
Performance and Adaptability of the Dorper Sheep Breed under Hungarian and Romanian Rearing Conditions

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Abstract

Dorper (DO) is a meat-specialized hair composite breed, intensively selected for growth rates, carcass quality, unselective grazing. The aim of the current comparative study was to evaluate the adaptability and performance of DO breed under Hungarian and Romanian rearing conditions. DO breed was introduced into Hungary to Debrecen University in 2008. Under Hungarian rearing conditions the DO breed maintained its non-seasonal reproduction and reproductive precocity, with maiden ewes being put to ram starting the age of 9 months. Lamb crops of 2 weaned per year are common under proper management and feeding conditions. In Romania DO breed was introduced starting 2007, with the heard-book and genetic improvement plan of the breed being established in 2009. Under Romanian farming conditions the DO rams are usually used as terminal sires which are crossed with indigenous Turcana and Tsigai breeds, being preferred by the farmers to sire the crossbreds because of the high growth rates and non-selective grazing of the crossbreds. Fertility of DO ewes and survival rates of the DO sired lambs until weaning were not affected when compared to native Turcana breed. It was concluded that DO breed has adapted and performs extremely well under both Hungarian and Romanian rearing conditions.

Keywords: Dorper, exotic breeds, hair sheep, rearing system, White Dorper

1. Introduction

The South-African Dorper is a meat-specialized easy care breed, developed from crosses of Dorset Horn and Blackheaded Persian in the 1940s, for slaughter lamb production. Under arid, low rainfall, tropical or highland climatic conditions, Dorper has the ability to perform well. As a strong and non-selective grazer it can advantageously be incorporated into a well planned range management system and thrives in less than good

pasture areas. The breed is also reputed for its reproductive performance [1, 2]. In an accelerated mating system with 1.05 lambings per year ewes have fertility rates of 85%, with a litter size of 1.41, and litter weaning weight of 18.7 kg at 94% lamb survival to weaning. Lambs gain weight quickly, mature early and may be mated at around 9 months, therefore running the rams with ewes continuously all over the year can also be an option to increase the sale number of lambs born out of season [3-5]. Dorper was introduced from France to Hungary, Debrecen University in 2008, in order to produce fast-growing lambs with high quality carcasses. In Romania Dorper breed was introduced starting 2007, with the heard-book and

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genetic improvement plan of the breed being established in 2010.

The purpose of the current comparative study was to evaluate the adaptability and performance of the Dorper breed under Hungarian and Romanian specific rearing conditions.

2. Performance of Dorper sheep under Hungarian rearing conditions

2.1. Performance of Dorper breed as a terminal sire:

The first two Dorper rams were imported to Bakonszeg, Hungary in 2006 by the Awassy Co. Farm, in order to improve the meat quality and quantity of the extensive reared Gyimesi Racka herd, without changing the sheep farming technology. To evaluate the effect of crossbreeding on weaning weight, carcass characteristics and composition an experiment was carried out with the Hungarian indigenous Gyimesi Racka breed crossed with different mutton type rams (Beltex, British Milkshoop, Charollais, Dorper, Ile de France, German Blackhead Mutton, Suffolk and Texel) managed under intensive or extensive rearing conditions. At the age of 60 days weaning weight for the seven genotypes were as follows: 16.2 kg for Gyimesi Racka purebred lambs, 18.1 kg Beltex x Gyimesi Racka, 19.3 British Milkshoop x Gyimesi Racka, 20.0 Charollais x Gyimesi Racka, 20.2 kg for Dorper x Gyimesi Racka, 19.1 kg Ile de France x Gyimesi Racka, 20.9 kg German Blackheaded x Gyimesi Racka, 20.5 kg Suffolk x Gyimesi Racka, 19.5 kg Texel x Gyimesi Racka. The results revealed that weaning weight is influenced by the genotype of sire, while there was no significant effect of paternal heterosis. Under extensive conditions F1 Dorper lambs, as expected being mid-way between their paternal means for 60-day weight. Carcass volume, boneless meat content, loin value, S/ EUROP carcass classification was also observed. The largest carcass volume, boneless meat content and loin value belonged to Texel x Gyimesi Racka lambs. After examining the conformation of slaughtered bodies it was concluded that 42.8% of the Dorper crossbred lambs was classified O+ type, 28.6% O type, 14.3% O- type and 14.3% P+ category. Summarizing the results, Dorper cross breed genotype overdone the purebred Gyimesi Racka concerning weaning weight and S/EUROP

conformation as well [6]. In 2012 Dorper x Barbados Blackbelly rams were mated with ewes belonged to four different genotypes as: Dorper x Barbados Blackbelly, Persian Blackheaded x Barbados Balackbelly, Barbados Blackbelly x Dorper and Cokanski Tsigai x Barbados Blackbelly. The aim of the study was to determine differences between the growth rates of the purebred and „hair sheep” crossings managed under intensive conditions. The experiment was made exclusively with ewe lambs. The daily gain of purebred Dorper ewes during 0-60 days of age was an average 381 g/day. (Cokanski Tsigai x Barbados Blackbelly) x (Dorper x Barbados Blackbelly) ewes had the second best daily gain results with an average 296.3 g/day. After weaning (60 days of age) the height weight gain of the purebreds started to decrease to 171.4 g/day till the age of 120 days. After weaning, the best performing genotype was (Cokanski Tsigai x Barbados Blackbelly) x (Dorper x Barbados Blackbelly) ewes with 336.8 g/days. Genotype had a significant ($p \leq 0.001$) effect on the daily gain between all the breed compositions [7]. In 2011 Dorper rams were served in Merino flocks to start a „dewooling” program. The dual-crosses had excellent viability, weaning rate and body conformation. Dorper x Merino ram lambs raised under intensive conditions had an average 26.5 kg, ewes 24.1kg weaning weight at the age of 80 days. According to the „dewooling” program the crossbred rams were sold for slaughter and the F1 ewes will be backcrossed with Dorper rams. Similar program will start in 2013 using White Dorper rams. Dr. E. Gergátz and his team in Mosonmagyaróvár/West-Hungary made White Dorper x Lacaune crossings by using cryopreserved semen imported from Canada. The young crossbred animals showed a better body conformation, however this difference disappeared when they became one year old. The evaluation of the length of the breeding season and lactation characteristics will be first evaluated in 2013.

2.2. Reproductive performance of Dorper breed in Hungary:

In 2008, University of Debrecen imported 11 ewes and 3 rams from France, than 27 ewes and 4 rams 31 from Switzerland in 2009. The first 60 White Dorper lambs were born at Mikepércs -from embryo transfer- in 2011. The frozen embryos were imported from Canada. Purebred Dorper

ewes are still in an early age - especially White Dorper - for this reason little has as yet been done on the productivity and productive efficiency of the breed. Out-of-season breeding is an important characteristic of sheep in Hungary. Marketing potential increases with year-round supply of lamb, which can occur when multiple breeding seasons are included in the reproductive management. In the previous years early lambing system was used in Debrecen but nowadays changed to accelerated lambing with three lamb crops in two years in order to increase marketing potential with year-round supply of lamb. After labour, ewes with newborn lambs are removed from the flock and placed inside a covered lambing shed typically for 7-10 days, before being moved to mixing pens with other ewe and lamb(s). The ewes lamb easily as the newborns are not so big (~2.5-3.5 kg) in comparison with Cokanski Tsigai lambs (~3.0-4.5 kg). Within a few hours of birth, lambs are sexed, weighed and ear tagged and three days after birth the lambs are docked. In the first two weeks of life the only nutrition is mother's milk for the newborns. Between 1 and 2 weeks age we introduce the creep feeding system to the lambs. In Hungary it is a beneficial way of feeding lambs, because there are a lot of multiple birth in the same time and by the time the ewe's milk production peaks (3 and 4 weeks of lactation) the lambs may be obtaining as much as 50 percent of their nutrient intake from sources than their mother's milk. In the first days of creeping the lambs prefer feeds that are finely ground and have small particles and we give them hay and range cubes. They get used to the feeding system by the time they are between 60 and 70 days at the time of weaning. After the early weaning the lambs are placed for a high concentration diet for finishing. The diet consist corn and barley, oat mixed with pelleted protein-vitamin-mineral supplement, hay and salt. It is a high energy diet which promotes accelerated lamb gains.

Dorpers have a very early maturing rate. Ewes can be bred starting at 7 months. Rams can start breeding at 4 months of age. Under Hungarian climatic conditions purebred ewes also reached puberty in an early age (5 month), but nutrition and season of birth also had an effect on the age of maturity. Under the same rearing conditions Dorper x Barbados Blackbelly and Dorper x Blackheaded Persian crosses reached puberty earlier, at the age between 4.0 - 4.5 month [8].

In Debrecen, Dorper maiden ewes are exposed to the rams at the age of 9 or 18 month and joining period lasts from six to ten weeks. In 2012 the well grown and properly managed maiden ewes registered 93% fertility rate and 45% twinning rate. The pre-weaning survival of Dorper lambs was cited at approximately 0.97 and the weaning loss was 5-10%. These prolificacy and lambing rates compare favourably with some of the moderately prolific wool breeds in Hungary.

Under Hungarian climatic conditions some andrological parameters were also estimated. From the literature it is clear that reproductive efficiency of rams is influenced by age, nutrition and climatic factors as well, though rams are less affected than ewes. In Hungary Dorper lamb rams reached puberty at 6-7 month of age, but used only at the age of 12-14 month for semen collection. In 2012 semen was collected all year around, once per week from mature Dorper rams and seasonal fluctuation was observed in some andrological parameters. Semen volume was greatest in autumn (1.4 ± 0.5 ml) and lower in spring (1.3 ± 0.4 ml), the concentration of semen was lightest in spring ($2.6 \pm 1.5 \times 10^9$) and summer ($3.3 \pm 1.5 \times 10^9$) compared with fall ($4.1 \pm 1.1 \times 10^9$) season. Regarding total sperm number/ejaculate ($\times 10^9$), scrotal circumference (cm) all seasons differed significantly ($p \leq 0.05$), but motility (%) was not affected by seasonal change [9]. In summer, high daily temperature (above 30°C) had a beneficial effect on semen quality. When temperature increased to 30 °C the proportion of live spermatozoa and motility decreased to 60-65% from the expected 80-85% [10]. There was some degree of seasonality in semen parameters, but only high summer temperature had a detrimental effect on sperm production. To avoid Dorper rams from summer heat stress they are sheared, not to have full fleece during the summer and breeding season.

3. Performance of Dorper breed under Romanian rearing conditions

Accounting for 11.33 million breeding sheep [11], the Romanian national flock holds the third place among European countries, after the United Kingdom and Spain. The sheep industry in Romania registers an increase in the number of animals of 3-3.5% annually. While incomes registered in the last 5 years from the sheep sector

are orientated primarily on the meat production covering 70% from the farmers' total income, followed by milk production with 25%, while less than 5% is registered from the wool and skin productions [12].

In Romania, two indigenous and natural strains can be mostly found, breeds belonging to the Zackel and the Tsigai/Ruda groups. The most important breed is represented by Turcana belonging to the East European Zackel group, which accounts for over 75% of the national flock, followed by the Tsigai group, which accounts for 23% of the national flock. Merino strains are representing around 7-8% of the Romanian flock [13]. Lamb production although is the most important for the Romanian sheep industry, is based on multi-purpose breeds (selected initially for milk-meat-wool productions), while no native meat-specialized breed exists. The crossbreeding accounts for less than 1.7% at national scale and its being practiced mostly in lowland conditions, especially in western part of Romania, breeders farming in highlands preferring to rear indigenous pure breeds because of their organic resistance and suitability to „low input” extensive production systems [14].

Native sheep breeds register low growth rates of 140-160 g/day under extensive pasture-based rearing conditions, and carcass quality need much to be improved, currently most of the lambs produced by Turcana and Tsigai breeds are ranked in O and P classes at slaughterhouses according to the EUROP classification system [15].

As a general conclusion, there is much need for improvement of both growth rates and carcass quality in the Romanian sheep industry. For this, a set of experiments to test breed complementarity between Romanian native breeds and meat specialised sire-breeds was implemented, following imports of English breeds such as Hampshire Down and Suffolk, and South African indigenous Dorper.

3.1 Performance of Dorper breed as a terminal sire:

Researches that followed crossbreeding of Dorper breed with native Romanian breeds and composite-breeds were done under both semi-intensive and extensive rearing conditions. The differences between the two systems are being mainly in the feeding, housing and general management practices. The extensive systems

implies a average stoking rate of 6-7 animals/hectare, using natural pastures, no or very little concentrates inputs, no indoor housing or housing the animals for a short time period during winter, practicing one lambing/year, with an average age of the ewes at first lambing of 24 months. Semi-intensive production system implies the use of a higher stoking rate of 12 animals/hectare, pastures are typically improved or cultivated, with the use of moderate concentrates quantities, especially during the winter season, and also some of the breeders use the three lambings in two years system.

In the first research-trial, in order to test breed complementarities between Dorper breed and local genotypes under semi-intensive rearing conditions, purebred Dorper rams were mated with ewes belonging to four genotypes, two Romanian indigenous breeds, Turcana and Tsigai, and two composite breeds, the prolific F₁ Bluefaced Leicester x Turcana and F₁ Dorper x Turcana. Experiments were done exclusively on male lambs, which were weaned at the age of 60, when they were send to the slaughter-house. Immediately after slaughter, carcass yield was evaluated commercially which means that head and the internal comestible organs were weighed as well. For control, performance of purebred Turcana lambs reared under identical conditions was monitored.

Average daily gain during first 60 days of age for the five genotypes studied were as follows: 148.1 g/day for Dorper x Turcana dual-breeds, 178.4 g/day in Dorper x Tsigai lambs, 166.2 g/day in three-way crossbreeds Dorper x (F₁ Bluefaced Leicester x Turcana), of 202.9 g/day for Dorper sired back-crosses Dorper x (F₁ Dorper x Turcana) and 133.0 g/day for the Turcana lambs from the control group. Commercial carcass yields for the studied genotypes were of: 58.0% for Dorper x Turcana crossbreeds, 60.7% for Dorper x Tsigai, 58.7% for Dorper x (F₁ Bluefaced Leicester x Turcana), 62.0% for Dorper x (F₁ Dorper x Turcana) genotype and 56.0% in Turcana purebred male lambs. Differences for both studied traits were statistically significant ($p \leq 0.001$) for Dorper x Tsigai, Dorper x (F₁ Bluefaced Leicester x Turcana) and Dorper x (F₁ Dorper x Turcana) genotypes when compared with Turcana, and ($p \leq 0.01$) for Dorper x Turcana genotype respectively. Results registered in this research-trial lead to the conclusion that Dorper rams can

be used as terminal meat specialized sire for improving both growth rates and carcass yields in crossbred lambs reared semi-intensively which are to be produced and marketed as light-lamb for Easter celebrations.

In the second research-trail, which aimed to evaluate the effects that crossing Dorper rams with indigenous Romanian Turcana ewes have on growth rates and survivability of F₁ crossbred lambs when managed in an extensive rearing production system. Average daily gain of F₁ Dorper x Turcana lambs during the interval 28-90 days of age was on average of 226 g, being significantly higher ($p \leq 0.001$) when compared to Turcana purebred lambs who gained, on average 173 g/day. Researches shown that at the age of 8 months, crossbred lambs had an average weight of 44.6 kg, a significantly higher weight than those from the control group ($p \leq 0.001$), which registered 36.7 kg. Differences of 7.9 kg/marketed lamb could prove valuable for the overall profitability and returns for the sheep farmers that will adopt crossing Dorper rams with indigenous Romanian Turcana ewes. Survival rates of lambs until the age of slaughter (240 days) was not affected by the genotype ($p > 0.05$), averages being 88.4% for F₁ crossbred lambs and 88.8% for purebred Turcana lambs [15].

3.2. Performance and adaptability of Dorper breed in western Romania:

In the year 2007 a number of 6 pregnant ewes and two unrelated rams were imported into Romania. Because of the low number of animals, in order to avoid inbreeding, imports of stud book animals are being practiced. Due to the good results registered in crossbreeding native breeds with Dorper rams, Dorper breed popularity is in permanent growth. Therefore, in year 2010 the Romanian National Agency for Genetic Improvement and Reproduction in Animal Husbandry has approved the genetic improvement plan of the breed, alongside with the setting up of the breed's Herd-Book. Currently, there is one commercial farm that practices pedigreed Dorper breed rearing, which also was included in the performance testing program, with over 40 animals being included in the newly established Herd-Book.

Based on performance testing, the lambs registered an average daily gain of 260-270 g/day. While ewes registered conception rates of 93-94%

when exposed to rams during autumn season, and rates of 40% when put to ram during spring period. Dorper ewes improved their conception rate during outside the normal breeding season when melatonin implants were used, registering averages of 85% in adult ewes.

Litter size of the Dorper ewes reared in western Romania is similar with that reported by other authors from countries with temperate climate, being on average of 135-140% during spring lambings, and of 120-125% under accelerated mating system with a additional lambing following the spring mating.

Purebred lambs' survival rate averaged between 92-94%, lower limits for twin and triplet lambs and higher survival rates for single born lambs. Dorper maiden ewes proven to be precocious, registering conception rates of over 80% when put to ram at the age of 8-9 months, when they reached body weights of 50-55 kg. Adult Dorper ewes (≥ 2 years) reached body weights of 70-75 kg, significantly more compared to native breeds which reach weights of 45-50 kg in Turcana breed [16] and of 50-55 kg in Tsigai breed [17].

4. Conclusions

► Dorper breed proved that it can be used as a terminal sire in Hungary. Dorper x Gyimesi Racka, Dorper x Merino and Dorper x hair sheep crosses have the potential to produce lamb efficiently under marginal conditions and are suited for lower input, more sustainable production systems as well.

► Dorper ewes managed under Hungarian rearing conditions are capable to out of season breeding, therefore accelerated lambing can be performed without any hormonal treatments. The ewes have a great production potential, resulting in 93% fertility and 45% twinning rate, also lamb crops of 2 weaned per year are common under proper management and feeding conditions.

► Dorper breed proven to be highly adaptable, performing well under the Romanian farming conditions. Registering reproduction rates similar as those from its native country (93-94% fertility and 135-140% prolificacy), with good survival rates of the purebred lambs from birth to weaning (92-94%).

► Breed complementarities between Dorper and native Romanian breeds clearly exists, especially when crossbreeding the rams with indigenous

Turcana ewes, improving significantly ($p \leq 0.001$) both the growth rate in crossbred lambs as well as the carcass quality.

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References

1. Lategan, D., Dorpers: Into the new century, Brochure & Training Manual, Dorper Sheep Breeders' Society of SA, & Dolf Lategan, 2004, pp. 5-9
2. Székely, T., Dorper sheep have attractive properties, *The Organic Farmer*, 2011, 68, 3
3. Milne, C., The history of the Dorper sheep, *Small Ruminant Research*, 2000, 36, 99-102
4. Kovács, A., Kukovics, S., Jávora, A., Dorpers, the meat sheep of the future, *Analele Universitatii din Oradea, Fascicula: Ecotoxicologie, Zootehnie si Tehnologii de Industrie Alimentara*, 2008, 7, 272-275
5. Cloete, S.W.P., Snyman, M.A., Herselman, M.J., Productive performance of Dorper sheep. *Small Ruminant Research*, 2000, 36, 119-135
6. Kukovics, S., Németh, T., Molnár, A., Jávora, A., Nagy, S., Toldi, Gy., Lengyel, A., Az extenzíven tartott gyimesi racka juhok hústermelésének fejlesztése különböző húsfajtákkal végzett keresztezésekkel, *AWETH*, 2008, 4, 265-272
7. Kakuk, Zs., Dorper és keresztezett bárányok teljesítményvizsgálata, Master thesis, University of Debrecen, 2012, pp. 56.
8. Gyimóthy, G., Reproductive seasonality in various genotypes of female sheep, Doctoral thesis, University of Debrecen, 2011, pp. 101
9. Budai, Cs., Oláh, J., Egerszegi, I., Jávora, A., Kovács, A., Scrotal circumference and semen characteristics of Dorper rams in different seasons, *A jövő tudósai - a vidék jövője*, PhD konferencia, 30. november 2012.
10. Oláh, J., Fazekas, G., Vass, N., Pécsi, A., Kovács, A., Jávora, A., Dorper kosok nyáron végzett ondóvizsgálata, In: Kukovics S - Jávora A., A juhtenyésztés jelene és jövője az EU-ban, *Licium Art Kiadó*, Debrecen, 2008, pp. 337-346.
11. Reports of the Romanian Ministry of Agriculture and Rural Development, for the year 2011, retrieved on 6 March 2012 from: <http://www.madr.ro/pages/page.php?self=015&sub=01501&tz=0150103>
12. Padeanu, I., *Productia de carne la ovine*, Ed. Mirton, 2011, pp. 3-6
13. Reports of the Romanian National Agency for Genetic Improvement and Reproduction in Animal Husbandry for the year 2010, Retrieved on 5 March 2012 from: <http://www.anarz.eu/Anarz Administrator Site/ CMS Content/ RAPORT% 20DE% 20ACTIVITATE/ Raport% 20de% 20activitate% 20ANARZ % 202010. pdf>
14. Belibasaki, S., Sossidou, E.N., Gavojdian, D., Local Breeds: Can they be a Competitive Solution for Regional Development in the World of "Globalization"? The Cases of Greek and Romanian Local Breeds, *Scientific Papers: Animal Science and Biotechnologies*, 2012, 45 (2), 278-284
15. Gavojdian, D., Csiszter, L.T., Padeanu, I., Pacala, N., Erina, S., Ilie, D., Tripon, I., Researches regarding growth rates, survivability and carcass quality in F1 Dorper x Turcana lambs reared extensively, *Journal of Food, Agriculture & Environment*, 2012, 10 (2): 617-619
16. Padeanu, I., *Biotehnici de reproducere la ovine*, Ed. Mirton, 2012, pp. 9-12
17. Voia, S.O., *Ovine si caprine - ghid practic de crestere*, Ed. Waldpress, 2005, pp. 70-73