

## NON-GENETIC FACTORS AFFECTING BIRTH WEIGHT OF GOAT KIDS

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### Abstract

The aim of the study was to determine paragenetic factors and effect of environmental (year) on body mass of goat kids at birth.

The goats included in this research were representatives of three breed groups – group A (Bulgarian White Dairy goat), group B (Bulgarian White Dairy goat x Toggenburg) and group C (Bulgarian White Dairy x Anglo-Nubian).

Average body mass at birth of male kids was heavier than that of females and the difference is not statistically significant ( $P > 0.05$ ). Exceptions are observed only in 2010 at Bulgarian White Dairy goat, where females are heavier than male kids –  $3.66 \pm 0.29$  to  $3.40 \pm 0.17$ , as this is probably due to the age of the goats.

The singles were heavier than twins and triplet kids and the differences are statistically significant ( $P < 0.05$ ). For the three groups average trend in singles, twins and triplets, is respectively: 2009 –  $3.25 \pm 0.149$  and  $3.12 \pm 0.15$ ; 2010 –  $3.60 \pm 0.20$ ,  $3.55 \pm 0.09$  and  $3.26 \pm 0.13$ ; 2011 –  $3.68 \pm 0.19$ ;  $3.46 \pm 0.07$  and  $3.33 \pm 0.18$ ; 2012 –  $3.97 \pm 0.14$ ;  $3.70 \pm 0.09$  and  $3.14 \pm 0.28$ .

**Key words:** goat, kids, sex of kids, birth weight, non-genetic factors

### Introduction

Birth weight is an important economic indicator for animal production. There is a positive correlation between birth weight and further increasing of the live weight of animals. (Roy et al. 1989).

Studies of various authors show that birth weight is influenced by gender, type of birth, breed, nutrition, year, season of birth, maternal age and more. (Shetaewi et al, 2001; Kumar et al., 2007; Supakorn and Pralomkarn, 2009; Bharathidhasan et al, 2009).

The results can be used to evaluate the effectiveness of selection on birth weight indicator in goat population, the impact of non genetic factors to be taken into account in breeding programs. (Montaldo et al. 1987).

The aim of the study was to determine the effect of some non-genetic factors on the birth weight of goat kids from three breed groups.

### Material and methods

The study was conducted in the experimental farm of the Institute of Mountain Stockbreeding and Agriculture (Troyan) in four year period (2009 – 2012 ). The site is located at an altitude of 300-499 m, latitude 42.883N degrees and longitude 24.717E.

The goats were of three breed groups – group A (Bulgarian White Dairy goat), group B (Bulgarian White Dairy goat x Toggenburg) and group C (Bulgarian White Dairy x Anglo-Nubian). The goat kids were born during the months of February-March.

In winter the animals were kept indoor and daily ration consisting of 1 kg/head hay, 2 kg silage and 0.4 kg concentrate. Water and salt were offered ad libitum. During the summer months (May-August) the goats were grazing.

After birth the following indicators of goat kids were reported: birth weight, sex, type of birth, year, breed and age of mother. The influences of year and maternal age on birth weight of kids are discussed in our other article.

The results of the average weight of kids at birth are viewed in various aspects: by years for each breed group and years average for the three groups and by gender and type of birth.

The data are presented as the arithmetic mean ( $\bar{x}$ ) and average standard Error ( $S\bar{x}$ ). To determine significance ANOVA Single Factor is used.

## Results and discussion

### 1. Influence of sex of kid on the birth weight.

The data for average birth weight of male and female kids through four years of study (2009 – 2012) are shown in Table 1.

Table 1. Average weight (kg) at birth of male and female kids for the period 2009 – 2012

Group	Female kids, kg.		Male kids, kg.	
	number	$\bar{x} \pm S\bar{x}$	number	$\bar{x} \pm S\bar{x}$
2009				
Group	4	2.58±0.42	5	3.30±0.49
Group B	5	2.82±0.26	4	3.78±0.18
Group	3	3.03±0.15	4	3.38±0.13
Average for , B and	12	2.79±0.17	13	3.47±0.19
2010				
Group	5	3.66±0.29	5	3.40±0.17
Group B	6	3.38±0.14	12	3.53±0.10
Group	5	3.16±0.25	3	3.57±0.23
Average for , B and	16	3.40±0.16	20	3.50±0.10
2011				
Group	13	3.28±0.11	7	3.57±0.20
Group B	5	3.26±0.14	12	3.61±0.14
Group	5	3.38±0.19	6	3.77±0.18
Average for , B and	23	3.30±0.08	25	3.64±0.09
2012				
Group	15	3.54±0.19	27	3.66±0.17
Group B	7	3.84±0.25	15	3.99±0.18
Group	12	3.83±0.17	8	4.14±0.23
Average for , B and	34	3.70±0.12	50	3.83±0.11

The data show that the average live weight at birth of male kids in all three groups is higher than that of females, during the four years of study and the differences are insignificant ( $P > 0.05$ ). Exceptions are observed only in 2010 at Bulgarian White Dairy goat, where females are heavier than male kids –  $3.66 \pm 0.29$  to  $3.40 \pm 0.17$ , as this is probably due to the age of the goats. We believe that the insignificance of this indicator is due to greater variation in birth weight in the group of kids in the male group compared to the females.

Elabid (2008) reported for higher birth weight of male than that of female kids in Sudanese Nubian goats which obtain an average live weight of male kids  $2.374 \pm 0.622$  kg and in females –  $2.312 \pm 0.481$  kg where the difference is significant ( $P < 0.05$ ).

Castillo et al. (1976) have also received significantly higher live weight of male kids at birth compared to females in breeds Anglo-Nubian, Toggenburg and Saan goat. According to Hafez (1962) higher live weight of males is due to the anabolic effect of male hormones. In table 1 is shown that the female and male kids-crosses between Bulgarian White Dairy goat and Anglo-Nubian have the highest birth weight, which we believe is due to breed.

## 2. Influence of type of birth on birth weight

Table 2 shows the variation of live weight at birth, according to the type of birth of the kids for the same period.

Table 2. Average live weight (kg) at birth according to type of birth for the period 2009 – 2012.

Group	Singles		Twins		Triplets	
	number	average, kg	number	average, kg	number	average, kg
2009						
Group			9	2.98		
Group B	3	3.33	6	3.20		
Group	1	3.00	6	3.27		
Average for , B and	4	3.25	21	3.12		
2010						
Group	1	3.40	6	3.63	3	3.37
Group B			12	3.51	6	3.42
Group	1	3.80	4	3.55	3	2.83
Average for , B and	2	3.60	22	3.55	12	3.26
2011						
Group	2	3.50	18	3.37		
Group B	2	3.90	12	3.48	3	3.33
Group	1	3.60	10	3.59		
Average for , B and	5	3.68	40	3.46	3	3.33
2012						
Group	16	3.83	22	3.54	5	3.14
Group B	10	4.09	14	3.89		
Group	12	4.04	8	3.81		
Average for , B and	38	3.97	44	3.70	5	3.14

Our results show that the type of birth has significant effect ( $P < 0.05$ ) on birth weight of kids and with increasing the number of kids born of a goat reduces their birth weight.

For the three groups average trend in singles, twins and triplets, is respectively: 2009 –  $3.25 \pm 0.049$  and  $3.12 \pm 0.15$ ; 2010 –  $3.60 \pm 0.20$ ,  $3.55 \pm 0.09$  and  $3.26 \pm 0.13$ ; 2011 –  $3.68 \pm 0.19$ ;  $3.46 \pm 0.07$  and  $3.33 \pm 0.18$ ; 2012 –  $3.97 \pm 0.14$ ;  $3.70 \pm 0.09$  and  $3.14 \pm 0.28$ .

In the study carried out in goats breed Sirohi, Banerjee and Jana (2010) reported that singles have higher birth weight than twins and they have higher than triplets. This is in agreement with our results.

Several authors (Tuah et al., 2002; Afzal et al., 2004) – in Beetal goats; Thiruvankadan et al., (2008) – in goats Tellicherry determined significant influence of the birth type on the birth weight in goat kids.

Heavier birth weight in singles kids might be attributed to uterine environment which the fetus does not have to share with its littermates, thereby attaining higher bodyweight than the twin or triplet born kids (Banerjee and Jana, 2010).

### Conclusions

1. The study shows that the average live weight at birth of male kids was higher than that of females in all three groups during the four years of the experiment.
2. It was found that on average birth weight of single was higher than that of the twins which in turn were heavier than the triplets.

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