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# A comparative study on reproductive and productive performance of Boer and Baladi goats raised under similar environmental conditions in Egypt

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**Abstract:** This study was carried out at the Goat Research Unit of the Department of Animal Production at El-Noubaria Experimental Farm, National Research Centre, Al-Imam Malik, El-Noubaria, Behira Governorate, and Laboratories of Animal Production Department, National Research Centre, Dokki, Giza. A number of 20 Egyptian Baladi and Boer does were separated into two groups, the first Egyptian Baladi group (n=10) was mated with one Baladi buck and the second Boer group was mated with purebred Boer buck. The performance (i.e. milk production, twinning and fertility rate) of Baladi and Boer goats was studied for one year under local environmental conditions. Average milk yield (from 0-120 days at weaning) was lower ($P > 0.05$) in Baladi goats (752.50 ± 113.91 g) compared to Boer (1321.6 ± 152.63). Average twinning rate was also higher in Boer goats (66 %) compared to Baladi (50 %). Baladi does have greater fertility (80%) than purebred Boer does (60%). Body weight of Baladi goats ranged from 28.25 ± 1.03 kg at parturition to 24.90 ± 1.76 kg after 120 days whereas that of Boer goats ranged from 36.16 ± 2.48 kg to 32.30 ± 1.50 kg. Average daily growth (g/day) of kids after birth was higher ($P < 0.05$) for Boer kids (80.45) as compared to Baladi kids (56.45). Pre-weaning mortality rate was also higher of Baladi kids (28.57%) compared to Boer kids (20%). Boer goats have a higher twinning rate and kid growth rate than Baladi goats, so they can be considered as a dual purpose breed. Apparently, Boer goats seem to adapt well to the environmental conditions (climate, diseases and nutrition) of Egypt. The present study shows that conditions in Egypt are favorable for raising Boer goats due to increased potential for reproductive rate and enhance meat production.
**Keywords**: Baladi goat– Boer – Milk production – Twinning rate – Growth rate – Mortality.

## 1. Introduction:

Recently, goats became an important aspect of animal production in Egypt. Improving goat productivity in Egypt could be achieved through better management and genetic programs. To optimize gain from environmental influences, the genetic parameters and attributes of the animals for economic traits should be appraised regularly to enable breeders determine the breeding tools of their choice. The Egyptian goat breeds, especially the Egyptian Baladi breed (Capra hircus) with a wider distribution across the Nile valley and Delta, possess a high genetic variability. The local Baladi goats are hardy and small- to medium-sized and the hair is short to long.

The birth weight of the kids is influenced by breed, age of the dam, season of birth, sex and litter size. Milk production of the local Baladi goat is affected by body weight and litter size. Therefore increasing productivity of goats will contribute to improve the standard of living of the rural people. The improved Boer breed was established in semi-arid South Africa after selection for enhanced weight gain from within local unimproved goat populations during the first half of the 1900s [1,2]. The adaptability of the breed, the quality of meat produced and their ability to perform well under extensive semi-arid climatic conditions, ranging from hot dry seasons to the extremely low temperatures of snow-clad mountainous regions, are among the advantages [1,3]. The increasing interest in the Boer goats might be caused by the recent development of agroturistic activities as well as some possibilities of usage of this breed in landscape management and in the agro-environmental programs. The present study aims to compare the performance (reproduction, litter size at birth, litter size at weaning , total milk yield and growth rate) of Baladi and Boer goats raised under the same environmental conditions (climate, nutrition and management) of Egypt.

## 2. Materials and Methods:

### 2.1 Animals and management:

The does in this study were managed for once a year kidding. At the start of the breeding season, Boer and Baladi does at the age of 3-5 years and body weight ranging from 24.10 to 31.50 kg, Doe groups were synchronized during the breeding season (September-December) of 2011 with double intramuscular injection of prostaglandin (PGF2α) (5mg/dose). Cloprostenol (Estromate ; Essex Animal Health Friesoythe, Friesoythe, Germany), at a time interval of 11 days but 48 hours before the second injection of PGF2α, the animals were injected with a single intra-muscular injection of 0.5 ml Buserelin (Receptal Hoechst -UK ltd; UK). Estrous does were mated by Boer and Baladi buck respectively. Prior to kidding, does were placed in small pens so that kidding records could be obtained. Does were given rations that varied from stage to stage with one typical concentrate feed mixture (CFM) consisting of yellow corn, soybean meal, cottonseed meal, wheat bran, linseed meal, rice bran, and molasses (Table, 1).

**Table 1: Formulation of the experimental rations.**

| **Items** | **Concentrate feed mixture** | | | |
|---|---|---|---|---|
| **Ingredients** | **CFM 12%** | **CFM 14%** | **CFM 16%** | **CFM 18%** |
| **Yellow corn** | 450 | 450 | 450 | 450 |
| **Undecorticated cotton seed meal** | 100 | 130 | 120 | - |
| **Soybean meal** | - | - | 50 | 200 |
| **Wheat bran** | 210 | 170 | 100 | 140 |
| **Linseed meal** | - | 70 | 100 | - |
| **Rice bran** | 170 | 110 | 110 | 140 |
| **Molasses** | 40 | 40 | 40 | 40 |
| **Limestone** | 17 | 17 | 17 | 17 |
| **Sodium chloride** | 10 | 10 | 10 | 10 |
| **vitamins & Minerals mixture(1)** | 3 | 3 | 3 | 3 |
| **Total** | 1000 | 1000 | 1000 | 1000 |

1- Each 3 kg vitamins and minerals mixture contains: Vit. A 12000,000 IU, Vit. D3 2200,000 IU, Vit. E 10,000 mg, Vit. K3 2000 mg, Vit. B1 1000 mg, Vit. B2 5000 mg, Vit. B6 1500 mg, Vit. B12 10 mg, Pantothenic acid 10,0 mg, Niacin 30,000 mg, Folic acid 1000 mg, Biotin 50 mg, Choline 300,000 mg, Manganese 60,000 mg, Zinc 50,000 mg, Copper 10,000 mg, Iron 30,000 mg, Iodine 100 mg, Selenium 100 mg, Cobalt 100 mg and CaCo3 to 3,000 gm.

Depending on age and physiological stage, crude protein of (CFM16 %) presented for doe groups in late gestation until weaning and decreased by 2 and 4 percentage units during flushing for breeding (CFM 14 %) and early gestation (CFM 12%), respectively. Does were provided roughages (Berseem hay, Berseem 2nd cut and Groundnut vines hay) that varied according to the season and the animal's physiological stage. Kids were tagged and identified with their dam within 18 hours of birth. Kids were allowed to suckle their dams *ad libitum* from birth until weaning and were creped fed at kid starter (18 %), kids were start feeding a grain mix at 1% of body weight and Berseem 2nd cut was available free choice. Within the four months after kidding.

From 90 days, kids were partially weaned (separated from dams at night). Kids were not vaccinated before weaning. Male kids were not castrated before weaning. Birth weight, sex, and type of birth were also recorded at kidding. All does were vaccinated for enterotoxaemia, internal and external parasites. Water was freely available.

### 2.2 Measurements:

Body weights (BW) of does were recorded monthly for the period from flushing and four months post-kidding. Conception rate (%); fertility rate ; prolificacy ; fecundity ; litter size and twining rate (%) were recorded. Every 2 weeks, milk production was recorded using milk suckling technique according to [4,5] ; full weaning of kids was applied after 120 days of age. Kids were weighed within 24 h after birth and thereafter weekly for 12 weeks. Weight gains (g/day) and Body weight of kids at different stages were recorded. Kid mortality rate from birth to weaning was calculated from birth until 120 days of age and kid mortality from weaning to year was calculated from weaning until one year of age. The experimental ingredients and milk samples were chemically analyzed for determination of dry matter (DM), organic matter (OM), crude protein (CP), ether extract (EE), crude fiber (CF), nitrogen free extract (NFE) and ash contents according to A.O.A.C. [6] (Table 2).

**Table 2: Chemical composition of rations used by experimental animals.**

| Feed | % DM | Composition (%DM) | | | | | |
|---|---|---|---|---|---|---|---|
| | | OM | CP | CF | EE | Ash | NFE |
| **CFM 12%** | 89.63 | 92.41 | 12.15 | 8.22 | 7.43 | 7.59 | 64.61 |
| **CFM 14%** | 82.70 | 92.80 | 13.78 | 8.39 | 7.40 | 7.20 | 63.23 |
| **CFM 16%** | 80.56 | 92.77 | 15.72 | 8.01 | 7.16 | 7.23 | 61.88 |
| **CFM 18%** | 89.16 | 92.86 | 18.02 | 5.56 | 4.83 | 7.14 | 64.45 |
| **Berseem 2nd** | 15.22 | 85.87 | 16.13 | 20.33 | 1.85 | 14.13 | 47.56 |
| **GVH** | 88.45 | 87.14 | 9.89 | 30.20 | 2.39 | 12.86 | 44.66 |
| **BH** | 88.22 | 87.12 | 11.23 | 30.02 | 2.63 | 12.88 | 43.24 |

DM= Dry matter, OM= Organic matter , CP= Crude protein , CF= Crude fiber , EE= Ether extracts, CFM 12% = Mixture contained 12% Crude protein, CFM 14% = Mixture contained 14% Crude protein, CFM 16% = Mixture contained 16% Crude protein, CFM 18% = Mixture contained 18% Crude protein, BH= Berseem Hay, GVH= Groundnut vines hay.

### Statistical analyses

Data were statically analyzed with SPSS 15.0 [7] software using parametric tests. One-way ANOVA was used to compare means of different factors in goats of the different groups. Differences among means were ranked using Duncan's New Multiple Range Test [8]. All analysis were carried out in triplicates and the differences were considered significant at ($p<0.05$).

## 3. Results and Discussion

### 3.1. Effect of breed of does on live body weight changes at different physiological and productive stages.

Results presented in (Table 3) indicated significant difference ($P<0.05$) among tow different experimental groups. Boer does were significantly heavier ($P<0.05$) than Baladi group at breeding (31.5 kg and 24.10 kg.), at conception (32.33 kg and 25. 00kg.); one month before kidding (41.66 kg and 32.28 kg.); at kidding (36.16kg and 28.55 kg.) and at weaning (4 months) *i.e.* (32.30 kg and 24.90 kg.), respectively, (Table, 3). These results might be refereed to genetic breed differences. In concurrence with the breed rankings, Boer does were heavier than indigenous does in South Africa [9]. It was also noticeable, higher increase in does live body weight for different breed groups in parallel direction with the advance in pregnancy development from conception to kidding stages; 2.64% for Boer in compare with 3.73 %, for the Baladi group from breeding to conception. Does at one month before kidding (late gestation) maintained significantly higher ($P<0.05$) body weight.

An obvious increase in pregnant does live body weight was observed from conception to 1 month before kidding; 28.86 % for Boer and 29.12 % for Baladi group. A result which might be attributed to the higher development of the fetus and embryonic fluids. At weaning (4 months); both the two breed groups still losing weight; -10.67 % for Boer and -11.86%, for Baladi group.

**Table 3: Means of body weight changes of does Experimental groups at different production stages.**

| Groups | Item | production stages | | | | |
|---|---|---|---|---|---|---|
| | | At breeding (Kg) | At conception (Kg) | Late gestation (Kg) | At. kidding (Kg) | At weaning (Kg) |
| BALDI | LBW(kg) | $24.10^{b}\pm 2.36$ | $25.00^{b}\pm 1.06$ | $32.28^{c}\pm 3.03$ | $28.25^{b}\pm 1.03$ | $24.90^{b}\pm 1.76$ |
| | Change | 0 | 0.90±1.22 | 7.28±1.50 | -4.03 ±1.45 | -3.35±1.24 |
| | Change (%) | 0 | 3.73±3.52 | 29.12±5.42 | -12.48±3.30 | -11.86±4.29 |
| BOER | LBW(kg) | $31.50^{a}\pm 2.50$ | $32.33^{a}\pm 2.065$ | $41.66^{a}\pm 3.55$ | $36.16^{a}\pm 2.48$ | $32.30^{a}\pm 1.50$ |
| | Change | 0 | 0.83±3.02 | 9.33±1.63 | -5.50 ±1.22 | -3.86±0.75 |
| | Change (%) | 0 | 2.64±2.42 | 28.86±3.69 | -13.20±2.02 | -10.67±2.07 |

a and b Means in the same column with different superscripts are different at ($p <0.05$)

Boer doe body weight during the current study was lower than the means of Boer doe body weight (42 to 62 kg) that reported by [10, 11, 9, and 12]. Slight increase of body weight through flushing, recorded in this study may be translated into higher fertility and ovulation rates. The increased weight of does during flushing may be translated into higher fertility and ovulation rates, though many factors may determine the female's response to flushing [13]. The higher body weight of all does observed at one month before kidding could be associated with the interaction between the level of supplementation and the number of fetuses as reported by [14]. The decrease in body weight after kidding and during early lactation was a result of mobilization of body reserves as reported by [15, 16]. The negative change in body weight mass after parturition throughout the weaning periods was highly significant, (Table 3). This could be due to the higher milk secretion of different dam breeds. Similar results were reported by [17] who reported that in early lactation the dry matter intake was low and the daily milk yield was high so the energy supplies is below maintenance and milk production requirements, so more energy was mobilized from body reserve resulted in animal losing weight. The results also agreed with [18] who reported that the nutrition have a significant influence on mass changes at different periods of gestation and in the pre weaning period. [9] Reported a 12-wk. postpartum body weight loss for extensively managed Boer does (nearly 7%), whereas intensively managed does gained 3%. Over a similar 12-wk. postpartum period, Boer does lost 4.4 kg (8%).

### 3.2. Milk yield and chemical composition:

Lactation length is shorter for meat breeds compared to dairy breeds and milk solids are generally higher in meat breeds. The average daily milk yield obtain in this study was a higher ($P<0.05$) for pure Boer does 1321.6 g/d, compared to that for Baladi does, (752.50 g/d) (Table 4). Milk production during the first 12 week after kidding were lower than mean ranged from 1.8 to 2.5 kg/day that reported by [10], of similar age. The significant ($P<0.05$) higher average daily milk yield observed in Boer compared to that for Baladi does, is directly related to weight loss in crossbred does after kidding. The high milk yield in Boer does with higher ($P<0.05$) twining rate (66 %) compared to that for Baladi does (50%)(Table 7), is caused by high lactogenic activities during prepartum stage which cause greater development of mammary gland potential for milk synthesis and hence high milk yield during early postpartum. The differences ($P<0.05$) in total milk production between Boer and Baladi does could be the results of the increase in number of kids suckled. [19], working with local Sahelian goats found that does with twin kids produced significantly more milk than the does with singles and milk yield declines rapidly. The significant ($P<0.05$) lower average daily milk yield observed in Baladi does compared to that for Boer group during the four months after kidding, may be caused they consume less dry matter feeds, so the doe has the tendency to mobilize body tissues for maintenance and production.

Milk production and composition are more depending on composition of the diet fed to goats, the energy balance and energy reserved of the animal. The constituents of milk, namely fat, protein and lactose determine the value of the milk [20].

**Table 4: Chemical composition of experimental does milk and milk measurements.**

| GROUPS | | Avg. Milk yield, g/h/d | 4%FCM g/h/d | Total solid % | Ash % | SNF % | Lactose % | Protein % | Fat % |
|---|---|---|---|---|---|---|---|---|---|
| **BALADI** | Mean<br>S.D | 752.50$^{b}$<br>± 113.91 | 748.96$^{b}$<br>± 22.10 | 11.43$^{ab}$<br>±0.21 | 0.88$^{a}$<br>±0.020 | 7.48$^{b}$<br>±0.10 | 4.60$^{b}$<br>±0.10 | 2.88<br>±0.032 | 3.95<br>±0.26 |
| **BOER** | Mean<br>S.D | 1321.6$^{a}$<br>± 152.63 | 1274.9$^{a}$<br>± 78.88 | 11.55$^{a}$<br>±0.37 | 0.82$^{b}$<br>±0.02 | 7.75$^{a}$<br>±0.10 | 4.83$^{a}$<br>±0.09 | 2.92<br>±0.04 | 3.79<br>±0.37 |

a and b Means in the same column with different superscripts are different at (p <0.05)

4%FCM: Fat Corrected Milk, SNF: Soiled Not Fat, TS: Total Solid

In this study, Boer does produced the highest mean (P<0.05) milk components, namely, protein (2.92%), SNF (7.75%), Lactose (4.83%) and TS (11.55%) compared to their counterparts in Baladi does (Table 4). Fat was higher (P<0.05) in Baladi (3.95) compared to recorded for Boer does (3.79%) but no significantly. Ash content was highest (P<0.05) in Baladi (0.88%) and lowest in Boer goats (0.82%) (Table 4).

### 3.3 Productive Performances:

#### 3.3.1 Effect of breed on live body weight (kg) of kids born to experimental groups at different productive stages:

#### 3.3.1.2 Birth weight:

Data presented in (Table, 5) indicated significant differences (P<0.05) among different breed groups in the average live body weight at different ages and stages of the live kids due to breed differences. In addition, the average birth weight of kids in the present study might be attributed to the feeding program for pregnant does groups; since it was revealed that, the higher level of concentrate diet (CP), the higher expected kids' birth weight. The mean birth weight of Boer kids was significantly (P<0.05) higher than kids of Baladi (1.94 kg). The average birth weight of Boer kids was (3.08 kg) in this study which was closely associated to 3.21 kg in the southeastern USA (Browning *et al*., 2004).

**Table (5): Effect of breed on live body weight (kg) of kids born to experimental groups at different productive stages.**

| Age parameters | Experimental groups | | | |
|---|---|---|---|---|
| | **No.** | **Baladi** | **No.** | **Boer** |
| **LBW at Birth, (Kg)** | 14 | 1.94$^{b}$ | 10 | 3.08$^{a}$ |
| **LBW at weaning, Kg** | 10 | 8.54$^{b}$ | 8 | 12.84$^{a}$ |
| **LBW at six months, Kg** | 8 | 11.41$^{b}$ | 7 | 16.43$^{a}$ |
| **LBW at one year, Kg** | 8 | 22.28$^{b}$ | 7 | 35.27$^{a}$ |

a and b: Means in the same row with different superscripts are significantly (P <0.05) different.

LBW: Live Body Weight

According to [21], Boer does as having an average litter size of 1.92 kids/doe, a litter birth weight of (6.05 kg), and an average kid birth weight of (3.21 kg) was recorded. The higher birth weight of pure Boer kids in the present study is mainly related to genetic breed differences. The birth weight of kids is highly variable, and is mostly under the influence of breed. In most cases it represents 1/15 of the body weight of an adult goat as reported by [22]. The lower body weight of Baladi kid was expected because does with small weight at mating will have small kids at birth. As in all placental mammals, the maternal uterine space has a finite capacity to gestate offspring. Dams' weight is also related to birth weight of kids. This may be due to favorable maternal environment as evidenced by the higher body weight at kidding reported by [23, 24] in Barbari and Jamnapari breeds of goats. The differences in birth weight between kids born could be the results of maternal nutrition (high and low nutrients available for the foetus).

[25] Investigated the relationship between body weight of South African indigenous does during pregnancy and the development of the foetus. They reported that the live weight of pregnant does during gestation affects the amount of available energy for foetal growth. However, size and health status of a doe may be another important factor, which may affect birth weight of kids [26]. Furthermore, [9, 27] found that milk yield increased with the increased level of concentrate diet. However, [28] recorded a lower birth weight by approximately 0.90 kg in South Africa.

**3.3.1.3 Weaning weight:**

Weaning weight of kids is influenced by breed, birth weight, weaning age, pre-weaning nutrition, litter size and lactation performances of the dam. The higher significant ($P<0.05$) values for weaning weight were observed in Boer kids (12.84 kg) than Baladi (8.54 kg). Results of the present study (Table, 5) for birth and weaning weights from kids of pure Boer are somewhat lower than the reports of earlier literature, where Boer goats averaged up to 3.9 kg at birth and 29 kg at weaning (weaned at 4 months) [29, 30]. Boer kids with higher birth weight (3.08 kg) in the present study indicated also significant ($P<0.05$) higher body weight at weaning (12.84 kg). [31, 32, 30] showed that Boer kids to have higher birth weights and weaning weights than Spanish does' kids.

**2.1.3. Six months to one year old age:**

Boer kids with higher weaning weight (12.84 kg) in the present study still maintained significant ($P<0.05$) higher body weight at six months (16.43 kg).The lower body weight of Baladi kids at birth in the present study (1.94 kg) still showing significant ($P<0.05$) lower body weight at weaning (8.54 kg), at six months (11.41 kg) and at one year old age (22.28 kg) (Table, 5). At one year old, F1 Boer kids registered an average live body weight of (35.27 kg) and were higher than Baladi kids.

**3.3.2 Effect of breed on average daily gain (g/day) of kids born to experimental groups at different productive stages.**

**3.3.2.1 Birth to weaning age:**

Provision of improved feeding system during late pregnancy and lactation period might increase the growth performance of kids. The highest significantly ($P< 0.05$) (ADG) values were recorded from birth to weaning in this study are justifiable given the fact that, the kids born had a plenty of food since they were given concentrate feed mixture (18 CP %) during pre-weaning, besides suckling their dams. In addition, the weight gain of Baladi kids is closely associated with lower level of milk intake during the weaning period and declines with declining milk production. Least-square means for average daily gain (ADG) of kids are presented in (Table, 6). The mean average daily gain from birth to weaning of Boer kids (80.45 g) was significantly ($P< 0.05$) higher than Baladi kids (56.45 g), respectively. Higher estimates for ADG to during first 28 days after kidding, were reported by [33] where F1 Boer × Carpatina crossbred kids registered an average daily gain of 225.12 g/day which was significantly higher ($P<0.001$) then pure Carpatina kids, (159.76 g/day).[16] reported greater ADG and G/F for week 1 to week 14 (222 g/day and 136 g/kg, respectively) for Boer-cross wether goats when fed a concentrate diet containing 19.8% CP.

**Table (6): Effect of breed on average daily gain (g/day) of kids born to experimental groupsat different productive stages.**

| Periods | Experimental groups | | | |
|---|---|---|---|---|
| | No. | Baladi | No. | Boer |
| **LBW from birth to weaning (Kg)** | 10 | $56.45^b$ | 8 | $80.45^a$ |
| **LBW from weaning to 6 months** | 8 | $43.63^b$ | 7 | $69.54^a$ |
| **LBW from 6 months to one year** | 8 | $60.00^b$ | 7 | $104.6^a$ |
| $^/\mathbf{X}$ | - | 53.63 | - | 84.88 |

a and b: Means in the same row with different superscripts are significantly ($P <0.05$) different.

LBW: Live Body Weight

**3.3.2.2 Weaning to six months of age:**

The average daily gain (ADG, g/day) of kids after weaning was higher (P<0.05) for Boer kids (69.54) compared to F1 Baladi kids (43.63), respectively,(Table,6 ). Reports from [31, 1] indicated that Boer and Boer × Spanish crossbred kids had a higher pre-weaning daily gain than pure Spanish kids. After weaning, kids of different groups lose weight as a result of weaning stress. Factors such as weaning age, weaning stress and compensatory growth can affect growth rate [34]. During weaning, kids in all dietary treatments lose weight as a result of weaning stress [35]. The rate of growth of a kid after weaning, however, is partly determined by the genetic potential of the kid and the level of environmental influence, especially during the immediate post weaning stage.

**3.3.2.3 Six months to one year old age:**

The highest significant (P<0.05) ADG value was recorded from six months to one year old in this study for pure Boer kids (104.66 g) compared to the Baladi group (60.00 g), (Table, 6). [36] Observed slightly greater difference in ADG from 150 to 365 d of age approximately 35 g between Boer crosses and indigenous small East Africa goats; although ADG were considerably lower (i.e. 33 vs. 68 g). [37] Working with Alpine bucks and Rove does in Egypt indicate increasing heterosis in weight gain with the increase in age of kids.

**3.4 Reproductive traits:**

**3.4.1 Fertility and prolificacy:**

Data in Table (7) showed that conception rate was different in the two tested groups. The proportion of doe mating resulting in at least one live kid at birth is a measure of fertility. Baladi does have greater fertility (80%) than purebred Boer does (60%) (Table 7). This lack of difference between Baladi does and purebred Boer agrees with studies on Boer x Feral, Boer x Angora, and Boer x Spanish crossbred does compared to purebred Feral, Angora, and Spanish does [38, 39]. Reduced fecundity rate in the Boer does (100%) indicated their decreased fertility compared with Baladi does under the conditions of this study. Few studies have compared fertility rates of purebred does representing different breeds [40, 37 and 41]. Boer does were not found to differ from indigenous does for fertility in 2 previous reports [42, 43] where Boer fertility rates were 83 and 90%, respectively. Boer doe fertility rates on typical Small African grazing land ranged from 79 to 90% [44, 30]. Boer does were at the lower end of the range reported Boer doe fertility rates. Conversely, Spanish does were at the upper end of the range of fertility rates (84 to 93%) previously reported for Spanish goats [45, 39]. [39] Found no difference in prolificacy of Boer x Spanish and Spanish does. However in previous work done at this location, [46] reported the prolificacy of Boer to be 1.83 ± 0.12 kids, similar to Kiko and Spanish across six years.The prolificacy estimate of the present study for Baladi does is lower than those reported by [47] which ranged from 1.84-2.1 under research stations conditions in Egypt. These differences may be due to different management systems. In Nubian goats in Mexico, the average number of kids per doe was 1.77 [48], as opposed to 2.3 to 2.9 kids in Egypt [49], 1.94 ± 0.07 for Spanish goat in the US, 1.89 ± 0.07 in Kiko [50], and 1.7 kids at first to 2.4 kids at the sixth kidding in Creole goats of Guadeloupe [27]. In this study, the prolificacy rate was 1.66, lower than in Boer goats in Botswana at 1.93 [11], and about 1.89 in South Africa [30] and 1.85 in the US [50]. 435 newborn goat kids were born dead or alive in the present three-year study period.

**3.4.2 Litter size at birth per does kidding, (LSB):**

Overall mean for litter size at birth in the present study was the highest rate of the Baladi does than those reported for Boer Does. This may be due to improved efficiency of reproduction as the doe matures. Secondly, the management system permitted to cull does with low litters, which could partially account for the significant increase in litter size. It must be stressed that litter size is not directly influenced by management only but by both genetic and environmental factors [51]. [52] in Norway found larger litter size in goat's kid during December/January season. These litter sizes at birth agree with that reported by other workers for Korean goats [53]and West African dwarf goats [54]. Also, agree with other published reports [55]. Overall mean for litter size at birth obtained in this study was 1.75 and 1.66 of Baladi and Boer does (Table 7), which is in contrary to that early report by some authors reported different figures for litter size in different goat breeds. The result of this study suggests that culling of unproductive Boer does might be the most important management practice to increase the litter size at birth.

**Table, 7: Effect of crossing on some reproductive traits of experimental groups.**

| Reproductive traits | Experimental groups | |
|---|---|---|
| | Baladi | Boer |
| Number of does joined | 10 | 10 |
| Conception rate,% | 80 | 60 |
| Fertility, % (percent of does kidding/ does | 80 | 60 |
| Number of viable kids at birth | 14 | 10 |
| Male | 8 | 5 |
| Female | 6 | 5 |
| LSB (No, of kids born/ does kidding ) | 1.75 | 1.66 |
| Number of weaned kids | 10 | 8 |
| Male | 6 | 5 |
| Female | 4 | 3 |
| LSW (No, of kids weaned/ does kidding ) | 1.25 | 1.33 |
| Twining rate,% | 50 | 66 |
| Fecundity (percent of kids born/ does joined | 140 | 100 |
| Prolificacy (No, of kids born/ does kidding ) | 1.75 | 1.66 |

LSB: Litter Size at birth, LSW: Litter Size at weaning

**3.4.3 Litter size at weaning per does kidding, (LSW):**

In this study for litter size at weaning was 1.25 and 1.33 of Baladi and Boer does (Table 7). It seems to be an increase litter size at weaning was higher for Boer does than those recorded in other Baladi group. [56] Reported that the overall mean for litter size at weaning was 1.60 kids for Zaraibi goats. The result of this study for Baladi goats was lower than the figures reported by [57] of 1.31 kids for Korean native goats.

**3.5. Mortality rate of kids:**

The mortality rate was observed in this study indicated that differences in mortality rates among genetic groups. The Baladi group had the highest mortality rates, while Boer had the lowest (Table 8). Also we noticed that pre-weaning mortality rate of 28.75% and 20% in Baladi and Boer does, respectively .This According to [58] small sized does are most likely to have small (underweight) kids and sometimes abortion or dystocia may occur and the kid may die. [59] concluded that animals with low birth weights had lower energy reserves and were therefore less able to withstand harsh environments; also if the dam has a poor milk yield, she may be unable to provide adequate nutrition for twins, thus increasing their susceptibility to disease. Pre-weaning mortality rate in kids was also affected by period of age of the kids. Mortality rates were highest for kids born in period birth to weaning (25 %) and were lowest in kids born in period weaning to one year (16.7 %). (Table 8).

**Table 8: Mortality rate of goat kids of different age groups due to genetic group, sex and birth type.**

| Item | | Birth to weaning | | | Weaning to 1 year of | | | Birth to 1 year of age | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Born | Died | (%) | Weane | Died | (%) | Born | Died | % |
| Genetic group | | | | | | | | | | |
| 1 | **Baladi** | 14 | 4 | 28.57 | 10 | 2 | 20.00 | 14 | 6 | 42.85 |
| 2 | **Boer** | 10 | 2 | 20.00 | 8 | 1 | 12.50 | 10 | 3 | 30.00 |
| **Total** | | 24 | 6 | 25 | 18 | 3 | 16.7 | 24 | 9 | 37.5 |

Losses in the pre-weaning period can be minimized by providing proper shelter, prophylaxis and better nutrition. In this study the major causes of mortality were not fully recorded. Nonetheless, from the limited records available, pneumonia and wet season seems to have been major causes of death in kids.

Natural infections from Caseous Lymphadenitis in goats have been reported from the USA, India, Pakistan, Egypt, Venezuela and Sicily and have also been associated with 70% of the superficial abscesses in goats in the United States [60]. According to obtained results from this study, it was concluded that, mortality rate of kids at birth and at weaning was affected by some environmental factors and better management might reduce it.

## 4. Conclusions:

The larger body weight of the Boer goats will require higher nutritious needs and higher feed consumption for body maintenance. This means a higher production cost. However, due to the higher fertility and prolificacy for Baladi than Boer does observed in this studies, the Baladi breed can still be considered to be more reproduction efficient and adapted than the Boer breed under the environmental conditions of Egypt. The larger body weight of the Boer breed and the higher twinning rate gives it an advantage as purpose breed that can be used to produce meat. The present study shows that conditions in Egypt are favorable for raising Boer goats due to increased potential for reproductive rate. The genetic potential of the Boer breed with regards to meat production are promising. Therefore, should be that introduction of exotic breeds with a proper study on their ability to adapt to local conditions, the Boer goat must be considered as the base for any future work aiming to enhance Egyptian goat production.

## 5- References:

1. Casey, N.H. and Van Niekerk, W.A. (1988). The Boer Goat II. Growth, nutrient requirements, carcass and meat quality. Small Ruminant Res., 1:355-368
2. Campbell Q. P. 2003. The origin and description of southern Africa's indigenous goats.S. Afr. J. Anim. Sci. 33:18–22.
3. Barry, D.M. and Godke, R.A. (1997). The Boer goat: the potential for cross breeding. http://www.boergoats.com/ godke.htm; accessed April 15, 2009.
4. Moawd, R. I. (2003). Effect of feeding mushroom cultivating by-products on performance of pregnant and suckling ewes. J. Agric. Sci. Mansoura Univ., 28(8): 5985 – 5993.
5. Saleh, H. M. (2004). Effect of supplementing fenugreek seeds as galactagogue on performance of lactating ewes. Egyptian J. Nutr. and Feeds, 7 (2) : 155 – 165.
6. A.O.A.C (2000). Official Methods of Analysis, Association of Analytical Chemists, Washington, DC.
7. SPSS 15.0 Command Syntax Reference. Chicago, Illinois: SPSS Inc. 2006.
8. Duncan, B.C. (1955). Multiple range and multiple F test. Biometrics, 11, 1–42.
9. Greyling, J.P. C., Mmbengwa, V.M., Schwalbach, L.M.J. and Muller, T. (2004). Comparative milk production potential of Indigenous and Boer goats under two feeding systems in South Africa. Small Rumin. Res. 55:97–105.
10. Raats J. G.(1988). The effect of supplementation on milk yield in Boer goat ewes. S. Afr. J. Anim. Sci. 18:97–100.
11. Seabo, D., Aganga, A.A. and Mosienyane, M. (1996). Reproductive performance of Tswana ewes and Boer does in south-eastern Botswana. Pages 293–296 in Small Ruminant Research and Development in Africa. S. H. B. Lebbie and E. Kagwini, ed. Proc.3rd Bien. Conf. Afr. Small Rumin. Res. Network, UICC, Kampala, Uganda, Int. Livest. Res. Inst. (ILRI), Nairobi, Kenya.
12. Hirakawa, M., Arasaki, Y., Sunagawa, K. and Shinjo, A. (2007). The season of delivery, litter size and body measurement in Boer goats. Nihon Chikusan Gakkaiho 78:15–20.
13. Schoenian, S. (2009). An introduction to feeding small ruminants. Small Ruminant Info Series. www.Sheepandgoat.com/ articles/graintruth.html.
14. Ivey, D.S., Owens, F.N., Sahlu, T., Teh, T.H., Dawson, L.J., Campbell, G.A. and Goetsch, A.L. (2000). Influences of the number of fetuses and levels of CP and ME in gestation and lactation supplements on performance of Spanish does and kids during suckling and post-weaning. Small Rumin. Res. 35:123–132.
15. Eknæs, M., Kolstad, K., Volden, H and Hove, K. (2006). Change in body reserves and milk quality throughout lactation in dairy goats. Small Ruminant Research, Volume 63, 1-11.

16. Ngwa, A.T., Dawson, L.J., Puchala, R., Detweiler, G., Merkel, R.C., Wang, Z., Tesfai, K., Sahlu, T., Ferrell, C.L and Goetsch, A.L. (2009). Effect of stage of lactation and dietary forage level on body composition of Alpine dairy goats. Journal of Dairy Science, Volume 92, 3374-3385.
17. Gubartalla, K. E. A., Abu Nikhaila, A. M. and EL Khidir, O.A. (2002). Production and reproductive performance of flock of Sudanese Nubian goats fed on Molasses or sorghum based diets (1) Production. Sudan. J. Anim. Prod 15:33-41. 3rd International Scientific Conference on Small Ruminant Development, Hurghada, Egypt, 12-15 April, 2010.
18. Oyeyemi, M.O. and Akusu, M.O. (2002). Response of multiparous and primiparous West African Dwarf goats (Capra hircus, L.) to concentrate supplementation. Veterinarski Arhiv 72 (1):29-38.
19. Sangare, M. and Pandey, V. S., (2000). Food intake, milk production and growth of kids of local, multipurpose goats grazing on dry season natural Sahelian rangeland in Mali. British Social of Animal Sci. 71, 165- 173.
20. Sanz Samplelayo, M.R., Fernández, J.R., Ramos, E., Hermoso, R., Gil Extremera, F. and Boza, J. (2006). Effect of providing a polyunsaturated fatty acid-rich protected fat to lactating goats on growth and body composition of suckling goat kids. Anim. Sci. 82, 337-344.
21. Browning, R. Jr., Kebe, S. and Byars, M. (2004). Preliminary assessment of Boer and Kiko does as maternal lines for kid performance under humid, subtropical conditions. S. Afr. J. Anim. Sci. 34:1–3
22. Morand-Fehr, p. (1981). Growth in goat production (Gall,c., Ed.). Academic Press. London. pp. 53-283.
23. Prasad, S. P., Roy, A. and Pandey, M. D. (1972). Live weights, growth in Barbari kids up to one year old age. Agra University Journal Research (Science), 20: 45-54.
24. Khan, B.U. (1980). Studies on the variation in body weights due to non-genetic factors in Jamnapari goats. Presented at First Annual Symposium of the Indian Society of Animal Genetics and Breeding on "Genetics and Livestock Development" held at Ajmer, 1-3 February, 1980.
25. Akingbade, A.A., Nsahlai, I.V., Bonsi, M.L.K., Morris, C.D. and Du Toit, L.P. (2001). Reproductive performance of South African indigenous goats inoculated with DHP-degrading rumen bacteria and maintained on Leucaena leucoce phala/grass mixture and natural pasture. Small Rumin. Res. 39: 73-95.
26. Hossain, M.E., Shahjalal, M., Khan, M.J and Hasanat, M.S. (2003). Effect of dietary energy supplementation on feed intake, growth and reproductive performance of goats under grazing condition. Pakistan Journal of Nutrition 2 (3): 159- 163.
27. Alexandre, G., Aumont, G., Mainaud, J.C., Fleury, J. and Naves, M., (1999). Productive performances of Guadeloupean Creole goats during the sukling period. Small Rum. Res. 34: 155-160.
28. Lehloenya, K.C., Greyling J.P.C and Schwalbach L.M.J., (2005). Reproductive performance of South African indigenous goats following oestrous synchronization and AI, Small Ruminant Research, 57, 115–120.
29. Erasmus, J.A. (2000). Adaptation to various environments and resistance to disease of the Improved Boer goat. Small Rumin. Res. 36:179–187.
30. Malan, S.W. (2000). The improved Boer goat. Small Rumin. Res. 36:165–170. Reduction efficiency in farm animals: A review. Livest. Prod. Sci. 56:15–33.
31. 33-Bogui, N. S. (1986). Reproductive performance and preweaning growth of Spanish goats. M.S. thesis. Texas A&M Univ., College Station.
32. Luo, J., Sahlu, T., Cameron, M. and Goetsch, A.L. (2000). Growth of Spanish, Boer × Angora and Boer × Spanish goat kids fed milk replacer. Small Ruminant Res. 36:189-194.
33. Sauer, M.,Walter-Ioan Sauer., DinuGavojdian., Camelia-ZoiaZamfir., IoanPadeanu., Sorin-Octavian Voia and Doru-IoanRatiu. (2012). Improving Growth Rates in Romanian Carpatina Breed throughout Crossbreeding with Boer. Scientific Papers: Animal Science and Biotechnologies: 45 (2) .
34. Lu, C.D. and Potchoiba, M. J. (1988). Milk feeding and weaning of goat kids. Small Ruminant Research. 1:105-112.
35. Memiši, N., Žujović, M., Tomić, Z and Petrović, M.P. (2009). The effect of time of weaning on body mass and gain of kids. Biotechnology in Animal Husbandry 25, 993-998.
36. Haas, J.H. 1978. Growth of Boer goat crosses in comparison with indigenous Small East African goats in Kenya. Tropenlandwirt. 79:7–12.
37. Anous, M.R. and Mourad, M.M. (1993). Crossbreeding effects on reproductive traits of does and growth and carcass traits of kids. Small Rumin. Res. 12, 141–149.
38. Norton, B. W.,(2004).The role of the Boer goat in the development of the Australian goat meat industry. Revised report. A MLA/RIRDC funded research project TR.012. 53 pp. Schools of Veterinary Science and Animal Studies, the University of Queensland November 2004.

39. Rhone, J.A. (2005). Estimation of reproductive, production, and progeny growth differences among F1 Boer-Spanish and Spanish females. MSc thesis. Texas A and M University, College Station. Ruminant Res. 1:105-112.
40. Bradford, G. E., Burfening, P.J. and Cartwright, T.C. (1989). Evaluation of production and reproduction of sheep, goat and alpaca genotypes in the small ruminant collaborative research support program. J. Anim. Sci. 67:3058–3067.
41. Mourad, M. (1993). Reproductive performances of Alpine and Zaraibi goats and growth of their first cross in Egypt. Small Rum. Res. 12, 379-384.
42. Kimmés, A. (1992). On Réunion Island: The goat, a traditional product. Pages 46–49 in La Chevre, No. 189. Inst. Anim. Sci., Paris, France.
43. Nsubuga, H.S.K. (1996). Small ruminants: Goats and sheep in Uganda. Pages 1–4 in Small Ruminant Research and Development in Africa. S. H. B. Lebbie, and E. Kagwini, ed. Proc. 3rd Bien. Conf. Afr. Small Rumin. Res. Network, UICC, Kampala, Uganda, Int. Livest. Res. Inst. (ILRI), Nairobi, Kenya.
44. Erasmus, J.A., Fourie, A.J. and Venter, J.J. (1985). Influence of age on reproductive performance of the Improved Boer goat doe. S. Afr. J. Anim. Sci. 15:5–7. Fat to lactating goats on growth and body composition of suckling goat kids. Anim. Sci. 82, 337-344. Fra Norges Land brush oegskole 54(2), 30.
45. Thompson, P., and M. Shelton. 1990. Influence of management level on productivity of Spanish goats. Pages 13–15 in Research Reports: Sheep and Goat, Wool and Mohair, 1990. Texas Agric.Exp. Stn., San Angelo.
46. Browning, R., Jr., Leite-Browning, M.L. and Byars, Jr.M. (2011). Reproductive and health traits among Boer, Kiko, and Spanish meat goat does under humid, subtropical pasture conditions of the southeastern United States. J. Anim. Sci. 89:648–660.
47. Aboul-Naga, A.M., Aboul-Ela, M.B., Mansour, H. and Gabr, M. (1989). Reproductive performance of Finn sheep and crosses with subtropical breeds under accelerated lambing. Small Ruminant Res. 2:143−150.
48. Mellado, M., Foote, R.H. and Gomez, A. (1991): Reproductive efficiency of Nubian goats throughout the year in northern Mexico. Small Rumin. Res. 6, 151-157.
49. Marai, I. F. - M., E. I. Abou Fandoud, A. H. Daader, A. A. Abu-Ella (2002): Reproductive doe traits of the Nubian (Zaraibi) goats in Egypt. Small Rum. Res. 46, 201-205.
50. Browning, R.Jr., Payton, T., Donnelly, B., Leite-Browning, M.L., Pandya, P., Hendrixson, W. and Byars, M. (2006): Evaluation of three meat goat breeds for doe fitness and reproductive performance in the southeastern United States. 8Th World Congress on Genetics. Applied to Livestock Production, Bello Horizonte, MG, and Brazil. Bush community of the Eastern Cape. Boer Goat News 3: 25-28.
51. Wilson, R. T., Murayi, T. and Rocha, A. (1989). Indigenous African small ruminant strains with potentially high reproductive performance. Small Rumin. Res. 2:107–117.
52. Steine, T.A. (1975). Fkorar med innverknad pa oekono misk viktigeei genskaparhosgeit (Factors affecting characters of economic importance in goats).Meld in gerfra Norges Land brushoegskole 54(2), 30.
53. Kim, C.K. and Chung, Y.C. (1979). Reproductive performance of Korean native goats under natural and intensive conditions Korean J. Anim. Sci. 21, 27-133.
54. Odubote, I.K. (1996). Genetic parameters for litter size at birth and kidding interval in the West African Dwarf goats. Small Ruminant Research 20: 261-265.
55. Delgadillo, J.A. and Malpaux, B. (1996). Reproduction of goats in the tropics and subtropics. International Conference on Goats, vol. 1, pp. 785– 793.
56. Hamed, A., M. M. Mabrouk, I. Shaat, and S. Bata. (2009). Estimation of genetic parameters and some non-genetic factors for litter size at birth and weaning and milk yield traits in Zaraibi goats. Egyptian J. Sheep Goat Sci. 4:55–64.
57. Song, H.B., Jo, I.H. and Sol, H.S. (2006): Reproductive performance of Korean native goats under natural and intensive conditions. Small Rumin. Res. 65, 284-287.
58. Kinne, M. (2002). Neonatal mortality in kids. http//www.kinne.net/neomort.htm.
59. Curtis, H.J. (1969). Aging. In: Hafez E S E and Dyer I A (eds), Animal growth and nutrition. Lea and Fibger, Philadelphia, USA. pp. 165-174.
60. Gall, C. (1981). Goat production. Academic Press Inc., New York, NY.

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