006). By them, single lambs and male lambs were heavier than those twins and females. Lambs that are born singles have 9.6% higher birth weight compared with twins (*Simeonov et al.*, 2015).

Our results of birth weight have confirmed by some authors of such *Ebangi et al.* (1996) stated that their results indicate that breed and non-genetic factors significantly affect birth weight and by *Mellado et al.* (2016) litter size was the most important factor affecting birth weight of lambs. *de Combellas et al.* (1980) found a significant effect of year on birth weight.

Other scholars mildly agree and disagree with the result we have obtained. *Siddalingamurthy et al.* (2017) the year of birth of lamb had a non-significant effect on the birth weight. The season of birth of the lamb, sex of the lamb significantly affects the birth weight. The mean birth weight of different sexes revealed that the male lambs had significantly ($P \leq 0.01$) higher birth weight. In the study of *Thiruvengadan et al.* (2008) the birth weight was highly significantly ($P < 0.01$) affected by the period of birth, the season of birth, sex of the lamb (*Fasae et al.*, 2012). *Marufa et al.* (2017) the birth type, sex and year had significant ($p < 0.05$) effect on birth weight. *Catalán et al.* (2018) concluded that the effects of year and season of birth, parturition number, type of parturition and sex, had a significant effect on lamb birth weight. Many other authors attach great importance to the influence of paragenetic factors on the weight of lambs (*Fasae et al.*, (2012); *Momoh et al.*, 2013; *Caro Petrović et al.*, 2013; *Mellado et al.*, 2016).

Conclusion

The month of birth, year of birth, the type of birth significantly affected the birth weight of the F1 generation lambs of Mis x Ile France. However, the season of birth and sex of lambs have no effect on the birth weight of lambs F1 generation of Mis x Ile de France.

Neki negenetski faktori koji utiču na porođajnu masu jagnjadi u F1 generaciji Mis x Ile de France

Violeta Caro Petrovic, Milan P. Petrovic, Marina I. Selionova, Dragana Ružič-Muslic, Nevena Maksimovic, Bogdan Cekic, Ivan Pavlović

Rezime

Cilj istraživanja bio je spoznati uticaj interakcije negenetske faktore na masu jagnjadi pri rođenju. Analizirani su podaci o masama janjadi (u kg), F1 generacije Mis x Ile de France. Observirani su sledeći negenetski faktori: mesec rođenja, godina rođenja, sezona rođenja, pol, tip rođenja kod ukupno 388 janjaca rođenih tokom 2018. i 2019 godine. Za analizu podataka korišćen je postupak Generalnog Linearnog Modela (GLM). Analiza varijanse pokazala je da mesec rođenja značajno utiče na masu kod rođenja janjadi ($P < .005$). Rezultati pokazuju veoma značajan uticaj godine na masu rođenja janjadi ($P < .001$). Najveću srednju prosečnu masu imala su jagnjad u drugoj godini. Sa aspekta uticaja godišnjeg doba, jagnjad su imale najveću telesnu masu u proleće i zimi, a najmanju u jesen, ali uprkos razlikama u masi, sezona nije pokazala značajan uticaj na masu janjadi ($P > .005$). Pol jagnjadi nije pokazao značajan uticaj na masu janjadi ($P > .005$). Tip rođenja značajno utiče na masu jagnjadi kod rođenja ($P < .001$). Najveću telesnu masu imaju jedinci, zatim blizanci, trojke i četvorke.

Ključne reči: ukrštanje, negenetski faktori, jagnjad, masa rođenja

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