



Influence of housing models on reproductive performance of Saidi ewes, under Upper Egyptian conditions

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ABSTRACT:

A total of 80 Saidi ewes were used approximately 2 years of age and had an average initial body weight (BW) of 40 ± 2.46 kg. Ewes were divided in two experiments 40 mature saidi ewes in each experiment, The first experiment was in mating season September, 2018 and the second experiment was in mate season January, 2019. Ewes in two experiments were randomly assigned to 4 groups raised under four housing model which was Double Roof Close, single roof close, semi open and open housing model. Ewes, mated in September, lambd during January. Ewes, mated in January, lambd during May. Ewes were kept in double roof and open model houses had higher Conception rate than the other houses in winter and summer seasons respectively. Ewes in semi open and open model in season's summer and winter had higher number of service per conception. The analysis of variance showed that housing models had no significant effect on average birth weight and total birth weight/ewe of lambs. However, lambs born in double roof and single roof housing model tended to have a higher average birth weight than born in semi open and open models.

Key words: Saidi ewes, housing models. Upper Egypt, reproductive performance.

1. INTRODUCTION:

Moustafa (2003) found that ewes under palm branches with 2 or 3m height required more service to attain conception (1.55 and 1.44, respectively) than those under metallic roof with 2 or 3 m height (1.30 and 1.30, respectively). However, El-Sayed, (2003) found that number of service per conception for tree-sheltered and unsheltered goats dose were 1.75 and 1.22, respectively. Elevated air temperature in semi open and open than in closed houses. The increase of S/C during heat stress may be due to the loss of embryo at early few days of pregnancy due to abnormal size of oocyte (Al-Katanani et al., 2002 and Inskeep, 2002).

Asbestos shading improved Conception rate (CR) of sheep by about 5.0% (Gawish *et al.*, 1999). Providing asbestos shading during summer season improved the CR of Baladi goats by about 17.5%. (Badawy et al, 1999). Tree-sheltering of ewes improved their reproductive performance by 15.38% (Azamel et al., 1994). CR of shaded cows was higher than that of unshaded ones 44.4 vs. 25.3% respectively (Roman-Ponce et al., 1977). All ewes under metallic roof, regardless the roof height, were conceived. Moustafa, (2003). Fertility in Merino sheep was reduced ($P < 0.05$) when environmental temperature increased (≥ 32.0 °C) at mating during the period from January to March

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prevailed hot dry environment (Galal et al. 2005). Saidi sheep are considered the oldest Egyptian sheep breed in the country, they are characterized by high fertility, and high mortality rate of young animals (Elshazly and Youngs 2019). They are mostly dark in color, with open coarse fleece, some individuals are creamy or mixed colors. They have Roman noses, dewlap under the neck, length in tail and coarse wool cover (Ghanem 1980). (Fig. 1).

The present study was carried out to evaluate and assess the impact of different housing models on reproductive performance of Saidi ewes, under Upper Egypt hot and cold conditions. In addition, to decide which one of these models is the proper model for sheep housing.



Fig 1. Saidi Sheep

2. MATERIALS AND METHODS:

Experimental animals and design

The first experiment

This experimental was carried out 40 mature Saidi ewes during mating season September, 2018 and lambing during January (winter season) which had almost similar average BW 40 ± 2.46 kg.

The present study was carried out during the period from September 2018 to October 2019 at Mallawi Animal Production Research Station; El Minia governorate that belongs to Animal Production Research Institute (APRI), Agriculture Research Center (ARC), Egypt.

2019 and lambing during May (summer season) which had almost similar average BW (40 kg) and reproductive history.

almost similar age and body weight were used for bred ewes. Each ram was assigned to coplate ewes from all groups to delete any effect of rams on the results obtained.

Duration of estrus, number of service per conception (NSPC) and weight of ewes exhibited estrus were recorded. Conception rate (CR) and embryonic mortality (EM) during the mating season were determined by using sonar. Two sonar examinations were taken on the 45th and 75th days after mating according to Khalil et al., (2000). Weight at the day lambing was recorded and pregnancy period was calculated.

Statistical analysis:

The data were statistically analyzed using SPSS 21 (2012) for windows (SPSS Inc., Chicago, IL). Duncan's multiple range tests was used to compare the differences among means (Duncan's, 1955).

The model used for statistical analysis of reproductive and growth performance was:

$$Y_{ijk} = \mu + T_i + S_j + (TS)_{ij} + e_{ijk}$$

Where,

Y_{ijk} = The studied trait.

μ = The overall mean.

T_i = The effect of housing system.

$i = 1, \dots, 4$.

P_j = The period effect. Where:

$J = 1, \dots, 2$.

S_j = The season effect. Where:

$J = 1, \dots, 2$.

(TP) ij = The effect of interaction between housing system and period

(TS) ij = The effect of interaction between housing system and season.

e_{ijk} = the random error.

3. RESULTS AND DISCUSSION:

(1). Results showed that there was a significant deferent on ewes exhibited estrus% ewes were kept in double roof and open model houses had higher than the other houses in winter and summer seasons respectively.

The second experiment

The second experiment was carried on 40 mature ewes with in mate season January, Animals were randomly assigned to four groups raised under four housing models:

- 1- Semi open model house roofed (SOSR) with asbestos sheets 4.5 m.
- 2- A close model roofed with single asbestos roof at 3 m height (single low model) (CSR).
- 3- A close model roofed with double asbestos roofs at 3 and 3.5 m height for two roofs, respectively (CDR).
- 4- Open model house shaded hat rally with huge tree in the center (OM).

All animals were fed according to NRC (2001).

Reproductive performance of saidi ewes under Upper Egypt hot and cold conditions.

Ewes were mated in September and lambing during January (winter season). Ewes were mated in January and lambing during May (summer season). Four mature rams with

Effect of housing model on saidi ewes under Upper Egypt hot and cold conditions.

ewes exhibited estrus%:

The effects of housing model ewes exhibited estrus% were presented in Table

Conception rate:

In addition, such failure to conceive during heat stress may be due to the follicular size and its function, Wolfenson *et al* (1995) found a decrease in follicular size or dominant follicle function in lactating cows when they exposed to heat stress.

Conception rate % from total ewes:

Results showed that there was a significant deferent on Conception rate % from total ewes. Results showed that ewes were kept in double roof and open model houses had higher CR than the other houses in winter and summer seasons respectively. These results were agree with Moustafa (2003) who indicted that all ewes under metallic roof, regardless the roof height, were conceived.

Gestation period:

The gestation days are in the normal range in all houses models which reported by Moustafa (2003) who found no significant influence of roof model or height on gestation length of ewes.

Body weight at lambing:

Results showed that there was a significant deferent on body weight at lambing. Results showed that ewes were kept in double roof higher than other housing model. these results were agree with Moustafa (2003) who found no significant influence of roof model or height on gestation length of ewes.

Number of total lambs produced/ewe lambd

Ewes in semi open and open models in season's Sep. and Jan. had higher NSPC (1.4, 157 and 1.4, 1.5, respectively) than those other houses Table (1). Similarly, these results were agreed with Moustafa (2003) who found that ewes under palm branches with 2 or 3m height required more service to attain conception (1.55 and 1.44, respectively) than those under metallic roof with 2 or 3 m height (1.30 and 1.30, respectively). Howeve, El-Sayed (2003) found that number of service per conception for tree-sheltered and unsheltered goats dose were 1.75 and 1.22 respectively.

The effects of housing model on conception rate (CR %) were presented in Table (1). Results showed that there was a significant deferent on (CR %). Results showed that ewes were kept in double roof and open model houses had higher CR than the other houses in winter and summer seasons respectively. These finding are in agreement with the results of Gawish *et al.* (1999) who found that asbestos shading improved CR of sheep by about 5.0%. Also, Badawy *et al* (1999) reported that providing asbestos shading during summer season improved the CR of Baladi goats by about 17.5%. Azamel *et al* (1994) found that tree-sheltering of ewes improved their reproductive performance by 15.38%. Roman-Ponce *et al* (1977) reported that CR of shaded cows was higher than that of unshaded ones (44.4 vs. 25.3%, respectively). Moustafa (2003) indicted that all ewes under metallic roof, regardless the roof height, were conceived.

Hot climate conditions were responsible for a decrease in reproductive efficiency due to reduced hormone secretion, low embryonic survival, An increase in the incidence of ovarian cysts, placental malformation and placental retention Lacetera and Bernabucci (2000). This is in consistent with results of Ulberg and Burfening (1967) they found that CR declined from 61 to 45% when RT increased by 1°C for 12 hrs post breeding. They added that, cattle with RT of 40°C as a result of exposure to 32.2°C AT for 72 h after insemination had conception rate of 0% compared with a conception rate of 48% when RT was 38.5°C as a result of exposure to 21.1°C. (Wolfenson *et al.*, 2000) stated that summer heat stress is a major contributing factor in low fertility in lactating dairy cows in hot environments. Also, Kleemann and Walker (2005) found that fertility in Merino sheep was reduced ($P < 0.05$) when environmental temperature increased ($\geq 32.0^\circ\text{C}$) at mating during the period from January to March.

(3.1 kg, $P < 0.05$) than unshaded group. Similar results were obtained by Alexander and Williams (1971) who found that hot environments and/or excessive solar radiation, under experimental and natural conditions, decreased the birth weights of sheep.

Embryonic survival rate

The effect of housing models on embryonic mortality is presented in Table (2). The data illustrated the results of two sonar examinations at 45 and 75 days after mating according to Khalil et al., (2000). No loss in embryos was found in double roof and single roof housing model as compared with semi open and open housing model.

Several researches have shown that the decline of CR has been associated with elevated rectal and uterine temperatures. Putney *et al* (1988) observed that heat stress caused rise of the RT to 41.1°C causing large reduction in embryonic development. Roth *et al* (2001) reported that exposure to summer heat stress may impair follicle function and fertility.

Al-Katanani et al (2002) showed that proportion of oocytes and cleaved embryos that developed to blastocysts on d 8 after insemination was lower ($P < 0.001$) during the warm season (April to September) compared with during the cool season (October to March), and this result may be related to heat shock protein formation Ju (2005). The present results are in agreement with Pennisi *et al* (2010) who reported similar effects of different housing models on behavioral stress parameters during the hottest period of the year in the Mediterranean area. Similar observations were observed in Ouled Djellal breed of ewes in Algeria. Fertility and growth rate parameters were severely affected by thermal, nutritional, and walking stress resulted in decrease productive and reproductive performance Safsaf et al (2012). In this study, a significant variation in means of growth rate parameters and fertility parameters was observed among breeds and

Our results agreed with these of Simensen and Kielland (2013) who reported that keeping sheep outdoors or in other available housing facilities during the lambing season in addition to the main building unit was associated with a higher number of lambs born per pregnant ewe and lambs per ewe at the end of the indoor period. These results were agree with Abozed, et al., (2021) who reported that the physiological responses of sheep housed under double-roofed closed model were better compared to semi-open model. This housing model provided a more comfortable climatic condition that alleviated external heat stress on the animal.

The present study, ewes in semi open and open houses required more service/conception (S/C) than other houses. This effect may be due to elevated AT in semi open and open than in closed houses. The increase of S/C during heat stress may be due to the loss of embryo at early few days of pregnancy due to abnormal size of oocyte (Al-Katanani et al., 2002 and Inskeep, 2002), less heat shock protein (Ju, 2005) and less progesterone secretion from abnormal CL (McNeil et al., 2006), however such effects of housing during heat stress may require further studies.

Birth weight of produced lambs:

Average birth weight of lambs and total birth weight/ewe under different housing models in two seasons are presented in Table (1). The analysis of variance showed that housing models had no significant effect on average birth weight and total birth weight/ewe of lambs. However, lambs born in double roof and single roof housing model tended to have a higher average birth weight than born in semi open and open models Table (1).

That increase may be due to ewes housed in double roof and single roof housing models tended to have a higher body weight at gestation than those housed in semi open one. Collier et al (1982) found that pregnant shaded cows were slightly heavier than unshaded one, and delivered heavier calves

are in accordance with Munir et al (2007).

models of rearing. The findings of this study

Table 1. Effect of housing models on ewes' reproductive performance under Upper Egypt hot and cold conditions.

Item	Housing models							
	Double Roof		Single Roof Close		Semi Open		Open	
	summer	winter	summer	winter	summer	winter	summer	winter
No of ewes	11	10	11	10	11	8	11	8
Body weight at mating	40.6	43.73	39.33	41.64	40.4	43.80	41.69	45.39
No of ewes exhibited estrus	9*	9*	8	7	8	7	9*	8
Ewes exhibited estrus, %	81.8	90*	72.7	70	72.7	87.5	81.8	100*
No of ewes lambled	9*	9*	8	5	8	7	10*	8
Conception rate % from mated ewes	100*	100*	100*	71.4	100*	100*	111.1*	100*
Conception rate % from total ewes	81.8	90*	72.7	50	72.7	87.5	90.1*	100*
Gestation period (days)	152	151	149	145	154	153	148	150
Body weight at lambing	37.13	44.88*	42.85*	35.57	43.31*	41.25	41.86	42
No of lambs (total)	13*	11	11	6	11	11	14*	12
No of lambs (alive)	13*	11	10	6	10	10	14*	10
No of total lambs produced/ewe lambled	1.44*	1.22	1.38	1.2	1.38	1.57*	1.4*	1.5*
No of lambs produced (alive)/ewe lambled	1.44*	1.22	1.25	1.2	1.25	1.43*	1.4*	1.25
Average birth weight (kg)	3.46*	3.12*	3.16*	2.55	2.82	2.83	3.11	2.79

* Significant at 0.05

Table 2. Effect of housing models on embryo survival under Upper Egypt hot and cold conditions.

Period (day)	season	Housing model							
		Double Roof Close		Single Roof Close		Semi Open		Open	
		summer	winter	summer	winter	summer	winter	summer	winter
45 day	No of ewes pregnant	11	9	9	7	9	7	11	8
	No of fetus	15*	11	13	8	13	11	16*	14*
75 day	No of ewes pregnant	9	9	8	5	8	7	10	8
	No of fetus	13*	11	11	6	11	11	14*	14*

* Significant at 0.05

CONCLUSION

productivity. Concerning the reproductive performance of ewes, using such closed houses improved conception rate and decreased embryonic lose and number of service per conception.

The elevation of air temperature in Upper Egypt during summer affects the reproductive performance of sheep. However, using closed houses may eliminate such effect of high air temperature on sheep

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الملخص العربي

تأثير نظم الاسكان المختلفة على الاداء التناسلي لنعاج الصعيدي تحت الظروف الجوية لصعيد مصر

اجريت الدراسة باستخدام ٨٠ من نعاج الصعيدي بمتوسط عمر سنتين ومتوسط وزن جسم ٢.٤٦ ± ٤٠ في موسم التزاوج. قسمت النعاج الى تجربتين، التجربة الاولى تحتوى على ٤٠ من نعاج الصعيدي الناضجة في موسم التزاوج شهر سبتمبر ٢٠١٨ وكانت متقاربة في وزن الجسم ٢.٤٦ ± ٤٠ ومواسم التناسل. التجربة الثانية اجرية باستخدام ٤٠ من نعاج الصعيدي في موسم التزاوج شهر يناير ٢٠١٩ وكانت متقاربة في وزن الجسم ٢.٤٦ ± ٤٠ ومواسم التناسل. قسمت النعاج في كل تجربة عشوائيا الى أربع مجموعات تحت نظم الاسكان الاربعية. النعاج التي ادخلت في موسم التزاوج في شهر سبتمبر كانت ولاداتها في شهر يناير بينما كانت ولادات النعاج التي ادخلت لموسم التناسل في شهر يناير كانت الولادات في شهر مايو. سجل اعلى معدل للحمل في النعاج التي تم اسكانها تحت نظام السقف المزدوج والنظام المفتوح مقارنة بنظم الاسكان الاخرى في الشتاء والصيف على الترتيب. كانت النعاج التي تم اسكانها تحت النظام المفتوح وشبه المفتوح في فصل الصيف والشتاء اعلى في معدل الولادات الناتجة عن الاخصاب. أظهر تحليل التباين أن نماذج الإسكان ليس لها تأثير معنوي على متوسط وزن الولادة وإجمالي وزن الولادة / نعجة الحملان. ومع ذلك، فإن الحملان المولودة في نموذج إسكان بسقف مزدوج وسقف أحادي تميل إلى أن يكون لها متوسط وزن عند الولادة أعلى من المولود في الأنواع شبه المفتوحة والمفتوحة.

الكلمات الدالة: نعاج الصعيدي، نظم الاسكان المختلفة، جنوب مصر، الاداء التناسلي.