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## Association of Ewe's Age, Premating Weight on Litter Size and Birth Weight of Lambs

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### SUMMARY

The aim was to examine the effect of premating age, premating weight of ewes Mis sheep breed on lamb's birth weight, birth type, gender and the interaction between subject effects. 70 ewes of Mis breed of sheep and their F1 generation lambs produced (Mis x Ile de France) were used in the evaluation.

Data concerning the ewes premating age (PMA), premating weight of ewes (PMW), lambs birth weight (LBW), type of birth of lambs (BT), gender of lambs were collected from 122 lambs born.

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70 .  
" " F1 (  
" " " )  
(PMA), -  
(PMW), -  
(LBW), (BT),  
122 .

4.72 kg, PMA7, 4.18 kg, PMA5.

kg.

(3.65 kg).

55.74%, PMW, BT, PMA\*PMW, (LBW).

PMA\*, PMW\*, PMA\*BT, PMW\*BT (LBW).

The ewes PMA7 had the heaviest lambs with an average birth weight of 4.72 kg and the lightest was 4.18 kg from ewes PMA5. Some of the extreme values of body weight of mother corresponded to lambs with less weight. The pre-mating weight of Mis sheep mothers with 61 kg was optimal in this regard.

The order of birth weight of lambs corresponded with the type of birth of such; the single born lambs had the heaviest birth weight (5.61kg) while the triplets had the lightest birth weight (3.65 kg). According to the number of lambs, born the twin lambs have the highest percentage with 55.74% whereas an equal percentage acquired both for single and triplets with 22.13%. PMA, PMW, BT and the interaction effect between PMA\*PMW significantly influence lambs birth weight (LBW).

However, the Gender of lambs and the interaction effect between PMA\*Gender, PMW\*Gender, PMA\*BT, PMW\*BT found no influence on lambs birth weight (LBW).

**Key words:** ewes, age, body weight, lambs, birth weight, birth type, gender

## INTRODUCTION

(Assan and Makuza, 2005).

(Demiroren et al., 1995).

(Gabr

The genetic and non-genetic factors affected sheep breeding and knowledge of these factors is essential for efficient management and for the accurate estimation of breeding values. Furthermore, the birth weight as an early measurable trait is of great interest because of its positive genetic correlation with further live weights (Assan and Makuza, 2005). Reproduction is the greatest single factor affecting the economic efficiency of sheep breeding (Demiroren et al., 1995).

The major factors that affect profitability in sheep breeding are the total number and the total weight of lambs produced per

et al., 2016).  
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 (Snyman, 2010).  
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 (Notter, 2000)  
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 (Chniter et al.,  
 2009).  
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 (Gama et al.,  
 1991).  
 (Aktas et al., 2015).  
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 F1 (" " x "  
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 . 122  
 2018,  
 (PMA),  
 (PMW),  
 (LBW),  
 (BT)

- ewe (Gabr et al., 2016). Reproductive performance is the most important trait in determining the income from all livestock enterprises (Snyman, 2010). An adjustment of prolificacy records for effects of ewe age is therefore necessary in genetic evaluation programs (Notter, 2000).  
 -  
 - The knowledge of factors affecting variation in birth weight is especially important in regard to the relationship of birth weight with the neonatal and adult health (Chniter et al., 2009).  
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 - The age of dam, litter size, and birth weight all had important, effects that differed among breeds (Gama et al., 1991). The effect of live weight and age of the ewe have found to be important for the reproductive performance of ewes (Aktas et al., 2015).  
 -  
 - The study aim was to examine the effect of pre-mating age, pre-mating weight of ewes Mis sheep breed on lamb's birth weight, birth type, gender, and the interaction between subject effects.

**MATERIAL AND METHODS**

- The study has performed at the experimental farm of the Institute for Animal Husbandry in Zemun, Serbia. The records of 70 ewes of Mis breed of sheep and their F1 generation lambs produced (Mis x Ile de France) were used in the evaluation. All the animals had kept under intensive system condition with same animal husbandry management. Data concerning the ewes pre-mating age (PMA), pre-mating weight of ewes (PMW), lambs birth weight (LBW), the type of birth of lambs (BT), gender of lambs were collect from 122 lambs born in March 2018. To determine the relationship and different effects of the aforementioned data, a statistical analysis was performed by using the General Linear Model, Descriptive Statistics, of the SPSS

SPSS 20.

software program version 20.

## RESULTS AND DISCUSSION

The pre-mating age of ewes and the birth weight of their lambs are presented in Table 1. It shows that the ewes PMA7 got the heaviest lambs with an average birth weight of 4.72 kg while the lightest was 4.18 kg from ewes PMA5.

It can be noticed that within the ewes pre-mating ages, there were high variations of lamb's birth weights. Our results also show interesting biological sustainability of species. Some of the extreme values of body weight correspond to lambs with less weight. It seems that the pre-mating weight of Mis sheep mothers with 61 kg is optimal in this regard (Figure 1).

1. PMA7  
 4.72 kg, PMA5. 4.18  
 61 kg ( 1).

**Table 1. Average birth weight of lambs according to pre-mating age of ewes (PMA)**

/PMA, Years	N	Mean kg	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
2	11	4.20	.97	.29	3.55	4.85
3	41	4.66	1.02	.16	4.34	4.98
4	10	4.62	.99	.31	3.91	5.33
5	28	4.18	.94	.18	3.82	4.55
6	19	4.22	.97	.22	3.75	4.69
7	13	4.72	.72	.20	4.28	5.15
Total	122	4.44	.97	.08	4.27	4.62

-0.46 kg, -0.42 kg, 0.02 kg, -0.02 kg, -0.52 kg  
 7; 0.04 kg, 0.48 kg, 0.44 kg, -0.06 kg  
 3 7; 0,44 kg, 0,40 kg, -0,1 kg  
 4 7; -0.04 kg, 0.54 kg  
 5 7, -0.50

The mean differences of average lambs birth weight according to pre-mating ages of ewes were -0.46 kg, -0.42 kg, 0.02 kg, -0.02 kg, -0.52 kg between lambs of PMA2 to PMA7; 0.04 kg, 0.48 kg, 0.44 kg, -0.06 kg between lambs of PMA3 to PMA7; 0.44 kg, 0.40 kg, -0.1 kg between lambs of PMA4 to PMA7; -0.04 kg, 0.54 kg between PMA5 to PMA7 while there was a difference of -0.50 kg

kg

PMA6 PMA7.

( <0,05).

(PMW)

1

(LBW)

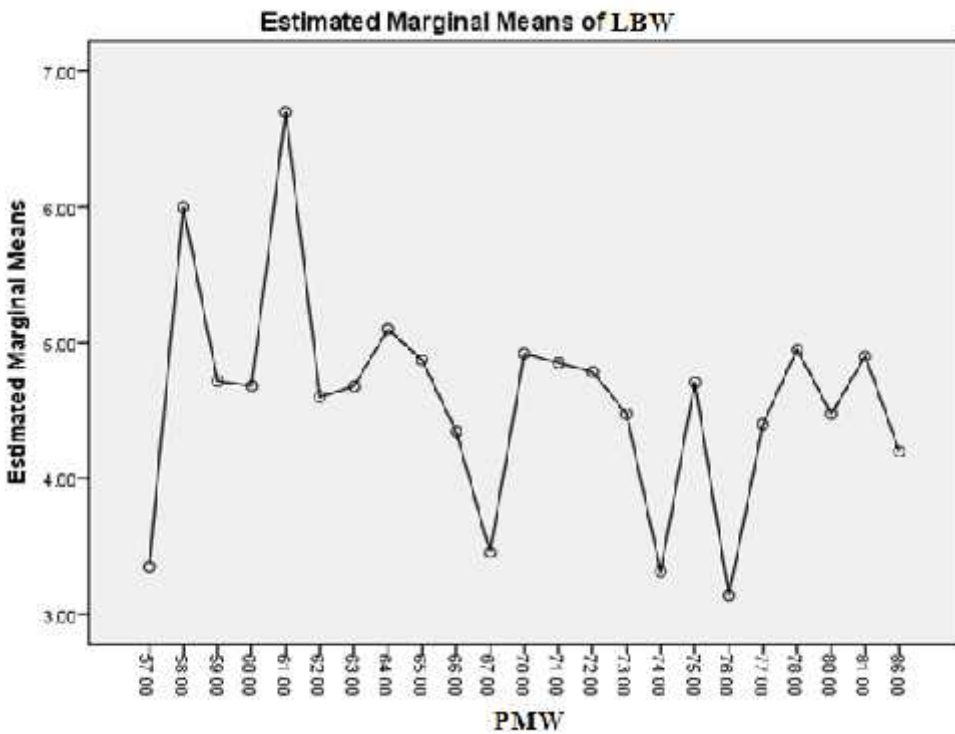
PMW 61 kg,

LBW

PMW 76kg.

average birth weight between lambs of PMA6 and PMA7. The result obtained in multiple comparisons of mean difference among lamb birth weight according to pre-mating age of ewe was significant at (P<0.05).

The pre-mating weight of ewes (PMW) and the estimated marginal means of the lambs shown in Figure 1, indicates that the highest lamb birth weight (LBW) detected on PMW 61kgs while the lowest LBW has established/reported in PMW76kgs.



. 1.

, kg

Fig. 1. Estimated marginal means of lambs birth weight according to pre-mating weight of ewes, kg

2.

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**Table 2. Average birth weight, standard deviation and standard error of mean according to lambs' gender**

Gender	Mean kg	N	Std. Deviation	Std. Error of Mean	Variance	Minimum	Maximum
Male	4.45	64	.97	.12	.95	2.80	6.70
Female	4.44	58	.97	.13	.94	3.00	6.70
Total	4.44	122	.97	.09	.94	2.80	6.70

2)  
0.01 kg

PMA7 4.85 kg  
PMA3 4.77 kg,

3).  
3.54 kg PMA2 3.95 kg  
PMA7.

The result obtained (Table 2) shows a very minimal difference of 0.01 kg on average birth weight in both sexes of lambs and had already considered as a similar value.

The lambs of PMA 7 and PMA 3 present an average weight of 4.85 kg and 4.77 kg, and are the heaviest male and female lambs born (Table 3). The lightest male is 3.54 kg from lambs of PMA 2 and 3.95 kg for female of PMA 7.

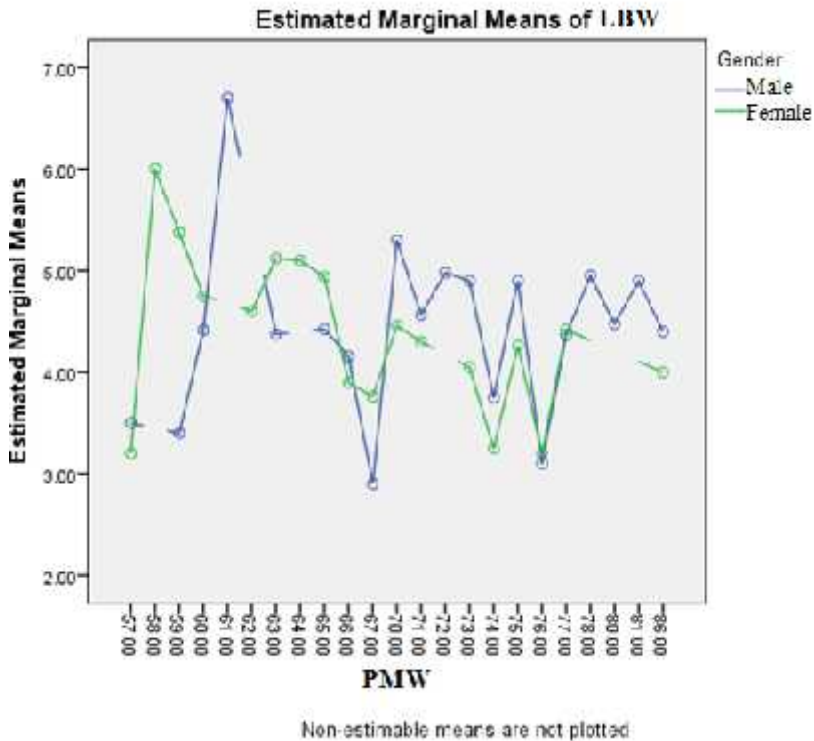
3.

**Table 3. Lambs average birth weight and gender according to prematuring age of ewes**

PMA, years	/Gender	Mean	N	Std. error
2	/Male	3.54	5	.31
	/Female	4.75	6	.27
3	/Male	4.53	19	.22
	/Female	4.77	22	.23
4	/Male	4.77	6	.27
	/Female	4.40	4	.31
5	/Male	4.29	14	.39
	/Female	4.07	14	.49
6	/Male	4.31	9	.27
	/Female	4.14	10	.31
7	/Male	4.85	11	.39
	/Female	3.95	2	.69

2  
 : - ;  
 PMW 61 kg; -  
 PMW 58 kg;  
 PMW 67 kg; PMW 57 kg.

It can be observed in Figure 2 that the heaviest male; female lamb birth weight found in PMW 61kg; PMW 58 kg while the lightest male; female lambs birth weight is established in PMW 67 kg; PMW 57 kg.



. 2.

**Fig. 2. Gender of lambs and the estimated marginal means of birth weight according to pre-mating weight of ewes**

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 ( 4).  
 - (5.61 kg),  
 - (3.65 kg).  
 , ,  
 - 55.74%,  
 22.13%.

The results we obtained show that the weight and order of birth of lambs correspond with the type of birth (Table 4). The single born lambs had the heaviest birth weight (5.61kg) while the triplets born got the lightest birth weight (3.65 kg). With regards to the number of lambs born, it has found that the twin born lambs have the highest percentage with 55.74% whereas an equal percentage acquired both for single and triplets with 22.13% each.

4.

(BT)

**Table 4. Average birth weight of lambs according to birth type (BT)**

Birth type	N	Mean kg	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
					Single	27
Twin	68	4.29	.64	.08	4.14	4.44
Triplets	27	3.65	.54	.10	3.43	3.87
Total	122	4.44	.97	.09	4.27	4.62

(PMA)

(BT)

5.

5. T

The pre mating age (PMA) of ewe, lamb birth type (BT) and their average birth weight can be viewed in Table 5.

**Table 5. Lambs birth type and average birth weight according to pre mating age of ewe**

PMA	Lambs Birth Type	Mean, kg	N	Std. Deviation	Std. Error of Mean
2	/Single	5.60	3	.46	.26
	/Twins	4.05	2	.21	.15
	/Triplets	3.55	6	.31	.13
3	Single	5.79	12	.74	.21
	Twins	4.39	20	.59	.13
	Triplets	3.74	9	.72	.24
4	/Single	4.63	6	1.24	.51
	/Twins	4.60	4	.63	.31
5	/Single	6.23	3	.64	.37
	/Twins	4.11	16	.63	.15
	/Triplets	3.63	9	.53	.17
6	/Single	6.10	2	.14	.10
	/Twins	4.08	14	.78	.21
7	/Triplets	3.63	3	.58	.34
	/Single	6.60	1	.	.
	/Twins	4.56	12	.47	.14

6.6 kg; 4,63 kg  
; 3.74 kg  
PMA7; PMA4; PMA3.  
PMA4  
4.63 kg,

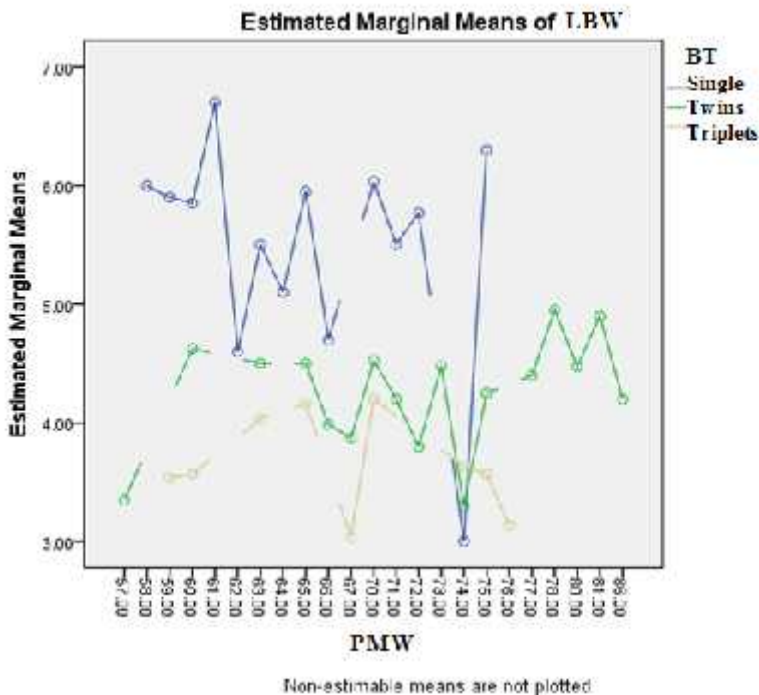
The result we obtained shows that the heaviest average birth weights of lambs were 6.6 kg single born; 4.63 kg twins born; 3.74 kg born triplets from lambs of PMA7; PMA4; PMA3, respectively. The lambs of PMA4 got the lightest average birth weight of 4.63 kg for single born while PMA2 got the lowest



PMA2  
kg.  
PMW  
LBW  
BT  
4.  
PMW 61 kg;  
PMW 78 kg;  
74 kg PMW  
PMW 67 kg

average birth weight of lambs both for twins and triplets born with 4.05 kg and 3.55 kg, respectively.

The corresponding PMW of ewes with the marginal means of LBW according to BT of lambs have illustrated in Figure 4. It shows that the heaviest birth weight were on lambs of PMW 61kg for single born lambs; PMW 78kg for twin born; PMW 70kg for born triplets. The lambs of PMW 74kg got the lightest weight both for single and twin born lambs while PMW 67kg got the lightest weight for lambs born triplets.



. 3.

**Fig. 3. Lambs birth type and average birth weight according to pre-mating weight of ewes**

, PMA, PMW, BT  
PMA \* PMW

Based on the results we obtained in the present study, the PMA, PMW, BT and the interaction effect between PMA\*PMW significantly influenced on lambs birth weight (LBW). However, the

(LBW).  
PMA\* , PMW\*  
PMA\*BT, PMW\*BT  
(LBW).  
Ali et al. (2006),  
. Fazlul and Curran (1992); Babar et al. (2004)  
. Akta and Do an (2014); Aktas et al. (2015)  
Hussein et al. (2000),  
Petrovic et al. (2011); Haque Bhuiyan Fazlul and Curran (1992); Babar et al. (2004)  
. Gaskins et al. (2000)  
Babar et al. (2004) ("Polypay").  
. Gabr et al. (2016)  
(P<0.01),

Gender of lambs and the interaction effect between PMA\*Gender, PMW\*Gender, PMA\*BT, PMW\*BT found no influence on lambs birth weight (LBW).

The results of our present study were similar with those of other authors, such as Ali et al. (2006). According to them, the age of dam at service had a significant relationship with the birth weight of lambs.

Fazlul and Curran (1992); Babar et al. (2004) reported that the age of the dam had also significant effect on birth weight of the lamb. Akta and Do an (2014); Aktas et al. (2015) found significant effect of ewe's live weight at mating on the birth of the lambs.

Partly agreeable with us that by Hussein et al. (2000) indicated a positive relationship of dam weight on birth weight of lambs. Petrovic et al. (2011); Haque Bhuiyan Fazlul and Curran (1992); Babar et al. (2004) indicated that the birth weight significantly affected by the type of birth and the single born lambs were heavier than multiple born lambs. Gaskins et al. (2000) found a higher percentage of multiple births (Polypay breed).

Babar et al. (2004) reported different results in comparison with ours. According to them, the younger ewes produced lighter lambs, and the sex of lambs affected on birth weight. Gabr et al. (2016) found that the birth-weight of lambs was increased significantly with increasing weight of their dams which is absolutely a contradiction with the result we acquired.

Regarding the result obtained on the test between subjects effects; the birth type significantly influenced on lambs birth weight (P<0.01) but in the interaction effect between PMA\*BT did not show significant effect (P>0.05) on

	PMA*BT (P>0.05)	-	lambs birth weight.
(1995),	Demiroen et al.	-	Considering the frequency of birth type we are amenable with Demiroen et al. (1995) informed that there was an important influence of age of ewe on the frequency of single, twin, and multiple births.
	Talore (2009),	-	According to Talore (2009), the lambs which are heavier at birth are usually singles or are those produced by ewes with larger body sizes moderately true with the result we obtained in our study. Definitely, there is matching between our results and those reported/indicated by Csizmar et al. (2013), namely singles were significantly heavier than twins but sex did not affected on birth weight.
	Csizmar et al. (2013)	-	
	Idris et al. (2011)	-	Slightly the results reported by Idris et al. (2011) were slightly similar to ours. Male lambs were heavier than females and single lambs recorded heavier weight than twins.
(Akta and Do an, 2014),	LW ( 65 kg)	-	The ewes with the highest LWs ( 65 kg) had the highest multiple birth rates (Akta and Do an, 2014) relatively agreeable with ours. However, with regards to the PMW*BT, it was not observed interaction effect on lambs birth weight.
(2000)	PMW*BT	-	
	Michels et al.	-	The investigation/study of Michels et al. (2000), is interesting and probably can consider as partly confirmation of ours. According to their study, there was a clear cut relationship between litter weight components and ewe weight cannot be generalized but may vary among differentially selected breeds and lines within them. Also the one by Gardner et al. (2007) reported that heavier birth weight could be obtained at late parities due to heavier dam weight and larger size and physiological imprint in the uterus during the first pregnancy which will facilitate relatively greater fetal growth in the subsequent pregnancies.
et al. (2007),	Gardner	-	

## CONCLUSIONS

PMA7  
 4.72 kg,  
 4.18 kg PMA5.  
 ( <0,05).  
 (LBW) PMW  
 61 kg, LBW  
 PMW 76 kg.  
 22.13%  
 27 9  
 34  
 55.74%.  
 (3.65 kg).  
 PMA, PMW, BT,  
 PMA\*PMW  
 (LBW).  
 PMA\* , PMW\* , PMA\*BT, PMW\*BT  
 (LBW).

The result of our study can cease that the ewes PMA7 got the heaviest lambs with an average birth weight of 4.72 kg while the lightest was 4.18 kg from ewes PMA5. The result obtained in multiple comparisons of mean difference among lamb birth weight according to pre-mating age of ewe was significant at ( $P < 0.05$ ).

The highest lamb birth weight (LBW) was found on PMW 61kgs while the lowest LBW was reported in PMW76kgs. Almost similar value on the average birth weight was obtained in both sexes of lambs. Identical percentage was acquired both by single and triplets born with 22.13% each of the total lambs born by 27 and 9 ewes respectively, but those lambs born twins by 34 ewes had the highest total number of lambs born with 55.74%. Lambs born single had the heaviest birth weight (5.61kg) while the triplets born were having the lightest birth weight (3.65 kg).

Based on the test between – subjects effects the PMA, PMW, BT, and the interaction effect between PMA\*PMW significantly influenced on lambs birth weight (LBW). On the contrary the Gender, PMA\*Gender, PMW\*Gender, PMA\*BT, PMW\*BT did not show interaction effect on lambs birth weight (LBW). Based on the above results the pre-mating age and pre-mating weight of ewes is clearly interrelated on lambs' birth weight.

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