

## EFFECT OF DIFFERENT PARITY TYPES ON REPRODUCTIVE PERFORMANCE OF DAIRY ZARAIBI GOATS

\*El-Moghazy, M. M., \*\*Khalifa, E. I. and \*\*Rasha, A. E. Hawas

\*Animal Production Department, Faculty of Agriculture, Domietta University, Egypt.

\*\*Animal Production Research Institute, Department of Sheep and Goats Research,

Ministry of Agriculture, Dokki, Giza, Egypt.

Correspondence author: [xyezz@yahoo.com](mailto:xyezz@yahoo.com)

### ABSTRACT

The main objective of this study was to assess the influence of parity types on reproductive efficiency of dairy Zaraibi goats. The conception rate, prolificacy, birth types, litter size, sexing of kids, gestation length, kidding interval, oestrus resumption and body weight of kids born were used as source to evaluate reproductive performance. Twenty-one dairy Zaraibi goats of different parities, 1<sup>st</sup>, 3<sup>rd</sup> and 5<sup>th</sup>, were used in this study (7 goats / parity). All goats had body weight ranged from 26.00 to 42.00 kg and age from 19 and 67 months. During the study period, all goats received feedstuffs, veterinary care and kept under the same environmental condition. The results indicated that different reproductive characteristics of dairy Zaraibi goats were recorded through 1<sup>st</sup>, 3<sup>rd</sup> and 5<sup>th</sup> parity. Conception rate showed similar results among 1<sup>st</sup>, 3<sup>rd</sup> and 5<sup>th</sup> parity. Estimation of prolificacy in the 3<sup>rd</sup> and 5<sup>th</sup> parity was greater as it reached 185.71 and 185.71% than shown in 1<sup>st</sup> parity (157.14 %). The birth types showed higher triplet rate in 3<sup>rd</sup> (28.57%) and 5<sup>th</sup> (14.29%) parity than in 1<sup>st</sup> parity (00.00%). Improvement of litter size was noticed in 3<sup>rd</sup> parity (2.29) following by 5<sup>th</sup> (2.14) compared to 1<sup>st</sup> parity (1.71). Sex ratio of female : male kids born was found to be 66.67:33.33, 37.50: 62.50 and 60.00:40.00 % in the 1<sup>st</sup>, 3<sup>rd</sup> and 5<sup>th</sup> parity, respectively. The average gestation length, kidding interval and oestrus resumption and duration also recorded significant difference ( $P < 0.05$ ) among parity types. Since, gestation length were 149.29, 145.86 and 143.29 days, kidding interval were 0.00, 350.29 and 365.71 days, oestrus resumption were 48.57, 37.14 and 36.71 days and estrus duration were 30.57, 37.29 and 38.14 hrs in 1<sup>st</sup>, 3<sup>rd</sup> and 5<sup>th</sup> parities, respectively. The average total birth weight (female plus male kids), birth weight of female kids and birth weight of twins significantly differed ( $P < 0.05$ ) among studied parities. Meanwhile, other weights, as weaning weight of kids in 3<sup>rd</sup> and 5<sup>th</sup> parity recorded better ( $P > 0.05$ ) weight than kids in 1<sup>st</sup> parity except single weaning weight of kids in 1<sup>st</sup> parity. It could conclude that reproductive performance of dairy Zaraibi goats is better in 3<sup>rd</sup> parity followed by 5<sup>th</sup> parity then 1<sup>st</sup> parity. There is a tendency for improvement of reproductive parameters of dairy Zaraibi goats by advance of age up to 5<sup>th</sup> parity. Hence, the 3<sup>rd</sup> parity proved potential reproductive life for dairy goats and could be achieved with good breeding plan and ameliorated management programs.

**Keywords:** Dairy goats, different parity, reproductive performance.

### INTRODUCTION

Reproductive performance of dairy goats is very important for production of kids, milk yield, skin, hair and in particular meat production. Hence, reproductive performance depends on adult body weight of nanny goats which influences growth, production pattern and has clear impact on the growth behavior of kids. The reproductive efficiency of goats based on some parameters, such as breed, season, nutritional stats, weight at mating and

parturition, gestation length, conception rate, type of birth, number of live born kids, mass of kids at birth or weaning, kidding interval and duration of reproduction cycle. Previously, reproductive performance was evaluated by traits like; age at first kidding, kidding interval, litter size, fecundity and prolificacy (Mellado *et al.*, 2008). In this context, Činkulov *et al.* (2009) reported that the main reproductive parameters in goats at 1<sup>st</sup> parity include age at mating and first kidding (days), gestation length

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(days), number of kids /litter (%), birth weight of kids (kg) and weaning weight of kids (kg) which reached 242.00, 398.10, 151.60, 1.96, 23.38 and 18.89, respectively. In addition, Faruque *et al.* (2010) pointed out that within 1<sup>st</sup>, 3<sup>rd</sup> and 5<sup>th</sup> parities of Black Bengal goats heat period were 32.31, 24.97 and 19.21 days, kidding interval were 0.00, 189.93, 189.29 days, gestation length were 146.05, 145.42 and 142.11 days, male kid birth weight were 1.14, 1.19 and 1.58 kg, female kid birth weight were 1.04, 1.16 and 1.41 kg, weight at weaning were 15.06, 21.56 and 28.98 kg and litter size were 1.28, 1.93 and 2.21%, respectively. Meanwhile, Paul *et al.* (2014) measured birth weight of kids; 1.07, 1.09 and 1.16 kg and litter size 1.50, 1.47 and 1.81% at 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> parities, respectively for Black Bengal goat. Furthermore, Halder *et al.* (2014) concluded that litter size reached to 1.60 with parity (number) <2.31, while it was 1.95 with parity (number) >2.31 for Black Bengal goats. Finding of Hasan *et al.* (2014) showed that total litter size under semi-intensive condition were 1.06, 1.76 and 1.96 while; were 1.01, 1.62 and 1.75 under extensive condition in first, second and third parities which confirm that reproductive performances were better in 3<sup>rd</sup> parity than 1<sup>st</sup> and 2<sup>nd</sup> parity. Also, the same authors defined that first parity gave birth weight (single) up to 1.86 and 1.57 kg, birth weight (triplet) 1.41 and 1.34 kg, birth weight (multifarious) reached 1.18 and 1.06 kg while, the second parity birth weight (single) up to 1.66 and 1.42 kg, birth weight (triplet) 1.28 and 1.23 kg, birth weight (multifarious) reached 1.09 and 0.96 kg for male and female kids, respectively. According to, Miah *et al.* (2016) the gestation length was 146.76, 148.46, 148.29 and 148.46 days, post-partum heat was 41.61, 34.03, 33.78 and 31.57 days and kidding interval was up to 0.00, 185.97, 186.50 and 187.49 days during 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> parities for Black Bengal goats, respectively. Moreover, the later authors worked on Jamnapari goats and recorded that gestation length was 149.69, 151.42, 151.25 and 151.42 days, post-partum heat was 69.17, 61.59, 61.34 and 59.13 days and kidding interval was up to 0.00, 198.88, 199.41 and 200.40 days through 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> parities,

respectively. On the contrary, Talukder *et al.* (2016) noticed non-significant differences in gestation length (151.00, 143.57 and 156.00 days), kidding to first heat (37.76, 24.71 and 42.10 days), kidding to conception (28.93, 38.28 and 34.83 days) and kidding interval (174.88, 182.80 and 172.00 days) through parities 1, 2 and 3, respectively. Generally, Msalya *et al.* (2017) explained that reproductive efficiency of dairy Norwegian goats determined by age at first kidding, kidding interval, type of birth, litter size and mass of kids at birth and weaning. These authors established significant difference among nanny goats in 1<sup>st</sup>, 3<sup>rd</sup> and 5<sup>th</sup> parities in birth weight (3.11, 3.32 and 3.70 kg) and weaning weight (12.78, 13.15 and 13.26 kg), respectively. For local dairy goats such as Zaraibi goats there is little information about effect of early, mid and late parity on the reproductive performance under Egyptian conditions.

Therefore, this research was intended to study reproductive efficiency achieved within three parities (1<sup>st</sup>, 3<sup>rd</sup> and 5<sup>th</sup>) to find out the suitable parity under local farming system in Egypt.

## MATERIALS AND METHODS

### Studied region

This study was carried out from October 2015 to May 2016 at El- Serw Agriculture Research Station belonging to Animal Production Research Institute (APRI) and locate in Domietta governorate.

### Housing of nanny goats

The goats were kept in a pen as one group, throughout the experiment. The pen measures 6.5 × 6.5 × 3.6 meters, the roof constructed of corrugated asbestos sheets and the floor of concrete. The pen equipped with feeding lines and basin for fresh water supply.

### Experimental Animals

A total of twenty-one Zaraibi nanny goats with body weight ranged from 26.00 to 42.00 kg and ages of 19 to 67 months. The goats were in their 1<sup>st</sup>, 3<sup>rd</sup> and 5<sup>th</sup> parities (n=7 goats / parity). The mating season started from first October 2015 up to mid November 2015.

### Feed intakes and rearing system

Eight hundred grams of concentrate feed mixture (CFM) was offered daily per goats at 8 am, fresh berseem (FB) was available during autumn and winter up to two kg, corn silage (CS) up to 1.5 kg during spring and summer and rice straw (RS) offered *ad libitum* during all

seasons according to NRC (2007). The fresh water and minerals blocks were allowed throughout the experimental period. The chemical composition was measured according to AOAC (2007) protocol. The chemical analysis of feedstuffs is shown in Table (1).

**Table 1: Chemical analysis of feedstuffs, on dry matter base, %.**

Contents %	Analysis of ingredients feedstuff			
	CFM	Fresh berseem (FB)	Corn silage (CS)	Rice straws (RS)
Organic matter (OM)	93.85	84.45	88.43	80.33
Crude protein (CP)	15.05	17.51	9.35	3.08
Crude fiber (CF)	16.11	26.13	26.29	36.88
Ether extract (EE)	3.45	1.21	3.11	1.49
Nitrogen free extract (NFE)	59.24	39.60	49.68	38.78
Ash	6.15	15.55	11.57	19.77
*ME= metabolic energy	3213.95	3166.56	3169.06	3117.76

\*ME= metabolic energy (k cal/ kg DM), it determined by the formula  $(3260+0.455 \times CP+3.517 \times EE-4.037 \times CF)$  according to Canbolat and Karabulut (2010).

### Experimental procedures

The basic traits used to measure the reproductive performances, including physiological descriptions of goat maternal and body weight of new kids are as follow;

#### Physiological description of goat maternal

**Conception rate** during the same parity confirmed when goats not return to heat post-mating season and calculated as: number of nanny goats gravid / number of mated nanny goats.

**Prolificacy** during the same parity measured post-partum for goats and calculated as: total number of live kids born / number of nanny goats kidded.

**Birth types** calculated as single birth rate during the same parity (number of nanny goats kidding single/ total number of nanny goats kidded), twins birth rate in same parity (number of nanny goats kidding twins/ total number of nanny goats kidded) and triplet birth rate in same parity (number of nanny goats kidded triplet / total number of nanny goats kidded).

**Litter size** during the same parity calculated as number of totals born kids /number of nanny goats kidded.

**Sex of kids** produced during the same parity calculated as number of born kids in particular sex / total number of kids born.

**Gestation length** measured as the time in days required from last mating (conception) until parturition.

**Kidding interval** measured as the date of one kidding to the date of next kidding. **Oestrus resumption** is the period between kidding and the occurrence of the first oestrus. It observed one week after partum and during suckling days (90 days) using teaser belly goat. The oestrous cycle observed twice daily at 12 hours interval and one hour for monitoring. The nanny goats experiencing oestrus walk near the fence or increased vocalizations for the teaser. They stand and allow teaser to mount (oestrous duration).

#### Body weight of new kids

The birth weights of new kids measured soon after cleaned and dried. The kids weighed with an electric digital balance. The newly born kids reared with their dams in kidding pens for

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individual care for 3 days after kidding. Then, dams and kids relocated in care pens; kids suckled their mothers beside *ad libitum* feeding of greenish succulent fodder and creep on mixture from the age of one month. Subsequent body weights of kids were recorded monthly up to three months, the date of weaning.

### Statistical Analysis

All values collected were expressed as mean  $\pm$  SE. Statistical evaluation 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 computer program (Version 22.0 SPSS, 2013) was used.

## RESULTS AND DISCUSSION

### Reproductive parameters

Data presented in Table (2) provides estimates of conception rate, prolificacy, birth type, litter size and sex of kids within different parities.

It was observed that no-significant difference between conception rate among parities. According to, Mat *et al.* (2015) no significant difference noticed among parities in conception rate for Saanen crossbred goats. However, Paul *et al.* (2014) found oppositely that parity had significant ( $P < 0.01$ ) effect on age at first conception for Black Bengal goats.

In term of prolificacy, a higher prolificacy observed in 3<sup>rd</sup> (185.71%) and 5<sup>th</sup> (185.71) parity than 1<sup>st</sup> (157.14%) parity. Similarly, Haldar *et al.* (2014) reported positive correlation between parity and multiple births (prolificacy) for Black Bengal goats. In earlier study, Mellado *et al.*, (1991) reported that prolificacy was higher in goats with more than two parities and also, defined that variation in prolificacy accounted was small which reached 7%, but proved significant values ( $P < 0.05$ ) for parity. Also, Hossion *et al.* (2004) observed that parity 1, 2 and 3 have significant effect on prolificacy; that estimated by 108, 176 and 196%, respectively. In addition, Akpa *et al.*, (2011) reported that prolificacy of goats tended to increase with advance of parity. They also reported lower prolificacy for primiparous goats (first mating) which may be associated with developing status of the reproductive features required for

successive litter bearing compared with those of multiparous goats reached physiological maturity.

The calculation of birth types in different parities presented in Table (2) and shows parity as a major factor influencing birth types of Zaraibi goats. The present result indicated that no goats carried single fetuses in 3<sup>rd</sup> and 5<sup>th</sup> parity while bearing single fetus occurred in 1<sup>st</sup> parity. Similarly, earlier reports stated that parity significantly influenced birth types of Barbari kids (Bharathidhasan *et al.*, 2009). The current results are supported by Hagan *et al.* (2014) who recorded that parity types such as 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup> and 6<sup>th</sup> had significantly influencing birth types, being 1.52, 1.99, 2.19, 2.43, 2.42 and 2.34, respectively. At all event, Miah *et al.* (2016) reported that goats  $\geq$  parity 2 had less single kid and more twins and triplet.

Accordingly, high litter sizes have positive correlation with different stage of goats' parity. The present results showed that litter size was 1.71, 2.29 and 2.14 for goats reached parity 1, 3 and 5, respectively. This is comparable to the earlier observation of Mellado *et al.* (1991) who summarized that mean litter size for first, second, third and fourth parities were 1.5, 1.5, 1.8 and 1.8 kids. However, Hossion *et al.* (2004) determined non-significant difference in values of litter size between 2<sup>nd</sup> (1.76) and 3<sup>rd</sup> (1.96) parity compared to values in 1<sup>st</sup> parity (1.08). In confirmation, litter size of first-parity was significantly smaller ( $P < 0.05$ ) than in subsequent parities (Baiden, 2007). The findings of current study are in accordance with the results reported by Akpa *et al.* (2011) who indicated significant changes in litter size ( $P < 0.01$ ), that was positively correlated with parity ( $r = 0.49$ ) as it tended to increase from first to fifth parity while reduced in the sixth parity. They highlighted that twinning declined up to parity 2, then increasing up to parity 6 where the peak at parity 3. In addition, the present findings are in general agreement with that proven on Black Bengal goat under semi-intensive and extensive conditions (Haldar *et al.*, 2014). Paul *et al.* (2014) also reported that litter size increased significantly ( $P < 0.01$ ) as parity progress.

With respect to sex ratio, the number of male kids in 1<sup>st</sup> and 5<sup>th</sup> parity was found to be smaller with an exception in 3<sup>rd</sup> parity (Table 2). Polák *et al.* (2015) confirmed that sex ratio in 3<sup>rd</sup> showed higher males' offspring (1.73) than females (1.27). Meanwhile, Tölü *et al.* (2007)

concluded that the male progeny ratio ranged from 50.4% to 73.8% and affected by parity types. The same authors explained that maternal production of several male progeny, increased the chance that some of these males will reproduce, thus will have a great contribution on flock performance than any female progeny.

Otherwise, the mating season under this study (autumn vs. winter) affect kids' gender, especially in 3<sup>rd</sup> parity to produce more male kids. This is in accordance with Kharkar *et al.* (2017) who mentioned that percentage of male was higher in winter than summer season with a maximum of 60.14% during winter season.

**Table 2: Conception rate, prolificacy, birth type, litter size and kids' sex as affected by parity**

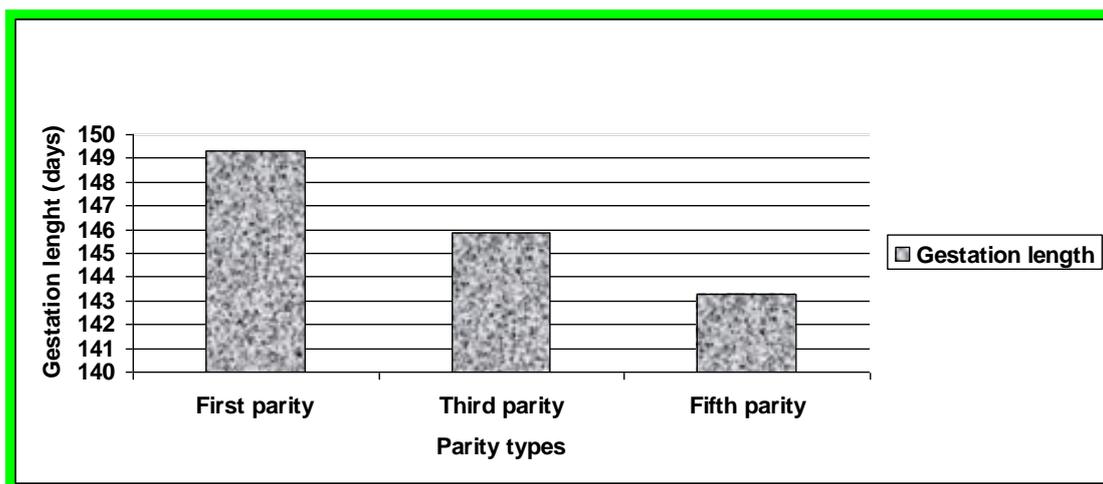
Parameters	Parity types		
	1 <sup>st</sup> parity	3 <sup>rd</sup> parity	5 <sup>th</sup> parity
<b>Conception rate</b>			
No. of nanny goats mated	7.00	7.00	7.00
No. of nanny goat gravid	7.00	7.00	7.00
Conception rate, %	100.00	100.00	100.00
<b>Prolificacy</b>			
No. of nanny goat kidding	7.00	7.00	7.00
Total No. of kids born	12	16	15
No. of a live kids at birth	11	13	13
Prolificacy,%	157.14	185.71	185.71
<b>Birth type of nanny goats</b>			
No. of nanny goat born single	2	-	-
Single rate, %	28.57	-	-
No. of nanny goat born twins	5	5	6
Twins rate, %	71.43	71.43	85.71
No. of nanny goat born triple	-	2	1
triplet rate, %	-	28.57	14.29
<b>Litter size</b>			
Litter size	1.71	2.29	2.14
<b>Sexing kids</b>			
Female sexing	8	6	9
Female ,%	66.67	37.50	60.00
Male sexing	4	10	6
Male, %	33.33	62.50	40.00

**Gestation length**

The average gestation period of dairy Zaraibi goats in different parities was 146.14 days in present study (Figure 1). The gestation length had different durations (P<0.05) in different parities. It reached 149.29, 145.86 and 143.29 days in the first, third and fifth parity, respectively. These results is similar to the observation of Mellado *et al.* (2000) who noticed fast reduction in gestation length as parity progress. being 151.3, 150.6 and 149.9 days for 1st, 2nd and > 7th kidding, respectively. This trend was supported by, Hoque *et al.* (2002) who mentioned that parity significantly affected (P<0.05) gestation length,

hence, the shortest gestation length was 144.9 days in 5<sup>th</sup> parity, 145.4 in the 3<sup>rd</sup> parity, whereas; the longest was 148.0 in 2<sup>nd</sup> parity. Contrarily, Hossion *et al.* (2004) found that parity 1, 2 and 3 had not significantly affect the gestation period, as it reached 148, 147 and 148 days, respectively. Miah *et al.* (2016) similarly found on Black Bengal and Jamnapari goats thatt gestation period not significantly differ among parity types, being shorter (P>0.05) in 1<sup>st</sup> parity (146.7 days) compared with 4<sup>th</sup> parity (148.46 days) in Black Bengal goats as well as 149.69 and 151.42 days in Jamnapari goat, respectively.

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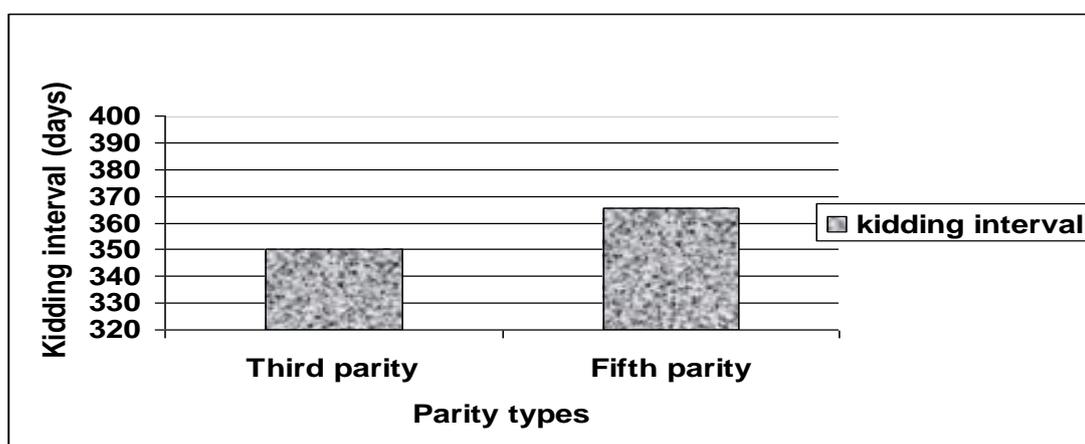


**Figure 1: Gestation length as affected by parity types**

### Kidding interval

Kidding interval as affected by different parities is shown in Figure (2). In this trial the effect of parity types on kidding interval was significantly higher ( $P < 0.05$ ) in fifth parity (365.71 days) than third parity (350.29 days). They result are in close agreements with those reported by Odubote (1996) who observed significant effects of parity on kidding interval in West African Dwarf goats. In the present results, kidding interval was increased in fever to the oldest parity compared to the youngest

parity. Similarly, Faruque *et al.* (2010) reported that kidding intervals were 195.41 and 158.50 days in 2<sup>nd</sup> and 7<sup>th</sup> parity, respectively. Furthermore, Miah *et al.* (2016) indicated that within 2<sup>nd</sup> and 4<sup>th</sup> parities, kidding interval was up to 185.97 and 187.49 days for Black Bengal goat, while was 199.88 and 200.40 days in Jamnapari goats, respectively. According to Hossion *et al.* (2004), goats in 2<sup>nd</sup> and 3<sup>rd</sup> parity obtained significant difference in kidding interval, 199.36 and 186.84 days, respectively.



**Figure 2: Kidding interval as affected by parity types**

### Oestrus resumption and oestrus duration

The effect of parity types on oestrus resumption and oestrus duration of dairy Zaraibi goats are shown in Table (3). In case of parity types, the average post-partum heat period and duration of heat found to be significantly differed ( $P < 0.05$ ) among 1<sup>st</sup>, 3<sup>rd</sup> and 5<sup>th</sup> parities. The longest days of oestrus

resumption and the shortest oestrus duration were noticed with first parity compared with third and fifth parities. As well, Hossion *et al.* (2004) summarized that post-partum heat period of goat were 48, 43 and 38 days for 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> parity, respectively. Furthermore, Faruque *et al.* (2010) suggested that goats in 1<sup>st</sup>, 3<sup>rd</sup>, 5<sup>th</sup> and 6<sup>th</sup> parities showed oestrus resumption at days

32.21, 24.97, 19.21 and 20.08, respectively. The interval between parturition and the first post-partum estrus is an important trait which contributes to the reproductive and productive efficiency of nanny goats. Kunbhar *et al.* (2016) reported similarly that involution of the post-partum uterus was one of the economic important limitations in achieving the goal of suitable kidding interval. In the present study, a decreasing trend was observed with advance of parity, since increased in 1<sup>st</sup> parity which nearly 11 days compared to 3<sup>rd</sup> and 5<sup>th</sup> parities. The present observation is close to that found by Deribe and Taye (2014) who revealed that the first post-partum estrus period decreased for goats older than 3 years. The findings of current study are comparable with Black Bengal and Jamnapari goats studied by Miah *et al.* (2016). They noticed significant decrease in post-partum heat period with progress of parity from 1<sup>st</sup> to 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup>, being 41.61, 34.03, 33.78 and 31.57 days in Black Bengal goats while, it was 69.17, 61.59, 61.34 and 59.13 days in Jamnapari goats, respectively. Interestingly, suckling stimulus may have an important effect on displaying the first post-partum period. Also, resumption of ovarian cyclic activity in goat is very susceptible to external factors, such as season, suckling and the presence of male. These reported results were at par with the

findings of Badawi *et al.* (2014) who reported uterine involution in Nubian goats where maximum uterine diameter occurred in day 3 and uterine lumen became minimum in day 31 post-partum hence, more than 50% of uterine involution occurred between days 3 and 14 post-partum. In addition, the same authors defined that the maximum (0.87 ng / mL) and minimum (0.54±0.2 ng / mL) plasma progesterone (P4) levels were measured at day 27 and day 7 post-partum, respectively.

Regarding the oestrus duration, the change in physic behavior of female is due to the hormonal influence on reproductive system. Factually, the dominant hormone is estrogen in estrus stage; that produced by mature follicles and progesterone by developed corpus luteum (CL) during cycle for goats. Estrus period duration varies from 22 to 60 hrs. in Boar goats (Bukar *et al.*, 2012), from 31 to 38 hrs. in Zaraibi goats (Khalifa *et al.*, 2014) and from 16 to 32 hrs. in Kamohri goats (Kunbhar *et al.*, 2016). A significant difference was detected between the different parities in the mean duration of oestrus cycle, as Mat *et al.*, (2015) revealed that primiparous goats (first parturition) presented a lower length of estrus time (hrs.) when compared to multiparous goats.

**Table 3: Oestrus resumption and oestrus duration as affected by parity types**

Specification	Parity types		
	1 <sup>st</sup> parity	3 <sup>rd</sup> parity	5 <sup>th</sup> parity
Oestrus resumption, days	48.57±0.37 <sup>a</sup>	37.14±0.80 <sup>b</sup>	36.71±0.68 <sup>b</sup>
Oestrus duration, hours	30.57±0.65 <sup>b</sup>	37.29±0.64 <sup>a</sup>	38.14±0.63 <sup>a</sup>

Mean values bearing different superscript at the same horizontal direction differ significantly ( $P < 0.05$ ).

### Body weight of new kids

Birth weight, weaning weight and weight gain of kids in different parities can be seen in Table (4). The data analysis indicated that the effect of parity on birth weight had significantly ( $P < 0.05$ ) higher values in 3<sup>rd</sup> (1.69g) and 5<sup>th</sup> (1.80g) parity than 1<sup>st</sup> parity (1.42g). Meanwhile, other parameters as weaning weight and weight gain improved in 3<sup>rd</sup> and 5<sup>th</sup> parity compared to 1<sup>st</sup> parity, but without significance. As well, Bharathidhasan *et al.* (2009) observed that birth weight tended to increase in second parity (2.04 kg) compared to first parity (1.88kg). Also, the

same authors reported that advance of parity accompanied with higher weaning weight (7.25 kg) and weight gain (58.69g) in second parity than first parity (6.61kg and 52.42g, respectively). According to, Mahal *et al.* (2013), birth weight increased with movement to old parity then, the highest birth weight was significantly indicated with 4<sup>th</sup> (1.5 kg) and 3<sup>rd</sup> (1.3 kg) parity, but the lowest was in 1<sup>st</sup> parity (1.1 kg), and thus the difference in birth weight between 1<sup>st</sup> and 2<sup>nd</sup> parity was not significant. Hagan *et al.* (2014) found that birth weight of parity at 1<sup>st</sup>, 5<sup>th</sup> and 6<sup>th</sup>

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parity were 1.20, 1.24 and 1.25kg, respectively, without significant differ among late parity.

**Table 4: Birth weight, weaning weight and weight gain as affected by parity types**

Specification	Parity types		
	1 <sup>st</sup> parity	3 <sup>rd</sup> parity	5 <sup>th</sup> parity
<b>Birth weight, kg</b>	1.42±0.07 <sup>b</sup>	1.69±0.08 <sup>a</sup>	1.80±0.07 <sup>a</sup>
<b>Weaning weight, kg</b>	9.50±0.64	9.91±0.53	10.15±0.39
<b>Weight gain, g</b>	88.89±7.08	91.41±5.62	92.31±4.69

*Mean values bearing different superscript at the same horizontal direction differ significantly (P<0.05).*

Birth weight and weaning weight of male and female kids, as affected by parity types, are shown in Table (5). The birth weight of male and female gradually increased by development of parity from 3<sup>rd</sup> to 5<sup>th</sup> compared to 1<sup>st</sup> parity. These values are concurred with the earlier results reported by Hossion *et al.* (2004) who found that overall birth weight of kids was 1.04, 1.52 and 1.49 in parity 1, 2 and 3, respectively. Conversely to this study, birth weight of female kids was significantly higher (P<0.05) in 5<sup>th</sup> parity than 3<sup>rd</sup> and 1<sup>st</sup> parity. Results of the present study agree with the finding of Snyman (2010) who reported that female kids had higher survivability than male kids. In earlier study by Baiden (2007), they noticed that sex and parity of goats had no significant (P>0.05) effect on birth weight of kids. Recently, Sodiq *et al.* (2015) found that the average male and female

birth weight were 2.18 and 2.02 kg, weaning weight reached 10.72 and 9.39 kg and growth gain 71.63 and 62.21 g/d, respectively. Defendingly, Talukder *et al.* (2016) found that birth weight of male kids (1.25 kg) was higher than that of female kids (1.13 kg) and also confirmed that birth weight of male and female kids was affected by parity. The present results indicated similarity of weaning weight of kids in 1<sup>st</sup> and 3<sup>rd</sup> parity. Meanwhile, weaning weight of male kids showed improvement in 5<sup>th</sup> parity without significant difference compared to 1st and 3rd parities. The non-significant effect of parity on weaning weight in this study concord to the report by Bharathidhasan *et al.* (2009) and Snyman (2010) who revealed that the effect of sex on weaning survivability was similar for both sexes.

**Table 5: Sex weight of kids as affected by parity types**

Specification	Sex of kids	Parity types		
		1 <sup>st</sup> parity	3 <sup>rd</sup> parity	5 <sup>th</sup> parity
<b>Birth weight, kg</b>	<b>Male</b>	1.38±0.13	1.70±0.08	1.52±0.17
	<b>Female</b>	1.44±0.06 <sup>b</sup>	1.58±0.15 <sup>b</sup>	1.89±0.07 <sup>a</sup>
<b>Weaning weight, kg</b>	<b>Male</b>	10.67±1.67	10.67±0.83	10.75±0.48
	<b>Female</b>	9.00±0.58	9.00±0.32	9.89±0.51

*Mean values bearing different superscript at the same horizontal direction differ significantly (P<0.05).*

The kids birth and weaning weights according to litter size (as single, twins and triplet) which affected by parity types are shown in Table (6). In case of twin kids, in the present results, the birth weight was higher (P<0.05) in 3<sup>rd</sup> and 5<sup>th</sup> parity than 1<sup>st</sup> parity. Also, birth weight of triplet kids was similar in parity 3<sup>rd</sup> and 5<sup>th</sup>. However, weaning weight of twin's birth had better (P>0.05) weight in 3<sup>rd</sup> and 5<sup>th</sup> parity than 1<sup>st</sup> parity. In addition, 5<sup>th</sup> parity could achieve more (P>0.05) weaning

weight of triplet kids than 3<sup>rd</sup> parity. The parity and birth types (litter size) has positive influence on multiple births in goats. Halder *et al.*, (2014) certain that age, body weight and parity seemed necessary for optimum metabolic requirements which influence on hypophyseal-pituitary-gonadal axis for more ovulation that ultimately give the number of successful fertilizations of oocyte and thence variable litter size. Also, the same authors assured that single kids were heavier than twins and triplets

throwing light on the welfare ability of nanny goats. Substantiation, Sodiq *et al.*, (2015) reported that total birth weight of single, twins and triplet kids were 2.10, 1.99 and 1.93 kg and also total birth weight of 1<sup>st</sup>, 3<sup>rd</sup> and 5<sup>th</sup> parity was 1.89, 2.06 and 2.02 kg, respectively. The

same authors also defined that total weaning weight were 10.06, 9.84 and 9.52kg in single, twins and triplet litter size, meanwhile, they were 9.40, 10.13 and 9.87kg in 1<sup>st</sup>, 3<sup>rd</sup> and 5<sup>th</sup> parity, respectively.

**Table 6: Birth types of kids as affected by parity types**

Specification	Birth type of kids	Parity types		
		1 <sup>st</sup> parity	3 <sup>rd</sup> parity	5 <sup>th</sup> parity
Birth weight, kg	Single	1.25±0.25	-	-
	Twins	1.50±0.00 <sup>b</sup>	1.80±0.08 <sup>b</sup>	2.75±0.84 <sup>a</sup>
	Triplets	-	1.50±0.13	1.50±0.00
Weaning weight, kg	Single	14.00±0.00	-	-
	Twins	8.80±0.44	9.89±0.63	10.00±0.39
	Triplets	-	9.25±0.63	12.00±0.00

Mean values bearing different superscript at the same horizontal direction differ significantly ( $P < 0.05$ ).

### CONCLUSION

Our results demonstrate better maternal of Zaraibi goats in 3<sup>rd</sup> as well as 5<sup>th</sup> parity in reproductive characteristics. Also, our results encourage that majority of maternal of Zaraibi goats has to be culled after the 5<sup>th</sup> parity, this is probably due to the fact that after the 5<sup>th</sup> parity the performance of the maternal reduced. Thus, it could not be economic to keep these maternal beyond the 5<sup>th</sup> parity. In addition, the study has shown that keeping 3<sup>rd</sup> parity of dairy Zaraibi goats in herd is positively economic, nutrition-wise, as it increases income and reduces vulnerability.

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## الملخص العربي

### تأثير أنماط الإنجاب المختلفة على الأداء التناسلي للماعز الزرايبي الحلابية

مصطفى المغازي\*، عز الدين إبراهيم خليفة\*\*، رشا عبد الله السعيد حواس\*\*

\* قسم الإنتاج الحيواني كلية الزراعة جامعة دمياط

\*\* معهد بحوث الإنتاج الحيواني قسم بحوث الأغنام والماعز

الهدف من الدراسة تحديد تأثير نمط الأنجاب على الأداء التناسلي للماعز الزرايبي الحلابية حيث تم قياس معدل الولادة، الخصوبة، حجم البطن، جنس الجداء، طول مدة الحمل، الفترة بين الولادتين، العودة للشياح، ووزن الجداء لتقييم الأداء التناسلي. إستخدم في الدراسة 21 عنزة زرايبي حلابية في أنماط إنجاب مختلفة (الموسم الأول، الثالث، الخامس) (7 عنزة لكل مجموعة). تراوح وزن العنزات بين 26-42 كجم والعمر من 18-60 شهر. اظهرت النتائج اختلافات في الأداء التناسلي بين أنماط الإنجاب المختلفة حيث أظهر معدل الحمل عدم وجود فروق معنوية بين الأنماط الثلاثة. كانت نسبة الخصوبة عالية للنمط الخامس والثالث من الولادة 185.71%، 185.71% مقارنة بنمط الإنجاب الأول 157.41% على التوالي. وحجم البطن سجل 2.29%، 2.14%، 1.71% لأنماط الإنجاب الثالث، الخامس، الأول على التوالي. سجلت النسبة الجنسية للجداء الذكور مقابل الإناث 33.67 و 33.66 و 37.50 و 37.50 و 65.50 و 60.00 و 40.00% لأنماط الإنجاب الأول، الثالث، الخامس على التوالي. وسجل متوسط مدة الحمل، الفترة بين ولادتين، العودة للشياح فروق معنوية بين أنماط الإنجاب المختلفة. كان طول مدة الحمل 149.29 و 145.86 و 143.29 يوم، والعودة للشياح 48.57 و 37.14 و 36.371 يوم وفترة الشياح 30.75 و 37.29 و 38.14 ساعة لأنماط الإنجاب الأول، الثالث، الخامس على التوالي. كما سجلت النتائج فروق معنوية في أوزان الجداء عند الولادة وعند الفطام مع أنماط الإنجاب المختلفة لصالح نمط الإنجاب الثالث والخامس مقارنة بنمط الإنجاب الأول. بناء على ذلك توضح الدراسة أن الأداء التناسلي كان افضل في نمط الإنجاب الثالث مقارنة بنمط الإنجاب الأول ومتماثل مع نمط الإنجاب الخامس ومن ثم يمكن التحسين حتى نمط الإنجاب الخامس مما يحقق خطة تربية جيدة وتقليل أعباء التربية.