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Investigating the Influence of non-genetic factors on birth weight and growth performance, pre and post weaning, of Sohagi lambs under intensive production system

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ABSTRACT

The aim of this study was investigating the influence of non-genetic factors on growth performance pre and post weaning for Sohagi lambs under intensive production system. The experiment used the recorded data of 480 Sohagi lambs born from 2015 to 2019 and maintained at the experimental sheep farm of animal production department, Faculty of Agriculture, Sohag University, Egypt. Sheep were reared under intensive system. The effect of non-genetic factors on lamb's weight at birth until week 16 of age were studied, and the average daily gain pre and post weaning were calculated. Results show that birth weight was significantly affected (P<0.05) by all studied factors. Male and single lambs were heavier than female and twins or triplets' lambs. Ewes of 3rd and 4th parities gave lambs heavier than those of 2nd and ≥ 5th parities. Lambs from ewes of 1st parity have the lowest weight. Lambs born in February and October (1st and 3rd lambing seasons) were heavier than those born in June (2nd season). These effects have been extended on lamb's weights and average daily gain until 16 weeks of age, and their effects was significantly (P<0.05) greater before than after weaning. It could conclude that birth weight and growth performance of Sohagi lambs were affected by environmental factors, and these effects were greater after weaning than before weaning. So, sheep breeders must provide the appropriate environmental condition and adequate nutritional requirements for Sohagi lambs, especially after separation from their mothers, to avoid decline in their growth performances.

Keywords: Non-genetic factors, birth weight, growth performance, Sohagi lambs.

INTRODUCTION

Sheep and goats play an important role in improving the rural livelihood in Upper Egypt and consider the main source of income to landless and small landowners to secure against poverty (Alary *et al.*, 2015). Growth performance is a key production indicator as it has implications on the sheep reproductive efficiency. The fast growth rate allows sheep to breed early and produce more lambs in their lifetime. Also, fast growth rate entails reaching market weight early, which brings a quicker income to the farmer (Bela and Haile, 2009). Sohagi sheep represents one of eight minor native breeds in Egypt. It mainly locate in Upper Egypt at Sohag, Assuit and Qena governorates and raise mainly in mixed flocks with some goats, kept as household animals in less extensive production systems.

A few previous researchers studied the productive performance of Sohagi sheep, Hamdon, (2010) demonstrated that Sohagi sheep is non-dairy sheep and suggested that it must reared under intensive production system, early weaning and early lambs fattening system because of their low milk production than other sheep in Upper Egypt. In another study aimed to improve the productive performance of Sohagi sheep, Kassab *et al.* (2009) reported that there is a certain beneficial effect of feeding treated canola meal on milk yield, composition and consequently lambs performance during suckling period. Researchers have not previously paid attention to study the factors affecting birth weight and growth performance of Sohagi lambs. Aiming to recognize potential productive ability of Sohagi lambs, this study was designed to investigate the Influence of non-genetic factors on growth performance pre and post weaning for Sohagi lambs under intensive production system.

MATERIALS AND METHODS

Location and climate of study area

The present study was conducted at the experimental sheep farm of the animal production department, Faculty of Agriculture, Sohag University, El-kawthar city which located at western arid regions of Sohag governorate, Egypt. Sohag is one of the rural governorates in Upper Egypt (latitude 26.36°, longitude 31.38° and elevation above sea level 68.70 m), characterized by a dry desert climate, where the temperature is high in summer and moderate in winter, the average yearly maximum and minimum temperature of Sohag is 30.4 °C, and 17.0 °C, respectively (Ouda and Zohry, 2016).

Animal and management

Researcher team of the animal production department, Faculty of Agriculture, Sohag University have an early interest on uniforming the morphological characteristics and improve the performance of Sohagi sheep breed which is prevalent in Upper Egypt at Sohag, Assuit and Qena governorates. Recorded data of 480 Sohagi lambs born from 371 dams and 14 sires and collected over 5 years (2015–2019) were maintained at the experimental sheep farm. Sheep were reared under intensive system: they housed in closed barns with access to an open area, fed concentrate mixture (60%) and green berseem or berseem hay as roughage (40%). Animals got their nutritional requirements according to NRC (2007). Freshwater was available all the time of the day from a fixed drinking trough. The year comprises three mating seasons (January, May, and September) and three lambing seasons in February (1st), June (2nd) and October (3rd). Lambs were kept with their dams until weaning. Early weaning is followed for lambs after being 60 days old.

Lambs growth performance pre and post weaning

Date of birth weight of lambs and their live body weight (kg) every two weeks was recorded until week 16 of age. Average daily gain (ADG, g/day) pre and post weaning of lambs were calculated.

Statistical analysis

Data were analyzed using the PROC MIXED for repeated measurements of SAS (SAS, 9.3) and the results presented as Least Squares Means (LSM). The statistical mixed model included the fixed effects of the lambing year (2015–2019), sex (male, female), type of birth (single, twin, triple), the parity number of the ewe (1, 2, 3, 4, ≥5), and lambing season (1st February; 2nd June; 3rd October). Differences between LSM were determined with the PDIFF option of SAS. The statistical model used for analyzing all obtained data was:

$$Y_{ijklmn} = \mu + R_i + S_j + T_k + P_l + L_m + \varepsilon_{ijkl}$$

Where Y_{ijklmn} is the dependent variable, μ is the overall mean, R_i is the fixed effect of lambing year, S_j the fixed effect of sex, T_k the fixed effect of type of birth, P_l the fixed effect of parity number of the ewe, L_m the fixed effect of lambing season and ε_{ijklmn} is the random residual error.

RESULTS

Least-square means and standard error of Sohagi lambs' birth weight and biweekly weights until weaning are given in Table (1). Male and single lambs were heavier than female and twin or triplet lambs. Ewes of 3rd and 4th parities gave lambs heavier than those of 2nd and ≥ 5th parities. Lambs from ewes of 1st parity have the lowest weight. Lambs born in February and October (1st and 3rd lambing seasons) were heavier than those born in June (2nd season). These effects have been extended on lamb's weights until weaning age (W8). The year of birth had a significant effect on lambs' weights at birth and on biweekly weights until the age of weaning.

The effects of studied factors have been extended on lamb's weights after weaning until 16 weeks of age (Table 2), and their effects were significantly ($P<0.05$) greater post-weaning than pre-weaning (Fig 1 to 5).

The effect of non-genetic factors on average daily gain (ADG) pre and post-weaning of Sohagi lambs is shown in Table 3. The overall mean of ADG of lambs post-weaning significantly ($P<0.05$) decreased than pre-weaning (141.22 vs. 103.05g, respectively). Lambs sex and birth type have significant ($P<0.05$) effect on ADG pre and post-weaning, Male and single lambs have higher ADG and grew faster than female and twin or triple lambs. Also, Lambs born in February and October (1st

and 3rd lambing seasons) have higher ADG than those born in June (2nd season). Lambs from ewes of 1st parity have the lowest (P<0.05) ADG pre-weaning. Post-weaning ADG did not affected significantly by ewe parity.

There is a highly positive correlation between Sohagi lambs' birth weight and biweekly weights until 16 weeks of age. Correlation value ranged from 0.60 to 0.72 pre-weaning and decreased post-weaning (ranged from 0.52 to 0.57) (Table 4).

DISCUSSION

Many researchers emphasized that lamb weight at birth affected by lamb sex. Every one of them may refer to this influence for specific reasons. For example, Abbas *et al.* (2010) and Mishra *et al.* (2007) found that male lambs were heavier than female lambs and this significant variance between both of them might be due to different metabolic rates during the embryonic stage of life. Furthermore, Gamasaee *et al.* (2010) reported that differences in sexual chromosomes, physiological characteristics and endocrinal system can lead to significant influences of sex performance.

Our results show that the effect of lamb' sex extended to weaning age, where male lambs were heavier than female lambs at weaning. In contrast, Petrovic *et al.*, 2011 and Al-Biall and Singh, 2012, found that the average weight of both sexes at weaning was similar.

Type of birth has a significant effect either on body weight of lambs at birth and weaning, Abbas *et al.*, 2010; Al-Bial *et al.*, 2010 found that weight of single lambs at birth and weaning were heavier than twins. This difference was confirmed by Gardner *et al.*, 2007; Gamasaee *et al.* 2010; and Petrovic *et al.* 2011 who stated that the effect of birth type on birth weight can be a result of the nutrition of dams during pregnancy as a response to the limited uterine space. Abbas *et al.*, (2010) suggested that the heavier weight of single lambs atweaning may be attributed to high birthweights and the competition between the twins on limited quantity of milk be given by dam.

From the above results, lambs born for ewes at 1st parity have the lowest birth weight compared with lambs born for ewes at 2nd parity and above. Yiheyis *et al.*, (2012) noticed that lambs born from fifth and above parity dams were heavier in weight than lambs born from lower parity dam. The same result was obtained by Taye *et al.*, (2010) and Gardner *et al.*, (2007) who reported a sustained increase in lamb birth weight with ewe up to 6 years old. The scientific explanation for the increasing trend of lamb's weight at birth with the increase in ewe parity or age at lambing is the competition on nutrients for growth of young ewes and growth of fetus, and the favorable uterine environment provided by the older ewes. Al-Biall and Singh (2012) noticed a slight effect of ewe parity within breed on birth and weaning weight of lambs because it seems to be complicated by external confounding factors such as nutrition during pregnancy and selection and culling strategies that may influence birth weight.

Season of lambing had a significant effect on birth and weaning weights of lambs. Lambs born in autumn had the heaviest birth and weaning weights compared by those born in summer and winter seasons. The significant variance of body weight at birth and weaning between these seasons may be a result of the contrast environmental condition at period of pregnancy and weight development stage pre-weaning for lambs, such as weather conditions, type of feeding, as green forage or not, and other factors (Al-Biall and Singh, 2012; Abbas *et al.*, 2010). Likewise, Petrovic *et al.*, (2011) stated that the significant difference in offspring's birth weight during various seasons was the result of difference in the environmental conditions surrounding the animal from season to another especially the mother's feeding in the last months of pregnancy.

The effect of year of birth on birth weight of lambs has been studied by several researchers, Akhtar *et al.* (2012); Al-Biall and Singh, (2012); Petrovic *et al.*, (2011) attributed the variation in pre-weaning traits in sheep across years may have been due to the combined effects of climate (e.g., temperature and humidity), feeding conditions (e.g., type and availability of feed), and sheep management practices influenced by staff training and availability.

From the obtained results, it is clear that there are decreasing in ADG value post-weaning which may be due to the dependence of Sohagi lambs on milk produced by their mothers, which are distinguished by producing sufficient quantities of milk for their newborns. While, El-Malky *et al.* (2019) found that daily gain of Barki and Ossimi lambs reduced at 30 days postpartum then growth rate was improved at 45 d. This mostly because the duration of lactation season is short in studied breeds which negatively affect lambs performance while growth rate getting better after lambs start feeding. In this regard, Abbas *et al.*, (2010) recommended that lambs born of dams with poor milk production must consume other feedstuffs within a few weeks after birth and thus early weaning can be useful for lambs born from ewes with low milk production. Solouma *et al.* (2014) concluded that Sohagi ewes could improve their ability to produce milk when fed on thymine as a supplement, and suggested that they have an inherent ability to produce more milk if their nutrition improved and that will consequently improve the performance of newborns during suckling period.

The positive correlation between birth weight and weaning weight of lambs investigated in this study were also stated by Abbas *et al.* (2010) with Rahmani and Chios lambs. The highly positive correlation between Sohagi lambs' birth weight and body weight until 16 weeks of age indicates that selection for increased body weight at birth in Sohagi sheep will result in genetic improvement in the subsequent development of the body weight during pre and post-weaning.

CONCLUSION

This study aimed to recognize information about the performance of Sohagi lambs pre and post-weaning, which are lacks in previous research. Birth weight and growth performance of Sohagi lambs pre and post-weaning were significantly affected by studied non-genetic factors, which play an important role in expressing the inherent potential of Sohagi lambs. Likewise, the positive correlation between birth weight and body weights pre and post-weaning helps in conducting early sheep selection programs to improve growth performance of Sohagi sheep. Finally, it could be summarized that the Sohagi sheep lambs have genetic capabilities that qualify them for premium production, but with the availability of appropriate environmental conditions such as nutrition, management and labor.

Table (1) Effect of non-genetic factors on birth weight and biweekly body weights until weaning of Sohagi lambs (LSM ± SE).

	BW (kg)		W2 (kg)		W4 (kg)		W6 (kg)		W8 (kg)	
Item	No.	LSM±SE	No.	LSM±SE	No.	LSM±SE	No.	LSM±SE	No.	LSM±SE
Lamb sex										
Male	246	3.09^{a} ±0.03	244	5.45^{a} ±0.06	237	7.61^{a} ±0.08	235	9.49^{a} ±0.11	234	11.25^{a} ±0.13
Female	234	2.84^{b} ±0.03	233	5.01^{b} ±0.05	229	7.01^{b} ±0.08	222	8.80^{b} ±0.11	217	10.42^{b} ±0.13
Birth type										
Single	267	3.13^{a}±0.02	266	5.58^{a}±0.05	263	7.85^{a}±0.07	259	9.88^{a}±0.09	257	11.70^{a}±0.10
Twin	201	2.81^{b}±0.03	199	4.84^{b}±0.06	191	6.67^{b}±0.09	186	8.28^{b}±0.11	183	9.82^{b}±0.14
Triple	12	2.33^{c}±0.09	12	4.17^{c}±0.18	12	5.79^{c}±0.24	12	7.00^{c}±0.34	11	8.14^{c}±0.43
Ewe parity										
1st	125	2.79^{c}±0.04	123	4.94^{c}±0.09	118	6.92^{c}±0.12	114	8.72^{c}±0.15	114	10.38^{b}±0.18
2nd	141	2.95^{b}±0.03	141	5.18^{b}±0.07	138	7.22^{bc}±0.11	135	9.03^{bc}±0.14	132	10.72^{b}±0.18
3rd	95	3.15^{a}±0.05	95	5.51^{a}±0.09	95	7.69^{a}±0.13	94	9.59^{a}±0.17	93	11.34^{a}±0.21
4th	67	3.16^{a}±0.05	66	5.49^{a}±0.10	63	7.60^{a}±0.16	62	9.49^{a}±0.21	61	11.25^{a}±0.25
≥ 5th	52	2.91^{b}±0.05	52	5.25^{b}±0.13	52	7.41^{ab}±0.19	52	9.25^{ab}±0.23	51	10.78^{ab}±0.28
Birth season										
1st	140	3.05^{a}±0.04	140	5.45^{a}±0.07	140	7.65^{a}±0.10	140	9.56^{a}±0.13	140	11.33^{a}±0.15
2nd	165	2.90^{b}±0.03	165	4.99^{c}±0.06	165	6.92^{b}±0.09	162	8.57^{b}±0.12	160	10.13^{b}±0.15
3rd	175	2.98^{a}±0.04	172	5.29^{b}±0.07	161	7.44^{a}±0.11	155	9.40^{a}±0.14	151	11.17^{a}±0.17
Birth year										
2015	52	2.93^{ab}±0.08	52	5.10^{b}±0.16	52	7.03^{b}±0.24	52	8.69^{b}±0.31	52	10.38^{b}±0.38
2016	86	2.90^{b}±0.05	83	5.14^{b}±0.09	72	7.26^{ab}±0.14	66	9.28^{a}±0.17	62	11.04^{a}±0.21
2017	140	2.98^{ab}±0.04	140	5.26^{a}±0.08	140	7.36^{a}±0.11	140	9.24^{a}±0.14	140	11.05^{a}±0.17
2018	121	3.02^{a}±0.04	121	5.30^{a}±0.08	121	7.51^{a}±0.11	120	9.35^{a}±0.14	119	10.89^{a}±0.18
2019	81	2.99^{ab}±0.04	81	5.27^{a}±0.08	81	7.18^{ab}±0.14	79	8.89^{ab}±0.19	78	10.61^{ab}±0.22

^{abc} mean values with a different superscript in the same Column (and within each factor) indicate significant difference (P<0.05).

Table (2) Effect of non-genetic factors on biweekly body weights post-weaning of Sohagi lambs (LSM ± SE).

	W10 (kg)		W12 (kg)		W14 (kg)		W16 (kg)	
Item	No.	LSM± SE	No.	LSM± SE	No.	LSM± SE	No.	LSM± SE
Lamb sex								
Male	231	12.87^{a} ±0.15	216	14.37^{a} ±0.18	183	15.70^{a} ±0.20	105	16.96^{a} ±0.26
Female	209	11.93^{b} ±0.15	199	13.28^{b} ±0.17	154	14.44^{b} ±0.22	103	15.55^{b} ±0.29
Birth type								
Single	251	13.40^{a}±0.12	233	15.01^{a}±0.14	188	16.34^{a}±0.16	123	17.44^{a}±0.21
Twin	178	11.24^{b}±0.16	171	12.49^{b}±0.18	138	13.75^{b}±0.22	79	14.74^{b}±0.31
Triple	11	9.32^{c}±0.49	11	10.41^{c}±0.51	11	11.55^{c}±0.55	6	12.25^{c}±0.88
Ewe parity								
1^{st}	111	11.82^{b}±0.20	103	13.22^{b}±0.22	87	14.47^{b}±0.28	54	15.56^{b}±0.37
2^{nd}	127	12.42^{ab}±0.21	121	13.88^{ab}±0.23	93	15.24^{ab}±0.28	56	16.34^{ab}±0.38
3^{rd}	91	12.90^{a}±0.25	86	14.32^{a}±0.29	72	15.51^{a}±0.33	41	16.80^{a}±0.44
4^{th}	61	12.91^{a}±0.29	57	14.31^{a}±0.34	48	15.63^{a}±0.41	34	16.81^{a}±0.54
$\geq 5^{th}$	50	12.32^{ab}±0.33	48	13.73^{ab}±0.39	37	14.95^{ab}±0.49	23	15.93^{ab}±0.62
Birth season								
1^{st}	137	12.96^{a}±0.18	129	14.42^{a}±0.21	93	15.90^{a}±0.25	65	17.10^{a}±0.29
2^{nd}	158	11.58^{b}±0.17	151	12.92^{b}±0.19	132	14.20^{b}±0.22	103	15.34^{b}±0.27
3^{rd}	145	12.84^{a}±0.20	135	14.34^{a}±0.24	112	15.56^{a}±0.29	40	17.26^{a}±0.55
Birth year								
2015	51	11.85^{b}±0.42	50	13.23^{b}±0.43	42	14.33^{b}±0.50	33	15.41^{b}±0.59
2016	53	12.80^{a}±0.23	38	14.26^{a}±0.32	33	15.62^{a}±0.33	21	16.93^{a}±0.31
2017	140	12.67^{a}±0.19	134	14.18^{a}±0.22	104	15.53^{a}±0.26	46	16.78^{a}±0.38
2018	119	12.31^{ab}±0.21	118	13.63^{ab}±0.24	118	14.81^{ab}±0.27	81	16.15^{ab}±0.36
2019	77	12.28^{ab}±0.26	75	13.81^{ab}±0.28	40	15.40^{a}±0.38	17	16.22^{ab}±0.45

^{abc} mean values with a different superscript in the same Column (and within each factor) indicate significant difference ($P<0.05$).

Table (3) Effect of non-genetic factors on average daily gain (ADG) pre and post-weaning of Sohagi lambs (LSM ± SE).

Item	Pre weaning ADG (g/day) No.	Pre weaning ADG (g/day) LSM ± SE	Post weaning ADG (g/day) No.	Post weaning ADG (g/day) LSM ± SE	*P* value
Lamb sex					
Male	244	146.45± 2.08	230	105.95 ± 2.14	0.001
Female	233	135.75 ± 2.03	209	99.85 ± 2.05	0.001
Birth type					
Single	266	153.45 ± 1.70	250	110.18 ± 1.95	0.001
Twin	199	126.99 ± 2.18	178	94.36 ± 2.23	0.001
Triple	12	106.15 ± 6.99	11	81.44 ± 7.37	0.024
Ewe parity					
1st	123	136.03 ± 2.82	110	98.96 ± 2.87	0.001
2nd	141	139.48 ± 2.73	127	106.98 ± 2.66	0.001
3rd	95	146.43 ± 3.34	91	103.31 ± 3.51	0.001
4th	66	145.82 ± 3.89	61	107.14 ± 4.22	0.001
≥ 5th	52	142.89 ± 4.49	50	96.55 ± 4.25	0.001
Birth season					
1st	140	147.79 ± 2.47	137	105.17 ± 2.51	0.001
2nd	165	129.27 ± 2.29	157	94.81± 2.24	0.001
3rd	172	147.34 ± 2.58	145	109.96 ± 2.86	0.001
Birth year					
2015	52	132.90 ± 5.75	51	104.93 ± 3.37	0.001
2016	83	148.06 ± 3.27	53	113.38 ± 4.42	0.001
2017	140	144.11 ± 2.54	140	108.58 ± 2.89	0.001
2018	121	140.25 ± 2.82	191	90.02 ± 2.68	0.001
2019	81	136.02 ± 3.50	76	104.79 ± 3.04	0.001
Overall	477	141.22±1.47	439	103.05 ± 1.49	0.001

abc mean values with a different superscript in the same Column (and within each factor) indicate significant difference (P<0.05).

Table (4) Correlation between Sohagi lambs' birth weight and biweekly weights until 16 weeks of age.

	BW	W2	W4	W6	W8	W10	W12	W14	W16
BW	1								
W2	.723**	1							
W4	.626**	.916**	1						
W6	.604**	.859**	.951**	1					
W8	.603**	.816**	.902**	.965**	1				
W10	.568**	.775**	.862**	.928**	.976**	1			
W12	.540**	.740**	.817**	.884**	.942**	.981**	1		
W14	.540**	.706**	.775**	.848**	.914**	.961**	.982**	1	
W16	.521**	.687**	.759**	.827**	.883**	.934**	.960**	.983**	1

** Correlation is significant at the 0.01 level (2-tailed).

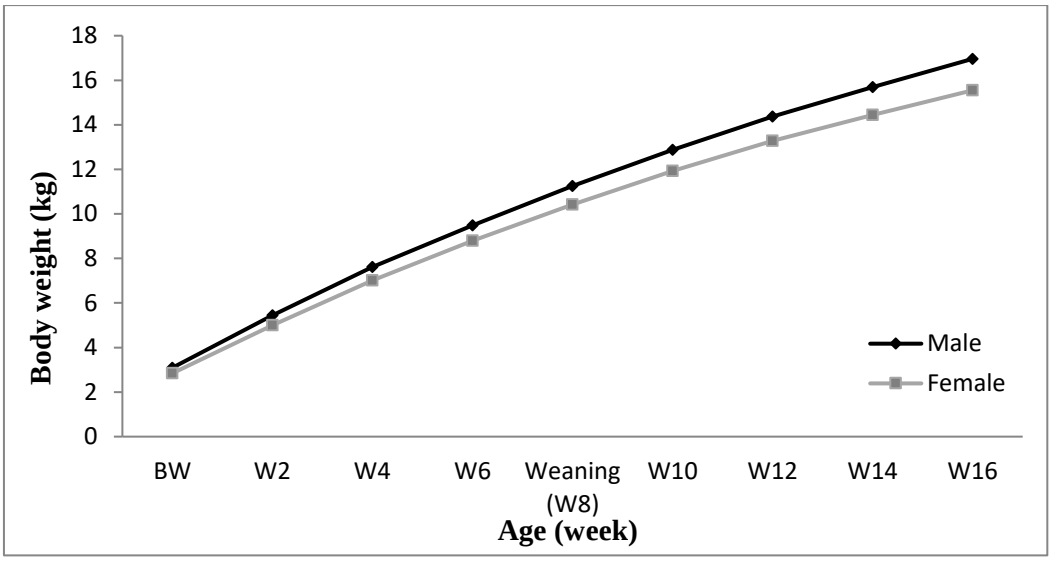

Fig (1) Effect of lamb sex on birth weight and body weight pre and post-weaning of Sohagi lambs.

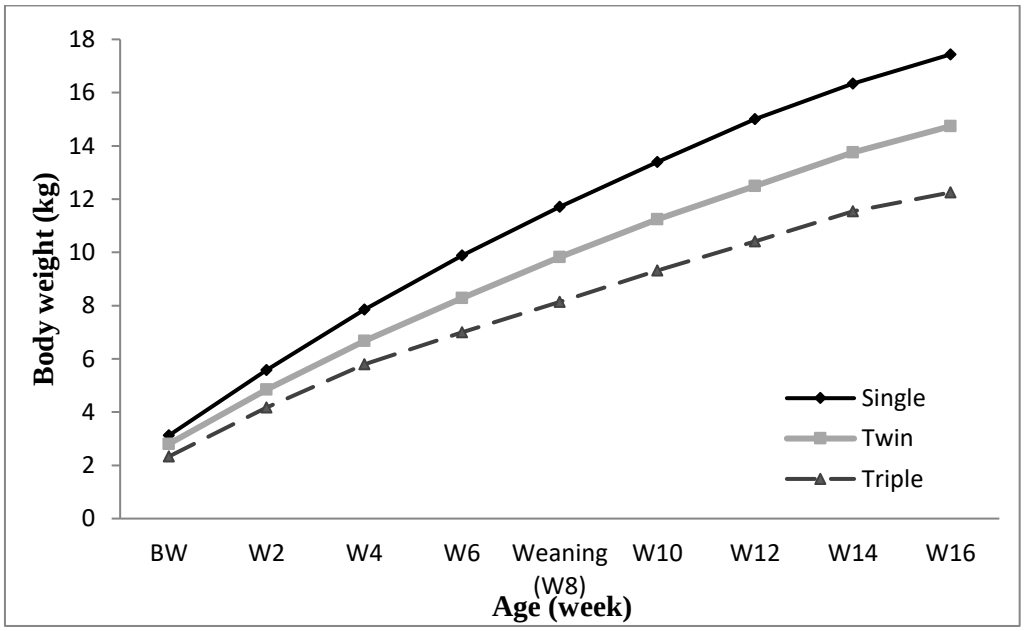

Fig (2) Effect of birth type on birth weight and body weight pre and post-weaning of Sohagi lambs.

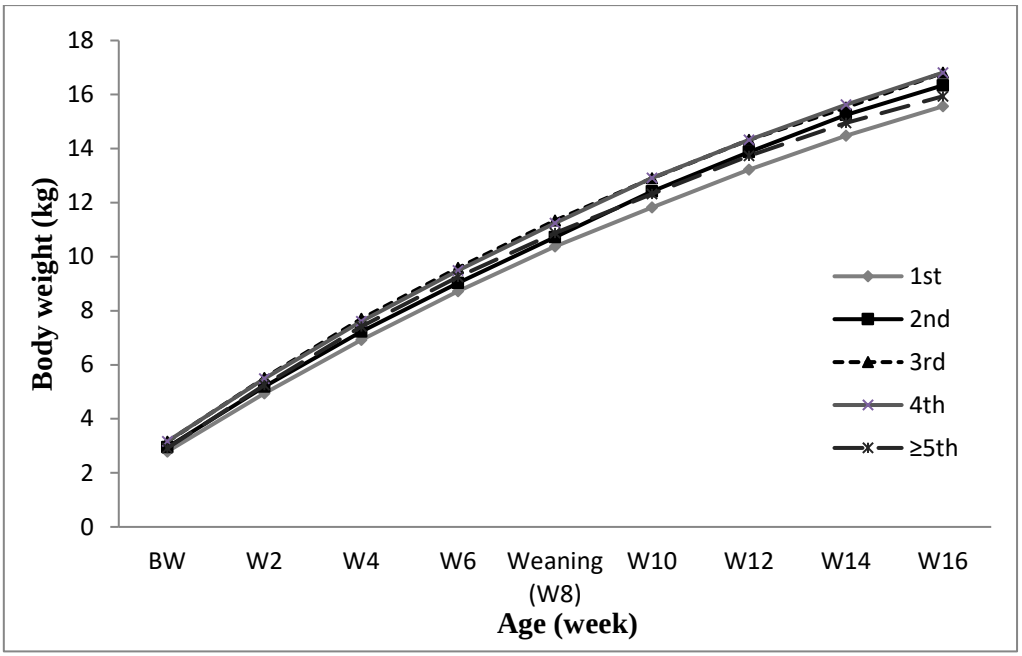

Fig (3) Effect of ewe parity on birth weight and body weight pre and post weaning of Sohagi lambs.

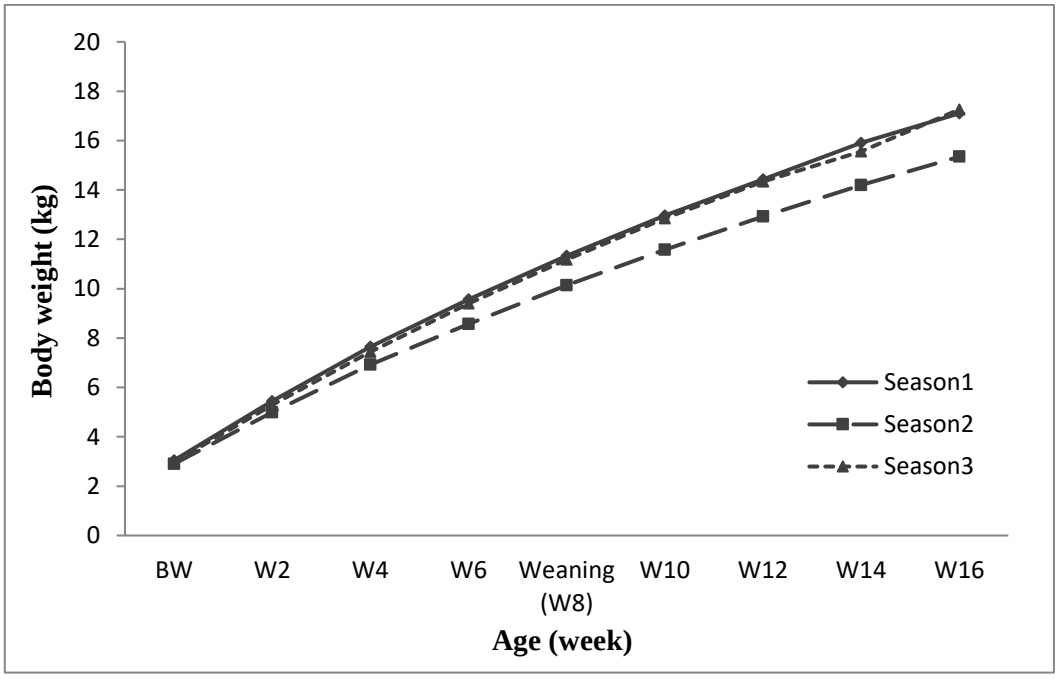

Fig (4) Effect of birth season on birth weight and body weight pre and post-weaning of Sohagi lambs.

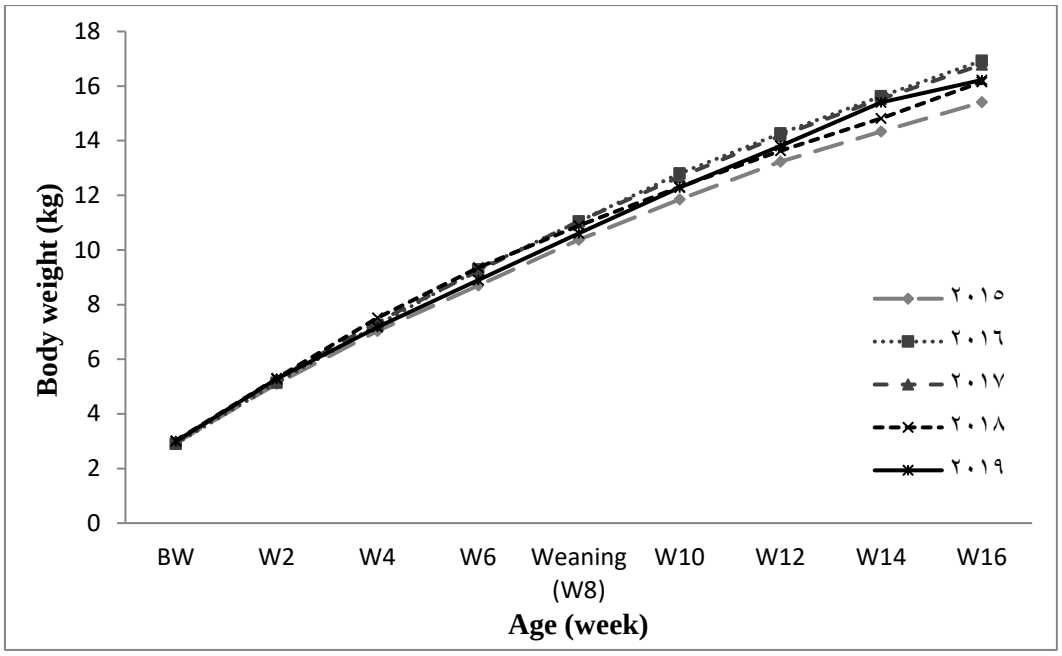

Fig (5) Effect of birth year on birth weight and body weight pre and post-weaning of Sohagi lambs.

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دراسة تأثير العوامل غير الوراثية على وزن الميلاد ونمو الحملان السوهاجي قبل وبعد الفطام تحت نظام الإنتاج المكثف

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الهدف من إجراء هذه الدراسة هو التعرف على تأثير العوامل غير الوراثية على النمو قبل وبعد الفطام للحملان السوهاجي تحت نظام الإنتاج المكثف. استخدمت التجربة البيانات المسجلة لـ ٤٨٠ حمل سوهاجي ولدت من ٢٠١٥ إلى ٢٠١٩ في مزرعة الأغنام التجريبية بقسم الإنتاج الحيواني، كلية الزراعة، جامعة سوهاج، مصر. تم تربية الأغنام تحت نظام الإنتاج المكثف. تمت دراسة تأثير العوامل غير الوراثية على وزن الحمل عند الميلاد حتى الأسبوع ١٦ من العمر ، وتم حساب متوسط الزيادة اليومية فى وزن الحملان قبل وبعد الفطام. أظهرت النتائج تأثر وزن الميلاد معنويًا **(P<0.05)** بكل العوامل تحت الدراسة. كانت الحملان الذكور والحملان الفرادى أثقل وزنًا من الحملان الأناث والحملان التوائم أو الثلاثية. كان وزن الميلاد للحملان الناتجة من نعاج فى موسم ولادتها الثالث والرابع أثقل وزنًا من تلك الناتجة من نعاج فى موسم ولادتها الثاني والخامس، وكانت الحملان الناتجة من نعاج فى موسم ولادتها الأول الأقل وزنًا. كانت الحملان المولودة في فبراير وأكتوبر أثقل وزنًا من تلك التي ولدت في يونيو. كما امتدت هذه التأثيرات على أوزان الحملان ومتوسط الزيادة اليومية حتى عمر ١٦ أسبوع، وكانت آثارها أكبر بشكل ملحوظ **(P<0.05)** قبل الفطام عنها بعد الفطام. وخلصت الدراسة أن وزن الميلاد وأداء نمو الحملان السوهاجي قد تأثرا بالعوامل البيئية المدروسة ، وكانت هذه التأثيرات أكبر بعد الفطام عنها قبل الفطام. لذلك ، يجب على مربي الأغنام توفير الظروف البيئية المناسبة والمتطلبات الغذائية الكافية للأغنام السوهاجي، خاصة بعد انفصالها عن أمهاتها ، لتجنب تراجع أداء نموها.