

## CHARACTERIZATION OF PRODUCTIVE AND REPRODUCTIVE PERFORMANCE OF SAIDI GOATS IN EGYPT

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### ABSTRACT

This study was carried out to describe the productivity and reproductive performance of Saidi goats (SG) under Upper Egypt conditions. The study involved forty-nine mature does aged 1 to 1.5 year, with an average body weight of 21.6 kg. A significant difference ( $p < 0.01$ ) was recorded in the number of services per conception between summer mating (2.33) and winter mating (1.45). Conception rates were 100 % for both winter and summer matings. Abortion rates were 11.1 and 0 % in summer and winter mating, respectively. The prolificacy was 145 % in summer kidding (SK) and 87.5 % in winter kidding (WK). The litter sizes were 1.88 and 1.65 for goats kidded in winter and summer, respectively. There was a significant difference ( $p < 0.01$ ) in the length of the oestrus cycle between seasons. The average length of the oestrus cycle of SG was 21.9 days. There were no significant differences in the oestrus duration among the four seasons. The birth weight of Saidi kids was 1.61 kg. Male animals were heavier than females. The weaning weight of kids was 6.72 kg. The average mortality rate from birth to weaning was 34.5 % for the kids born in summer and 14.3 % for kids born in winter. There was a significant effect ( $p < 0.01$ ) of the season on the duration of lactation (162.0 and 119.5 days in winter and summer, respectively), which led to a significant ( $p < 0.01$ ) increase in total milk yield in winter (126.9 kg/head) compared to summer (89.5 kg/head).

**Keywords:** Saidi goats, Fertility, Oestrus, Birth weight, Milk yield

### INTRODUCTION

Goats play an important socio-economic role for the villagers and goat owners. They are an immediate cash resource, dowry in marriages in rural and Bedouin areas, and a good source of meat (Galal *et al.*, 2002). In the Nile Valley, goat's

milk is processed by family or sold on a small scale in village markets (Soryal and Metawi, 2000). In Egypt, the demand for goat milk cheese has increased due to the growth of tourism or changes in consumers' preferences (Galal *et al.*, 2002).

In Egypt, the goat population is about 4.13 million heads (Khalil *et al.*, 2013). The most common goat breeds in Egypt are Saidi goat, which represents 47 % of the Egyptian goat population and is concentrated in the southern region; the Egyptian Baladi goat, which represents 37 % of the goat population and is distributed all over the Nile Valley and Delta

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region, the same thing with Wahati goats, which represents 2 %. Barki goats are spreading through the northern region and represent 5 %. Zaraibi goats make up 2% of the goat population and are located in the northeast delta. Sinawi or Black Sinai goats represent 5% of the goat population and are exclusively found only in their place of origin, Sinai in the eastern part of Egypt (Galal *et al.*, 2002).

Saidi goats represent the oldest breed of goat in Egypt especially located in Upper Egypt, which is denoted by the term "Saidi." The physical characteristics are not very distinct, relatively small to medium size. They possess a small head with a straight or slightly concave profile. Males are characterized by their horns, which are small, thin and curved backward. The ears are medium to large in size and hang down. The coat color varies from black, red, grey and white or mixture. The body is covered with long straight hair. Although SG is the oldest local Egyptian goat, there is no available information about this breed (Galal *et al.*, 2002). Saidi breed herd was introduced to Animal Production Research Institute stations in 2014.

**Table 1:** Kidding seasons

	Mating season	kidding season	weaning
Winter kidding (WK)	June	November	February
Summer kidding (SK)	November	April	July

During the mating season, does were randomly divided into 3 groups. Each group was joined with a fertile buck for 45 days. At kidding, newborn kids were ear-tagged and weighed to record their birth weight. Kids were kept with their dams till weaning at the 12<sup>th</sup> week, and their weaning weight was recorded. Animals were housed in semi-open pens. Drinking water was provided twice daily in the early morning and late afternoon during the winter season, and three times daily during the summer months. Mineral blocks were available at all times.

Experimental animals were fed according to NRC (1981). They were fed on a concentrate feed mixture (0.5 to 1.0 kg/head/day) according to their physiological status.

Consequently, the aim of the current study was to characterize the productive and reproductive performance (conception rate, litter size, prolificacy, milk production, birth weight, weaning weight and kid mortality rate) of SG under Upper Egypt conditions.

## MATERIALS AND METHODS

The experiment was carried out in Mallawi Animal Production Research Station (27.7°N, 30.8°E), Minya Governorate, under the auspices of the Animal Production Research Institute (APRI), of the Agriculture Research Center (ARC), Ministry of Agriculture, Egypt.

A total of forty-nine mature does were involved in the study, comprising 18 does utilized for winter kidding, 20 for summer kidding and 11 for detection of oestrus. The does aged 1-1.5 years with an average weight of 21.6 kg. The does were mated for the first time during the study. The goat herd was managed under one mating season per year, allowing the doe to kid one time each year. Thus, one breeding and one kidding season existed as follows in Table (1):

During winter, the animals were provided with Egyptian clover ad-lib from December to May and during summer months, the Egyptian clover was replaced by clover hay. The concentrate feed mixture consists of 14% crude protein. Supplementary concentration feeding of about 0.250 kg/head was offered two weeks prior to the mating season for flushing the does, and also during the last two to four weeks of pregnancy and the first week of lactation.

### Detection of oestrus

Detection of oestrus occurrence was conducted using an apron buck twice daily at 08:00 am and 04:00 pm. The does were

subjected to buck teasing for 15 minutes each, and the does exhibited signs were recorded.

**The reproductive performance** of does was studied over two years, including two mating and two kidding seasons (summer and winter), to measure the reproductive performance of does, according to El-Moghazy *et al.* (2018).

**The conception rate for does** during the same parity was confirmed when goats did not return to heat post-mating season and was calculated as: number of gravid does / number of mated does  $\times$  100.

**Prolificacy** during the same parity was measured post-partum, for the goats and calculated as: total number of live kids born / number of does kidding  $\times$  100.

**The types of birth** were estimated by calculating the single birth rate during the same parity (number of does kidded single/total number of does kidded  $\times$  100) the twins birth rate (number of does kidded twins/total number of does kidded  $\times$  100) and the triplet birth rate (number of does kidded triplet/total number of does kidded  $\times$  100).

**Litter size** was assessed by the total number of kids born / number of does kidded.

**The sex of kids** was calculated as the number of born kids of a particular sex / total number of kids born  $\times$  100.

#### **Milk traits**

Data on milk yield was collected from November to May (winter season) and from April to August (summer season). The milk production of does was recorded weekly after kidding until drying. During the suckling period, milk yield was measured by the kid suckling weight differential technique (Economides, 1987). Kids were isolated from their dams at 5.00 pm, and then weighed in the next morning at 8.00 am. After that, they were allowed to suckle their dams until they were satisfied. The increase in kids' weight after each suckling was considered milk

consumption. Thereafter, the does were hand milked, to estimate the residual milk. The sum of suckled and residual milk represented the quantity of the morning milk yield. This step was repeated at 5.00 pm to evaluate the evening milk yield. The daily milk yield was calculated by adding the morning and the evening milk yields. Following weaning, does were hand milked twice a day at 8.00 am and at 5.00 pm. Does were considered dry when their daily milk yield dropped to 100 grams per day. Total milk yield was calculated as the sum of milk during the suckling and milking periods. The lactation period is calculated as the interval between the kidding date and the drying date.

#### **Statistical analysis**

All values collected were represented as mean  $\pm$  SE. Statistical assessment of significant differences among means was performed by one-way analysis of variance (ANOVA), followed by the Duncan post hoc test to allocate the significant differences among means. The SPSS/PC program (version 22.0 SPSS, 2013) was used.

## **RESULTS**

#### **Reproductive performance**

The data presented in Table (2) provide estimates of conception rate, prolificacy, birth type, litter size and the sex of kids in summer mating- winter kidding and winter mating- summer kidding. A significant difference ( $p < 0.01$ ) was found in the number of services per conception between summer mating (2.33) and winter mating (1.45). This indicates that the summer season is the least favorable period for mating. The conception rate in winter and summer mating reached 100 % in SG. Additionally, the abortion rate in summer mating was recorded at 11.1 %, which was higher than the 0 % observed in winter mating. A higher prolificacy was observed in the summer kidding (SK) group at 145 % compared to 87.5% in the winter kidding (WK) group. Goats that kidded in winter had fewer single births (25 %) and more twins (62.5 %) and triplets (12.5%).

However, in the SK, half of the kids were born as single, while the remaining were born as twins (35%) and triplets (15%). The average litter sizes were 1.88 and 1.65 for goats kidded in winter and summer,

respectively. The sex ratio indicated a higher ratio of females in winter and SK (56.7% in winter and 57.6% in SK) than males (43.3% in winter and 42.4% in SK).

**Table 2:** Conception rate, prolificacy, birth type of does, litter size and sexing kids in Saidi goats.

Parameter	Winter kidding	Summer kidding
<b>Conception rate</b>		
No. of does mated	18	20
No. of service per conception	2.33± 0.13 <sup>a</sup>	1.45± 0.17 <sup>b</sup>
No. of does gravid	18	20
Conception rate %	100	100
<b>Prolificacy</b>		
No. of does aborted	2	0
Abortion rate%	11.1	0
No. of does kidding	16	20
Total No. of kids born	30	33
No. of kids born alive	14	29
Prolificacy (No. of kids born alive/ No. of does kidding) %	87.5	145
<b>Birth type of does</b>		
No. of does borne single	4	10
Single rate %	25	50
No. of does born twins	10	7
Twins rate %	62.5	35
No. of does borne triple	2	3
Triple rate %	12.5	15
<b>Litter size</b>		
Litter size	1.88	1.65
<b>Sexing kids</b>		
No. of females	17	19
Females %	56.7	57.6
No. of males	13	14
Males %	43.3	42.4

### Oestrus cycle length and oestrus duration

Data on oestrus cycle length and oestrus duration throughout the seasons of the year (summer, autumn, winter and spring) in SG is shown in Table (3). The results showed a significant difference ( $p < 0.01$ ) in the length of the oestrus cycle among the different seasons. In general, the average length of the oestrus cycle of SG was 21.9 days. Oestrus duration showed no significant difference ( $p < 0.01$ ) among the four seasons, ranging from

30.55 hours in autumn and 35.79 hours in summer. The proportion of goats showed oestrus/ month was highest in the autumn (84.8%), while it was the lowest in the spring (42.4%). There was also a significant difference ( $p < 0.01$ ) in the number of oestrus cycles/ doe/ month. The highest number was in the autumn (1.7 cycles/ doe/ month) and the least was in the spring (0.64 cycles/ doe/ month).

**Table 3:** Oestrus cycle length and oestrus duration throughout the seasons of the year in Saidi goats.

Parameter	Summer	Autumn	Winter	Spring	Mean
Oestrus cycle length (day)	16.47± 2.87 <sup>b</sup>	18.27± 2.9 2 <sup>b</sup>	20.35± 3.89 <sup>b</sup>	37.55± 3.61 <sup>a</sup>	21.9
Oestrus duration (h)	35.79± 2.64	30.55± 2.69	31.74± 3.58	33.33± 3.32	32.85
% Goats showed oestrus	75.8± 13.2 <sup>a</sup>	84.8± 3.0 <sup>a</sup>	78.8± 10.9 <sup>a</sup>	42.4± 10.9 <sup>b</sup>	
No. of oestrus cycles/ doe/ month	1.54± 0.36 <sup>a</sup>	1.7± 0.12 <sup>a</sup>	1.27± 0.23 <sup>a</sup>	0.64± 0.14 <sup>b</sup>	

No. of the goats used in the experiment was 11 goats

### Productive performance

#### Birth weight and weaning weight

The data presented in Table (4) indicate that there were no significant differences ( $p < 0.01$ ) in birth weight, weaning weight and average daily gain from birth to weaning during the summer and WK seasons,

however, these measurements were slightly higher during the summer compared to the WK season. The birth weight of Saidi kids observed during the current study was 1.61 kg. Additionally, the finding suggests that sex had been shown to influence weight at birth, where male kids were heavier than females.

**Table 4:** Growth rate of kids in Saidi goats.

Parameter	Winter kidding	Summer kidding	Mean
<b>Birth weight (Kg)</b>			
Birth weight	1.57± 0.18	1.66± 0.12	1.61± 0.11
Male	1.74± 0.28	1.95± 0.20	1.89± 0.16
Female	1.38± 0.16	1.36± 0.17	1.37± 0.12
<b>Weaning weight (Kg)</b>			
Weaning weight	6.12± 0.54	6.99± 0.37	6.72± 0.33
Male	6.63± 0.59	7.75± 0.68	7.41± 0.51
Female	5.61± 0.51	6.13± 0.40	5.95± 0.31
<b>Average daily gain from birth to weaning (g)</b>			
Average daily gain from birth to weaning	50.05± 3.67	58.31± 4.22	55.70± 3.15
Male	54.35± 3.98	64.40± 7.13	61.39± 5.17
Female	45.74± 5.99	51.20± 3.00	49.38± 2.79

The weaning weight of Saidi kids at 3 months of age was 6.72 kg. Data in Table (4) shows that the mean weaning weight of male kids was higher than that of female kids. The overall average daily gain from birth to weaning of Saidi kids was 55.7 g/d. The daily growth rate of males from birth to weaning was greater than that of females.

#### The kid mortality rate in Saidi goats

Table (5) shows that the average kid mortality rate from birth to weaning in summer kidded kids was higher than that in winter. The mortality rate was higher in twins than in single-born kids. The mortality rate in females was higher than in males. All kids that died in winter were females born twins. In summer, 60% of the dead kids were females, while 40% were males.

**Table 5:** Mortality rate in kids from birth to weaning in Saidi goats

Parameter	Winter kidding	Summer kidding
<b>Mortality rate in kids from birth to weaning, %</b>		
Mortality rate in kids from birth to weaning	14.3	34.49
Single	0	10.34 (30%)
Twins	14.3 (100%)	20.7 (60%)
Triplet	0	3.45 (10%)
Male	0	13.79 (40%)
Female	14.3 (100%)	20.70 (60%)

### Milk production in Saidi goats

The data presented in Table (6) illustrate the effect of seasonal variations on daily milk yield, lactation length and total milk yield in SG. Those results show that daily milk yield did not differ significantly ( $p < 0.01$ ) between the winter and summer seasons. Goats that kidded in winter had a slightly higher daily milk yield (773.0 g/day/head) than those kidded in summer season (751.9 g/day/head).

Furthermore, there was a significant effect ( $p < 0.01$ ) of season on the lactation length. Lactation length in winter (162.0 days or 23.14 weeks) was longer than in summer (119.5 days or 17.07 weeks), which led to a significant ( $p < 0.01$ ) increase in total milk yield, with winter production reaching 126.9 kg/head, compared to 89.5 kg/head in the summer.

**Table 6:** Daily milk yield, lactation length and total milk yield in Saidi goats.

Parameter	Winter		Summer	
	Range	Average	Range	Average
Daily milk yield, g	481 - 1260	773.0± 73.5	554 - 946	751.9± 28.1
lactation length, d	126 - 175	162.0± 4.1 <sup>a</sup>	91 - 147	119.5± 4.4 <sup>b</sup>
Total milk yield, kg	80.9 – 220.2	126.9± 13.7 <sup>a</sup>	54.3 – 112.6	89.5± 4.0 <sup>b</sup>

## DISCUSSION

### Reproductive performance

In this investigation, the conception rate for winter and summer mating in Saidi goats was 100%. This result agreed with the results reported by El-Moghazy *et al.* (2018) in Zaraibi goats, but contrasted with the results found by Marai *et al.* (2006), which indicated that the summer mating season yielded the lowest conception rate in Suffolk sheep.

The abortion rate during the summer mating period was higher than that observed in the winter mating period. Hamed (2010) reported that the overall incidence of abortions in Zaraibi goats was 9.5%, with goats mated in the fall having a lower abortion rate compared with goats mated in the summer. Savasani *et al.* (2015) indicated that heat stress during pregnancy reduces the growth of the fetus, which may be attributed to the decreased uterine blood supply with limited nutrients and hormones supply to the fetus (Amundson *et al.*, 2006). Slow-growing embryos fail to signal pregnancy to the maternal organism in due time. Therefore, the endometrial prostaglandin F2alpha (PGF2 $\alpha$ ) secretion tends to increase during periods of heat stress, leading to luteolysis, thereby threatening the maintenance of pregnancy (Upadhyay and Ashutosh, 2009). A raise of 1.05 unit in the temperature-humidity index (THI) above 72,

during the peri-implantation period, especially during 21–30 days and up to 90 days of gestation, increases the chance of pregnancy losses (Torres-Júnior *et al.*, 2008).

A higher prolificacy was observed in SK, because the percentage of kids born alive in summer (87.9%) was higher than those born in winter (46.7%). El-Fouly *et al.* (1984) reported that in Rahmani sheep, the lambing rate increased slightly in winter compared to summer. However, Abdel-Hafez (2002) and Marai *et al.* (2004, 2006) observed that the lambing rate in Ossimi x Suffolk ewes was not significantly affected by breeding season (summer, autumn and winter) under sub-tropical conditions. Haider *et al.* (2014) reported a prolificacy of 175.07% and an average litter size of 1.75 in goats, which is quite comparable to prolific goat breeds worldwide, including Nubian, Pygmy, American Alpine, French Alpine, Saanen and Toggenburg with average litter sizes of 2.0, 1.9, 1.9, 1.7, 1.7 and 1.6, respectively (Amoah *et al.*, 1996). The sex ratio in winter and SK showed higher prevalence of females compared to males, aligning with the findings reported by El-Moghazy *et al.* (2018) regarding Zaraibi goats.

### Oestrus cycle length and oestrus duration

According to Aboul-Naga *et al.* (1987), the length of the oestrus cycle in Zaraibi goats

ranges from 15 to 24 days. Senger (2015) found that in goats, the length of the oestrus cycle is approximately 21 days, with variation between 18 and 24 days. Amir and Volcani (1965) observed decreased oestrus activity during the spring season in Awassi sheep. Senger (2015) noted that the average duration of oestrus is 36 hours, with an average of 12 to 48 hours, depending on the breed and environmental factors, such as the presence of a buck and the season. Ovulation tends to occur toward the end of oestrus, although it may occur anywhere from 9 to 72 hours after the onset of oestrus (Senger, 2015). Goats are referred to as short-day breeders because they exhibit peak sexual activity throughout the autumn months. Longer nights in autumn and winter months lead to increased melatonin production from the pineal gland in the brain. Melatonin stimulates the release of GnRH from the hypothalamus, initiating the course of hormones involved in the oestrus cycle. When daylight begins to increase and nights become shorter, less melatonin is produced. A decrease in melatonin corresponds with a decrease in GnRH. Consequently, the oestrus cycle becomes irregular or ceases until autumn occurs again (Senger, 2015).

### **Productive performance**

#### **Birth weight and weaning weight**

Kamal (2008) stated that in Sudanese Nubian goat kids, the heaviest kids were kidded at summer, while the lightest kids were delivered at winter. The results indicated that giving birth during the summer season produced kids with a higher birth weight compared to those born in the winter. It could refer to the availability of green forages during the pregnancy period. Hossion *et al.* (2004) found that the birth weight of kids of Black Bengal goats was 1.52 kg. Abd-Allah *et al.* (2015) found that the average birth weight of Baladi kids was 1.94 kg. These results agreed with the findings of Castillo *et al.* (1976) for Anglo-Nubian, Alpine, Toggenburg and Saanen goats, as well as Tewfik (1997) for Sudanese Nubian goats. It has been established that sex influences birth weight, with males heavier than females. This

may be attributed to the effect of male sex hormones, as stated by Hafez (1962).

To reduce the mortality of goat kids and adults, and to promote good growth, it is necessary to ensure the birth of healthy kids, with good birth weight (Soundararajan *et al.*, 2006). Also, they observed that in Tamil Nadu goats, heavier does at the time of kidding tended to produce heavier kids at birth than lighter does, and also provided a better maternal environment for fetal growth. Also, pregnant does weighing below 20 kg gave birth to kids averaging 1.70 kg, while does weighing 21-30 kg and 31-40 kg produced kids weighing 2.00 kg and 2.01 kg, respectively. In Saudi Arabia, a study on Arrdi goats (Al-Shaikh and Mogawer, 2001), confirmed that dam's weight had a significant influence on birth weight and weight gain during the weaning period of the kid. The weight of kids at birth influenced their growth and the daily weight gain until weaning.

The overall average daily gain of Saidi kids from birth to weaning was 55.7 g/d. The daily growth rate of males from birth to weaning was greater than that of females. This result agreed with the finding of Abd-Allah *et al.* (2015) who found that the average daily gain of Baladi kids from birth to weaning was 56.45 g/d. Sodiq *et al.* (2015) found that the average male and female weaning weights reached 10.72 and 9.39 kg, and daily growth gain of 71.63 and 62.21 g, respectively in Kacang goat. The maximum growth occurred during the pre-weaning stage, primarily due to the supplementary feeding of the dam, plus other factors such as the kidding season and type of birth and the sex of the kid, which all had a significant effect on body weight at different ages (Thiruvankadan *et al.*, 2009).

#### **Kid mortality rate in Saidi goats**

The kid mortality rate from birth to weaning in summer kidded kids was higher than those kidded in winter. This is contrary to the findings of Shalash *et al.* (1970), who reported an average mortality rate in Baladi goats of 41.0% in winter and 6.4% in spring. Additionally, the mortality rate among female

kids was higher than that of males. Kid mortality of Black Bengal goats was influenced by the weight of doe, parity, birth weight, milk yield, season, feeding, housing and disease, and could be as low as 7.0 % if properly managed (Chowdhury *et al.*, 2002). The mortality rate was higher in twins than in single-born kids. Husain (1999) found that the kid mortality rate was 17%, which increased with the litter size. In Baladi goats, the mortality rate of kids from birth to weaning reached 25, 62, 86 and 62% for single, twin, triplet and quadruplet born, respectively (Tantawy and Ahmed, 1960). In indigenous goats in Ethiopia, the kid mortality rate reached 50% with the highest losses before weaning (Dereje *et al.*, 2015).

### Milk production in Saidi goats

Milk production in Saidi goats demonstrates notable seasonal variations. Total milk yield in winter was 126.9 kg/head over a lactation period of 162.0 days or 23.14 weeks and 89.5 kg/head in summer, with a shorter lactation duration of 119.5 days or 17.07 weeks. Aboul-Naga *et al.* (1987) found that in Barki goats the lactation length was 20.8 weeks (9-27 weeks), and the total milk yield was 81.5 kg (38.9 to 147.3 kg). In Zairaibi goats, the total milk yield was 103.3 kg with a lactation duration of 22.9 weeks. Additionally, Ashmawy (1982) reported that Baladi does produced 111.0 kg of milk when giving birth to a single kid while those with twin birth yielded 147.3 kg in 30 weeks of lactation.

### CONCLUSION

Saidi goats are small goat breeds with good productive and reproductive performance. It has a good ability to reproduce all through the year, with high prolificacy and growth rates. Their milk production is adequate to nourish their offspring in addition to a significant surplus. Characterization of Saidi goat breed requires more research and studies.

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## توصيف الأداء الإنتاجي والتناسلي للماعز الصعيدى في مصر

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تم إجراء الدراسة لتوصيف الأداء الإنتاجي والتناسلي للماعز الصعيدى في ظل ظروف صعيد مصر. استخدم في الدراسة عدد تسعة وأربعون عنزة تتراوح أعمارهم بين 1-1,5 سنة ووزنهم في المتوسط 21,6 كجم. وجد فرق معنوي ( $p < 0.01$ ) في عدد التلقيحات اللازمة للحمل بين موسم التلقيح الصيفي (2,33) و الشتوي (1,45). كانت نسبة الخصوبة خلال موسمي التلقيح الشتوي والصيفي 100%. كان معدل الإجهاض (11,1 و 0%) خلال موسمي التلقيح الصيفي والشتوي، علي التوالي. كانت نسبة التوأمية (14,5%) في موسم الولادة الصيفي (87,5%) في موسم الولادة الشتوي. كان حجم الخلفة 1,88 و 1,65 للعنزة خلال موسمي ولادة الشتاء والصيف، علي التوالي. كان هناك فرق معنوي ( $p < 0.01$ ) في طول دورة الشبق على مدى فصول السنة الأربعة، و كان متوسط طول دورة الشبق في الماعز الصعيدى 21.9 يوماً. لا يوجد فرق معنوي على مدى الفصول الأربعة في مدة الشبق. متوسط وزن الميلاد لجداء الصعيدى المولودة 1,61 كجم، و كان وزن الميلاد للذكور أثقل من الإناث. متوسط وزن الفطام للجداء 6,72 كجم. متوسط نسبة نفوق الجداء من الولادة إلى الفطام (34,5%) و (14,3%) للجداء المولودة صيفاً و شتاءً، علي التوالي. يوجد تأثير معنوي للموسم ( $p < 0.01$ ) علي طول موسم الحليب (حيث كان 162 و 119,5 يوم خلال موسمي الشتاء والصيف، علي التوالي)، مما أدى إلى زيادة معنوية في إجمالي إنتاج اللبن خلال موسم الحليب الشتوي (126,9 كجم / رأس) مقارنة بالصيفي (89,5 كجم / رأس).

**الكلمات المفتاحية:** الماعز الصعيدى ، الخصوبة ، الشبق ، الوزن عند الميلاد ، إنتاج اللبن