

## **REPRODUCTIVE PARAMETERS AND BIRTH TYPE INFLUENCE ON SANSKA GOAT KIDS BODY WEIGHT\***

*Mekić C.\*<sup>1</sup>, Perišić P.<sup>1</sup>, Petrović P.M.<sup>2</sup>*

<sup>1</sup> University of Belgrade, Faculty of Agriculture Belgrade – Zemun, Serbia

<sup>2</sup> Institute for Animal husbandry, Zemun polje, Serbia

\*Corresponding author: cvijanm@agrif.bg.ac.rs

### **Abstract**

In this paper Sanska goat reproductive parameters after the first kidding are shown as well as influence of birth type on kid body weight at birth. At first insemination average age of young goats was 252 days. Average gestation period for goats that carried twins was 150.19 days and for goats that carried singles 151.10 days. Determined difference in gestation length of 0.91 days in favor of goats that carried singles was not statistically significant ( $P>0.05$ ). Goat fertility after first kidding was 164.70%. Kid body weight at birth was analyzed based on birth type (singles-twins). Singles had higher body weight at birth than twins by 0.91kg (34.60%) which was statistically very significant ( $P<0.01$ ). Average body weight of singles was 3.54kg, and twins 2.63kg, twins were approximately 74.29% of body weight of singles. Gender based differences at birth in body weight were present in favor of male kids, but they were not statistically significant ( $P>0.05$ ). Based on obtained results in this research we can conclude that the results which were obtained for researched parameters are within average limits for Sanska goat breed.

**Key words:** *age, birth type, body weight at birth, fertility, Sanska breed*

### **Introduction**

Republic of Serbia, even though it has favorable conditions for goat herding development (geographic position, relief, ground composition, flora, environment) is in deficit with goat meat, milk and milk products (Mekić et al., 2011).

Goats are being reared in Europe mainly because of milk production and two breeds of goat which have the highest milk yield originate from Europe (Park, 2001). In the European Union, France is in the first rank for its goat milk production, it averagely produces 534 millions of liters of goat milk (Jean-Claude Le Jaouen, 2005).

Goats as genetic resource have very important socio-economical roles in many rural areas of the world (Ogola and Kosgey, 2012). In the developing countries, goat productivity level is low (Abdel Aziz, M. 2010). Today, it is considered that goat herding is very significant part of sustainable production, rural development and poverty reduction (Haen Lein, 1998).

Fact is that exceptional characteristics of goat milk – good nutritive value, digestibility and lack in allergens – make it recommendable for kids and reconvalescents (Ribeiro and Ribeiro, 2011). In the past two decades these facts had positive influence on goat herding interest increase in Serbia, especially for high milk yield of pure breeds. However, because in Serbia there are no such breeds, in several occasions Alpine, Sanska and German fawn were imported because of their good genetic potential for milk production and high fertility (Ćinkulov et.al., 2007).

When it comes to high milk production in Europe Sanska and Alpine breed have one of the highest potentials. Productive traits of those two breeds are almost the same. Sanska breed has slightly higher milk yield and fertility rate (Rako, 1981). Both genotypes are excellent for rearing in our ecological conditions.

Milk yield is influenced by genetic and paragenetic factors. Yield and milk quality depend on the breed (Sung et al., 1999), lactation stage (Ciappesoni et al., 2004); kidding season (Crepaldi et al., 1999) and all these factors have a very significant influence on the final product quality (Fekadu et al., 2005).

Amount and milk composition is a breed genetic characteristic, however, it is also influenced by physiological and environmental factors (Crepaldi et al., 1999). The most significant physiological factors according to Dimassi et al. (2005) are lactation length, fertility, kidding season, while most significant environmental factors that have influence on the amount and milk composition are diet and milking.

It is well known that the amount of milk increases with the age of the goat till the fourth, sometimes, till the fifth lactation (Steine, 1975; Crepaldi et al., 1999; Spath and Thume, 2000).

The aim of this paper was to determine phenotype variability of reproductive traits of Sanska breed after first kidding and the influence of birth type (singles-twins) on kid body weight at birth.

## **Materials and methods**

Reproductive parameters were monitored at the farm which keeps Sanska breed. Fertility parameters were monitored for young goats that were kidding for the first time. Parameters that were monitored were: young goat age at first insemination, gestation period length, goat fertility, body weight of kids at birth depending on birth type (singles-twins).

Data processing was done by usual statistical methods for this type of research. Influence of the birth type and gender of newborn kids on body weight at birth was processed using analysis of variance. Researched treatments comparison was conducted using the least significant difference test (LSD – test).

## **Results and discussion**

Reproductive parameters and goat fertility were unevenly expressed with different goat breeds and considered as their important racial trait. Average age at first insemination was 252 days and at first kidding it was 402.6 days.

Gestation period is a biological trait and it is influenced by many factors such as breed, season, number and gender of kids and goat age. Gestation length results for the first pregnancy depending on type of birth (singles-twins) are shown in Table 1.

**Table 1.** Average values and gestation length variability depending on birth type (days)

Birth type	Parameters				
	n	$\bar{x}$	$S_{\bar{x}}$	SD	CV(%)
Singles	75	151.10	0.46	3.95	2.61
Twins	52	150.19	0.49	3.54	2.36
Average	127	150.64	0.30	3.43	2.28

From given data (Table 1) it is visible that for the first gestation period average gestation length was 150.64 days. Determined difference of 0.91 days in gestation length between the singles and twins in favor of singles was not statistically significant ( $P>0.05$ ).

Urošević et al. (1999) determined that the age during first insemination in Sanska goat herd was 265.59 days and average gestation length was 149.84 days. Činkulov et al. (2009) quote that average age for German fawn during the first insemination was 242 days, while gestation length was 151.6 days, which is similar to our results.

Our research results are in compliance with the research of Duygu Ince (2010) where it was determined that gestation period length for Sanska goat was averagely 150.1 days and slightly higher value of 152.87 days of the same parameter and the same breed was determined by (Mekić et al., 2012).

Činkulov et al. (2009) in their research determined that gestation length for German fawn was averagely 152 days.

Determined gestation length of 150.64 days for Sanska breed in our research is in compliance with the research conducted by many authors and published in literature (Amoah, E.A. et al., 1996; Göncü et al., 2005; Moaen UD-DIN-M. et al., 2008).

Fertility of Sanska breed after first kidding was averagely 164.70%.

Fertility of Sanska breed according to literary data is between 1.20 up to 2.14 kids, Taskin et al. (2003), Göncü et al. (2005), Moaen UD-DIN-M. et al. (2008). Mekić et al. (2012), conducted a research and average fertility of Sanska breed in consequent kidding was 159.98%, and Činkulov et al. (2007) quote that fertility of German fawn was 1.96%, which is a higher value compared to our research.

Lower fertility for Sanska breed aged two years was determined by Duygu Ince (2010), where fertility value was 1.13%, and for goats older than five years it was 1.47%. Therefore, the average fertility of 164.70% obtained in our research for Sanska breed after the first kidding can be considered satisfying and in accordance with literature data, while Rako (1981) points out that fertility high milk yield goat breeds is 1.8 kids.

### **Kid body weight at birth**

Determined body weights of kids at birth were analyzed from the birth type aspect (singles-twins). It was concluded (Table 2) that difference between the body weight of singles and twins at birth was 0.91kg in favor of singles while twins were approximately 74.29% of body weight of singles. Determined difference was statistically very significant ( $P<0.01$ ).

**Table 2.** Average values and variability of body weight of one day old kids (kg)

Birth type	Gender	Parameters				
		n	$\bar{x}$	$S_{\bar{x}}$	SD	CV(%)
Singles	♂	35	3.57	0.16	0.98	27.45
	♀	40	3.51	0.30	0.83	23.65
	♂+♀	75	3.54	0.11	0.92	25.99
Twins	♂	58	2.66	0.12	0.89	33.46
	♀	46	2.60	0.12	0.81	31.15
	♂+♀	104	2.63	0.08	0.81	30.80

Body weight of kids at birth is very variable and it mainly depends on the breed. On average it represents 1/15 of grown goat weight, Morand-Fehr (1981). Majid et al. (1993) quote that body weights of kids at birth for five goat breeds in southern part of the USA (Alpine 3.8 kg; La Mancha 3.3 kg; Anglo Nubian 3.3 kg; Sanska 3.8 kg and Toggenburg 3.5 kg). Within the breed, kid body weight at birth depends on litter size, gender, kidding order, constitution and age of the mother, gestation length, diet, kidding season, health condition of the goat, etc. (Laes-Fettback and Peters, 1995). Jančić and Antunac (1986) have determined significantly higher body weight for Alpine breed singles compared to twins (3.95:2.92 kg).

In the research by Duygu Ince (2010), Sanska breed kids body weight was 3.06 kg; Göncü et al. (2005) determined for Turkish Sanska breed that kid body weight at birth ranges from 3.0 to 3.2 kg; Mioč (1998) has determined that value of Sanska goat kids body weight at birth was 3.26 kg while for Alpine it was 3.55 kg; Činkulov et.al. (2009) determined body weight of 3.38 kg for German fawn.

Amoah et al. (1996) quotes that average body weight of kids at birth for milking breeds of goat is within interval of 3.24±0.643 kg and that body weight drops down significantly if the number of kids increases in the litter.

When it comes to the gender of newborn kids within the birth type, there were differences and they were in favor of male kids but they were not statistically significant ( $P>0.05$ ). Male kids have bigger body weight than female by 200 to 500 grams (Mavrogenis et al., 1984). Otuma and Osakwe (2008) point out that body weight of kids at birth is under very significant influence of the season, birth type and gender, therefore determined values for body weight in our research is in compliance and within expected values for Sanska goat.

## Conclusion

Based on the obtained results about reproductive parameters for Sanska breed after the first kidding following conclusions can be made:

1. Average age at first insemination was 252 days.
2. Average gestation period length was 150.64 days and determined difference of 0.91 day between singles and twins was not statistically significant ( $P>0.05$ ).
3. Goat fertility was averagely 164.70%.
4. Average body weight of singles was 3.54 kg, and twins 2.63 kg, twins were approximately 74.29% of body weight of singles. Difference in favor of singles was statistically very significant ( $P<0.01$ ).

Based on presented reproductive parameters of Sanska breed after the first insemination it can be concluded that satisfying results were achieved for fertility and that body weight of

kids at birth can be even higher if the breeding conditions were to be improved, especially diet, during the entire productive cycle, as that is the only way to express genetic predispositions which Sanska goat has.

### **Acknowledgment**

This paper is within the project III-46009 „Improvement and development of hygienical and technologic procedures in animal origin food with aim to get high quality and safe products that are competitive at world market“.

### **References**

1. Abdel Aziz M 2010. Present status of the world goat populations and their productivity. *Lohman information* 45(2), 42-45.
2. Amoah EA, Gelaye S, Guthrie P, Rexroad CE IE 1996. Breeding season and aspects of reproduction of female goats. *J. Animal Sci.* 74, 723-728.
3. Ciappesoni G, Přibyl J, Milerski M, Mareš V 2004. Factors affecting goat milk yield and its composition. *Czech Journal of Animal Science* 49(11), 465-473.
4. Crepaldi P, Corti M, Cicogna M 1999. Factors affecting milk production and prolificacy of Alpine goats in Lombardy (Italy). *Small Ruminant Research*, 32(1), pp. 83-88.
5. Ćinkulov M, Nebesni A, Krajinović M, Pihler I, Žujović M 2009. Reproductive Traits of German Fawn Goats in Vojvodina. *Biotechnology in Animal Husbandry* 25 (1-2), 119-124.
6. Ćinkulov M, Trifunović S, Krajinović M, Popović-Vranješ A, Pihler I, Porcu K 2007. Osobine mlečnosti nemačke šarene koze u prve tri laktacije. *Savremena poljoprivreda*, 56, 1, 32-36.
7. Dimassi O, Neidhart S, Carle R, Mertz L, Migliore G, Mane – Bielfeldt A, Vale Zarate 2005. Cheese production potential of milk of Dahlem Cashmere goats from rheological point of view. *Smal. Rum. Res.* 57, 31-36.
8. Duygu Ince 2010. Reproduction Performance of Saanen Goats Raised Under Extensive Conditions. *African Journal of Biotechnology* 9(48), 8253-8256.
9. Fekadu B, Soryal K, Zeng S, Van Hekken D, Bah B, Villaquiran M 2005. Changes in goat milk composition during Lactation and their effect on yield and quality of hard and semi-hard cheeses. *Small Ruminant Research* 59 (1), 55-63.
10. Göncü C, Yurtman IY, Savas T 2005. Besleme düzeyinin disi cebicilerde büyüme ve üreme özellikleri üzerine etkileri. *Süt Keciçiliği Ulusal Kongresi, Sayfa*, pp. 95-101, İzmir.
11. Haenlein GFW 1988. The value of goat and sheep to sustain mountain farmers. *Int. J. Anim. Sci.* 13, 187-194.
12. Jančić S, Antunac N 1986. Neka osnovna saznanja o importiranom alpinom kozama. *Poljoprivredna znanstvena smotra* 7, 371-381.
13. Jean-Claude Le Jaouen 2005. Proizvodnja kozjeg mleka i sira u Francuskoj. *Simpozijum proizvodnja i prerada kozjeg mleka zbornik radova*, str. 43-47. Poljoprivredni fakultet, Beograd-Zemun.
14. Leas-Fattback C, Peters KJ 1955. A comparative Study of performance of Egyptian goat breeds II. Growth performance and productivity. *Archiv für Tierzucht* 38 (5), 363-575.
15. Majid AM, Cartwright TC, Yazman JA, Fitz-Hugh HA, J.R. 1993. Performance of five breeds of dairy and maturing pattern. *World Review of Animal Production* 28 (2), 15-23.

16. Mavrogenis AP, Constantinou A and Louca A. 1984. Environmental and genetic cause variation in preproduction traits of damastus goats 1. Pre-weaning and post-weaning growth. *Anim. Prod.* 38, 91-97.
17. Mekić C, Petrović PM, Perišić P, Novaković Zorica 2012. Age Influence on Reproductive Indicators of Sanska Goat Breed. V International Symposium of Livestock Production. Hotel „Kontinental“, 5-7. IX 2012 Skopje, Macedonia. Book of abstracts, (43) ISBN 978-9989-9688-8-4, COBISS. MC-ID 92030730.
18. Mekić C, Trifunović G, Hristov S, Novaković Zorica 2011. Mlečne rase koza, nutritivna i tehnološka vrednost kozjeg mleka. *Ekonomika poljoprivrede, God. Vol. LVIII, CB, Si 1* pp. 340-349.
19. Mioč B 1998. Povezanost pasmine i intenziteta rasta s kemijskim sastavom jarećeg mesa. *Poljoprivredno znanstvena smotra, vol. 63, br. 4*, pp. 179-186.
20. Moaen-Du-Din M, Yanf LG, Chen SL, Hawg ZR, Xiao JZ, Ven QY, Dai M 2008. Reproductive performance of Matou goat Under sub-tropical monsoonal climate of Central China. *Trop. Anim. Health. Prod.* 40, 17-23.
21. Morand-Fehr P 1981. Growth. In C. Coll (Editor), *Goat Production*. Academic Press London, pp. 253-283.
22. Ogola TDO, Kosgey IS 2012. Breeding and development of dairy goats: Eastern Africa Experience, *Livestock Research for Rural Development* 24(1).
23. Otuma OM, Osakowe II 2008. Estimation of genetic parameters of growth traits in Nigeria Sahelian goats, *Res. J. Anim. Sci.* 2 (3), 83-86.
24. Park YW 2001. Proteolysis and Lipolysis of Goat milk Cheese. *J. Dairy Sci.* 84 (E. Suppl), E. 84-E 92.
25. Rako A 1981. Razvoj intenzivne kozarske proizvodnje (farme mlečnih koza). *Stočarstvo* 35 (7-8), str. 209-218, Zagreb.
26. Ribeiro ELA, Ribeiro HJSS 2001. Uso nutricional e terapêutico do leite de cobra. *Ci. Agrárias, Londrina*, 22, 229-235.
27. Spath H, Thume O 2000. *Ziegen halten*, 5. Authage, Eugen Ulmer Verlag, Stuttgart.
28. Steine TA 1975. Faktorar med innverknad pa økonomisk viktige eig inskopar hos geit. *Meldinger fra Norges Landbrukshegskole*, vol. 54(2), pp. 1-29.
29. Sung YY, Wu TI, Wang PH 1999. Evaluation of milk quality of Alpinc, Nubian, Saanen and Toggenburg breeds in Taiwan. *Small Ruminant Research* 33(1), pp.17-23.
30. Taskin T, Demirören E, Kaymakci M 2003. Saanen ve Bornova Kecerinde oğlak veriminin üretkenliği ve etkinliği Ege Üniversitesi Ziraat Fak. Dergisi, 40(2), 33-40.
31. Urošević M, Skalicki Z, Šakić V 1999. Fenotipska varijabilnost reproduktivnih osobina koza rase francuska alpina. *Veterinarija, God. Vol. 48, sv. 1-2, Str.* 111-117, Sarajevo.