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PARITY EFFECT ON LAMBING RATE AND LAMBS BIRTH WEIGHT AT CROSSBRED OF MIS X ILE DE FRANCE BREEDS OF SHEEP

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Invited paper

Abstract: Success in lamb production depends on their body weight, and in recent years there had been a growing interest in understanding the impact of some factors such as parity on sheep productivity. Knowing the factors that affect the development and growth of lambs can help make changes in breeding plans. This paper was to detect important factors affecting lamb's birth weight which usually are not taken to consideration and have substantial part planning improvement in sheep production. Miss breed sheep were cross or pair with Ile de France rams three times, with the following characteristics observed; Body weights of lambs at birth, type of birth, number of lambs born per sheep per parity in the periods from 2018 to 2020. The result of each lambing per parity of each ewe was the basis of the study. The ANOVA, general linear model, univariate analysis of variance, and descriptive statistics derived to assess the following effects: Effect of parity on lambs' birth weight; Effect of parity on birth type, and lambs birth weight; Interaction effect of different subject effects on birth weight; The total marginal means of lambing rate per dam in three parities.
The result obtained showed a very significant influence of the indicated factors on tested traits ($P<0.01$). Based on the results of our research, we can conclude that parities have a very significant impact, so they need more attention in the future.

Keywords: Lamb, birth weight, lambing rate, parity

Introduction

Lamb viability dependent on their birth weight, and in recent years, there has been an increasing interest in the understanding of the influence of some factors such as parity on sheep productivity *(Macedo and Hummel 2006).* The lambs' body weight at birth has an essential role in achieving good sheep production while sheep productivity is affected by many factors, like breed improvement programs based on maximum utilization of genetic variation, but these features varied due to certain environmental factors *(Petrovic et al., 2011).* Increased percentage of lambing is the substantial contributor to get higher gains from sheep farms *(Mousa-Balabel, 2010).* Some important sources of variation of birth weight included breed, birth type, parity, breed by season, and season by year of lambing *(Ebangi et al., 1996).* The breed differences in lamb vigor at birth were report in pure and crossbred breeds (*Dwyer & Lawrence, 1999; Dwyer, 2003).* The lambs' weight at birth plays an imperative role in sheep's first production rate. Birth weight significantly varied due to years, season, sex, type of birth, and flock (*Farmanullah et al., 2020).* Although the year of lambing was a significant source of variation of birth weight, years are not repeatable, and their specific effects are of limited interest *(Ebangi et al., 1996).* Various influential factors affecting the birth weight of lambs' such as the maternal factor, maternal age, maternal nutrition, maternal body score, effect of ram, and environmental factors, have noted by various scholars *(Babar et al., 2004; Gardner et al., 2007; Petrovic et al., 2011; Kenyon et al., 2014; Petrovic et al., 2015; Caro Petrovic et al., 2018; Pesántez-Pacheco et al., 2019).*

Considering the non-genetic factors which influence the development and growth of lambs might help for changes in breeding plans and management practices to minimize the influential factors which reduce production performance (*Siddalingamurthy et al., 2017*).

This paper was to detect important factors affecting lamb's birth weight which usually are not taken to consideration and have substantial part planning improvement in sheep production.

Material and Methods

Mis breed sheep were cross or pair with Ile de France rams three times. The data of Mis breed ewes/dams that have lambed three times within the year of 2018 to 2020, the birth weight of their lambs, the lambs' birth type, and the number of lambs born per parity that obtained from the records kept in the mention years, was utilized.

The technology of sheep breeding was the same throughout the said years. The result of each lambing per parity of each ewe was the basis of the study.

The ANOVA, General Linear Model, Univariate Analysis of Variance, and Descriptive Statistics were performing using the SPSS software version 20. A total of 176 lambs, 37 ewes, 3 rams, and three times parity within the year of 2018 to 2020 have used for the estimation of the following effects:

Effect of parity (Par) on lambs' birth weight

Effect of parity on birth type (BT) and lambs birth weight (BWB)

Interaction effect of different subject effects on birth weight

The total marginal means of lambing rate per (LRP) dam in three (3) parities

Results and Discussion

The parity1 greatest lambs but got lowest average lambs birth weight. Parity 2 got the lowest number of lambs but the highest in lambs' average birth weight. Parity 3 was in between parities 1 and 2, holding the second placer both for average birth weight and the number of lambs (Table 1).

Table 1. Variation of lamb birth weight according to parity

Par	Mean	N	Std. Error of Mean	Variance	Minimum	Maximum	% of Total N
1.00	4.26	62	.13	1.03	2.10	6.70	35.2%
2.00	5.05	53	.12	.773	3.00	6.50	30.1%
3.00	4.59	61	.15	1.34	2.60	7.30	34.7%
Total	4.61	176	.08	1.15	2.10	7.30	100.0%

The test of between-subjects effects (Table 2) revealed that parity significantly affects lambs' birth weight ($P<001$).

Information on factors influencing the birth weight is of farmers' great interest, as well as the animal breeders, because birth weight is of great economic importance *(Bermejo et al., 2010).*

Table 2. Effect of parity on lambs' birth weight

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	17.849[a]	2	8.925	8.426	.000
Intercept	3759.056	1	3759.056	3549.071	.000
par	17.849	2	8.925	8.426	.000
Error	183.236	173	1.059		
Total	3944.590	176			
Corrected Total	201.085	175			

Table 3. Average birth type and birth weight according to parity

Par		BT	BWB
1.00	Mean	2.18	4.26
	N	62	62
	Std. Deviation	.85	1.02
	Std. Error of Mean	.11	.13
2.00	Mean	1.68	5.04
	N	53	53
	Std. Deviation	.49	.88
	Std. Error of Mean	.07	.12
3.00	Mean	2.11	4.59
	N	61	61
	Std. Deviation	.88	1.15
	Std. Error of Mean	.11	.15
Total	Mean	1.99	4.61
	N	176	176
	Std. Deviation	.79	1.07
	Std. Error of Mean	.06	.08

Supreme in average birth type found in parity 1, (Table 3) however, showed the lowest, on the average birth weight. Parity 2 appeared the lowest in birth type but highest in lambs' birth weight (more lambs born single in this parity that justified the result). Parity 3 manifested as the second placer for both birth type and average lamb birth weight.

Table 4. Analysis of Variance of birth type*parity, birth weight*parity

			Sum of Squares	df	Mean Square	F	Sig.
BT * par	Between Groups	(Combined)	10.279	2	5.140	8.743	.000
	Within Groups		101.698	173	.588		
	Total		111.977	175			
BWB * par	Between Groups	(Combined)	17.849	2	8.925	8.426	.000
	Within Groups		183.236	173	1.059		
	Total		201.085	175			

Based on the results of analysis of variance (Table 4) showed that parities have a very significant ($P<0.01$) influence on lambs' birth type and birth weight. Considerable with our results was by Ebangi et al. (1996) note that birth types by parity were equally significant sources of variation. *Koycegiz et al. (2009)* state that parity was a significant source of variation ($p>0.05$) for litter size at birth, while differed with ours was that ewes in their 1st and 2nd parity had significantly ($p<0.05$) lower litter size at birth in comparison to ewes with greater parity.

A contradictory effect found by *Macedo and Hummel (2006)* birth weights were not affected by parity.

Partly justify our result were the comments of some authors. *Blickstein (2004)* noted a constraint on fetal growth and development is likely to be greater in twin than singleton pregnancies, each of which has a distinct fetal growth pattern. *Farmanullah et al. (2020)* noted that there are likely complex interactions between genetics and environmental factors of parental, placental, and fetal origin.

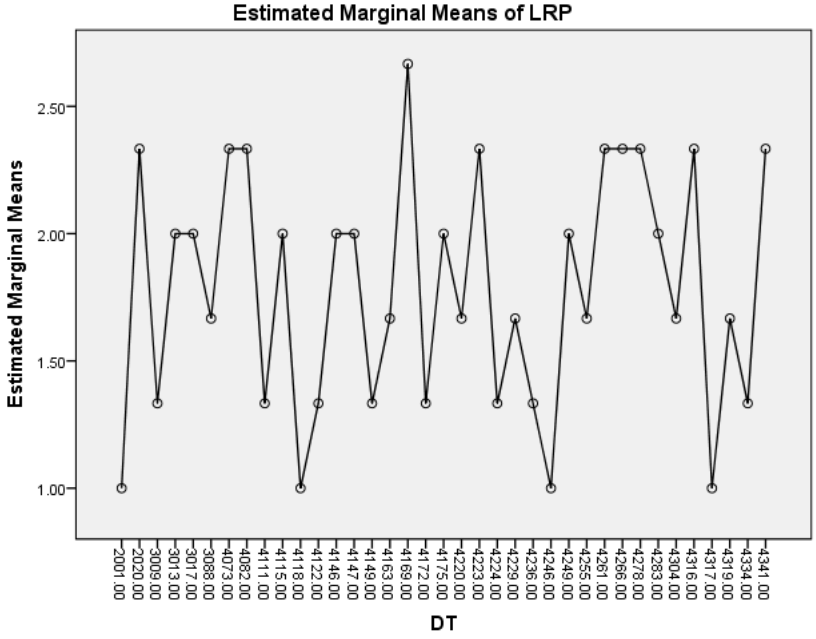

Figure 1. Total lambing rate per dam in 3 parities

The presented chart (Figure 1) showed the average lambing rate per dam in three parities. Dam tattoo (DT) 4169 was on top with regards to the average lamb rate of 2.67 for three parities. Second placer with an average lamb rate of 2.33. were dams numbers 2020, 4073, 4082, 4223, 4261, 4266, 4278, 4316, and 4341. Dams numbers 3013,3017,4115,4146,4147,4175,4249, and 4283 were the third placer with 2.00 an average lamb rate on three parities. The average lamb rate with 1.67 were dams numbers 3088, 4163,4220,4229, 4255,4304, and 4319 as fourth placers. Numbers 3009,4111,4122, 4149,4172, 4224, 4236, and 4334 were the 5th placers with 1.33 average lamb rate. The lowest on average lamb rate with 1.00 were numbers 2001, 4118, 4246, and 4317.

The parity of dam significantly affects the birth weight (*Siddalingamurthy et al., 2017*), was in accord with ours.

We do agree with *Mousa-Balabel (2010)* the number of born lambs per ewe is assuredly an economically important trait in a commercial sheep enterprise.

It's not included directly in our study but advocated ours were that as noted by the following authors: *Alexander (1974),* the peculiarities of digestion and metabolism in ruminants make it difficult for the pregnant ewe to provide adequate

glucose for fetal requirements; and it seems reasonable to explain all these influences on birth weight as acting, at least in part, through restriction of the nutrient supply to the fetus. *Pesántez-Pacheco et al. (2019),* fetal development is influenced by genetic and maternal factors which could interact with one another. Likewise, the mature ewes gave birth to heavier lambs than did maiden ewes, and ewes with single pregnancies gave birth to heavier lambs than did ewes with multiple pregnancies.

Conclusion

For successful and sustainable sheep breeding, the bodyweight of lambs at birth was especially essential. Many factors that affect birth weight are studied. However, on parity focused less. Based on the results obtain in our research, it can conclude that parities have a very significant influence on lambs' birth type and birth weight. The importance of the weight of lambs at birth should have paid more attention, and many contributing factors shall have studied in the future.

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Uticaj pariteta na stopu jagnjenja i masu tela jagnjadi pri rođenju

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Rezime

Uspeh u proizvodnji jagnjadi zavisi od njihove mase tela, a poslednjih godina postoji sve veće interesovanje za razumevanje uticaja nekih faktora kao što je paritet na produktivnost ovaca.Telesna masa jagnjadi pri rođenju ima suštinsku ulogu u postizanju dobre proizvodnje ovaca, dok na produktivnost ovaca utiču mnogi faktori. Poznavanje faktora koji utiču na razvoj i rast jagnjadi mogu da

pomognu u promenama planova gajanja. Svrha ovog rada je bila da utvrdi važne faktore koji utiču na porođajnu masu jagnjadi, a koji se obično ne uzimaju u obzir i imaju značajan udeo u planiranju proizvodnje kod ovaca.
Ovce Mis rasa tri puta su ukrštane sa ovnovima rase Ile de France, pri čemu su posmatrane sledeće osobine: Masa tela jagnjadi pri rođenju, tip rođenja, broj rođenih jagnjadi po ovci po paritetu u periodu od 2018. do 2020. godine. Rezultat svakog janjenja po paritetu svake ovce bio je osnova ove studije. ANOVA, opšti linearni model, univarijantna analiza varijanse i deskriptivna statistika izvedeni su za procenu sledećih efekata: Efekat pariteta na porođajnu masu tela jagnjadi; uticaj pariteta na tip rođenja; efekat interakcije različitih subjekta na porođajnu masu; ukupna granična srednja stopa jagnjadi po ovci. Dobijeni rezulrtati su pokazali vrlo signifikantan uticaj posmatranih faktora na ispitivane osobine ($P<0.01$). Na osnovu rezultata našeg istraživanja, možemo zaključiti da pariteti imaju veoma značajan uticaj kod procene vrednosti priolodnih ovaca, pa im treba obratiti više pažnje u budućnosti.

Ključne reči: Jagnje, porođajna masa tela, stopa jagnjenja, paritet

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