

The Effect of the BCS and the Age of Hungarian Merino Ewes During Pregnancy on Reproduction

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Abstract

In research, we looked for the answer to how the number of offspring is affected by the BCS of ewes at mating, during pregnancy and at lambing and the age of the ewes. We examined body condition scoring (on a 5-point scale) on 60 Hungarian Merino ewes from the beginning of the breeding season until lambing. The BCS values (2.29) of triple lambed ewes were significantly higher compared to the condition score of one- and two lambed ewes (1.55, 1.58). Two-year-old ewes gave birth to 1.84 offspring on average, this value only slightly decreased until 3-5 years of age. The number of offspring of 6-year-old animals was the highest (2.13). The old (7-8 years old) ewes gave birth to only one offspring, their condition was low both at fertilization (1.55) and at lambing (3.18) compared to those that gave birth to more. The average condition of ewes during pregnancy was significantly higher for animals that gave birth to two or three litters (2.12; 2.20) than for animals that gave birth to one (1.58). In the relationship between body condition and number of offspring, there was a loose, positive correlation, both at fertilization ($r=0.206$) and at lambing ($r=0.265$). In summary, we can declare that the ideal BCS at mating age condition is 3,5, for multiple twins and the ideal age for ewes is 2-6 years, in the case of Hungarian Merino ewes.

Keywords: age, BCS, ewes, lambing, mating, offspring number

1. Introduction

Body condition is a condition that changes cyclically depending on the production and reproduction phases, as body condition has a phenotypic relationship with production and reproduction properties, the health of the animal, and its ability to use feed [1].

Effect of body condition during the mating season:

Examining Lori-Bakhtiari sheep, it was determined that the mating BCS value of the ewes should be kept in the range of 3-3.5 to optimize their profitability [2]. Other authors investigated the effect of the mating BCS of the ewes on the lambs. They found that, the fertility rate, litter size

were higher in the medium and fat groups (BCS = 2.5–4.0) than thin and very fat groups [3]. That ewes of greater live weight and/or those offered higher levels of nutrition prior to breeding are more likely to be multiple-bearing [4;5]. But as BCS increases, the relative gain in ovulation rate might also be reduced and that ewes of higher BCS will be less responsive to improved nutrition in comparison with ewes of low BCS [6].

Effect of body condition during pregnancy:

Malnutrition of ewes during late gestation and early lactation not only affects BW and BCS of dams but also size of fetus and growth in lambs with negative effects on productive life span of sheep [7; 8]. The energy balance of a ewe is an important factor in determining the number and weight of lambs weaned. Therefore, it might be expected that ewes of lower BCS will display reduced reproductive performance in comparison with those of greater BCS [5]. Another study

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showed that housed Ossimi ewes of BCS of 1.5 and 4.0 were more likely to lose pregnancies than ewes of the intermediate BCS. That is, both low and high BCS can be detrimental to embryo survival [9].

Effect of age of ewes:

Ewes have the highest conception rate at 4-6 years of age. The number of lambs per ewe is the highest at 6 years of age. But there can be significant differences between breeds: Suffolk at 1-5 years of age, Dorset at 6-9 years of age has the most lambs [10]. In research, we looked for the answer to how the number of offspring is affected by the BCS of ewes at mating, during pregnancy and at lambing and the age of the ewes.

2. Materials and methods

We examined 60 Hungarian merino ewes, from the beginning of the mating period until the birth of the lambs, over a period of 5 months. We used harem mating in the farm. The Hungarian merino ram was among the ewes for 4 weeks, where the age of the ewes varied between two and eight years. Starting with mating, we performed monthly body condition evaluations on the ewes. Body condition scores were determined using the Kilkenny five-point evaluation method defined by Church in 1991, which is a method specially

developed for pregnant ewes [11]. During the scoring, the sharpness of the spinous processes and transverse processes of the lumbar vertebrae, the fullness of the long back muscle and the covering of tallow were given great emphasis. The determination of the condition scores was carried out using a five-point evaluation method, which is a method specially developed for pregnant ewes. During the research, we recorded the birth date of the ewes, the number of lambs born, the monthly BCS (Body Condition Scoring) - on a 5-point scale, the age of the sheep, and the days of fertilization. We determined this by counting back 150 days from the birth date of the lambs. We also recorded the BCS of ewes at fertilization and lambing. To evaluate the data, we used one-factor analysis of variance and correlation analysis with the SPSS 26 program.

3. Results and discussion

Changes in average body condition during pregnancy according to age of ewes
 Ewes between the ages of two and eight took part in the study. As a first step, we examined the evolution of the average pregnancy body condition score according to age of ewes (Figure 1). During the 5 months of pregnancy, the average condition score of the two-year-old animals was the highest (BCS2.05).

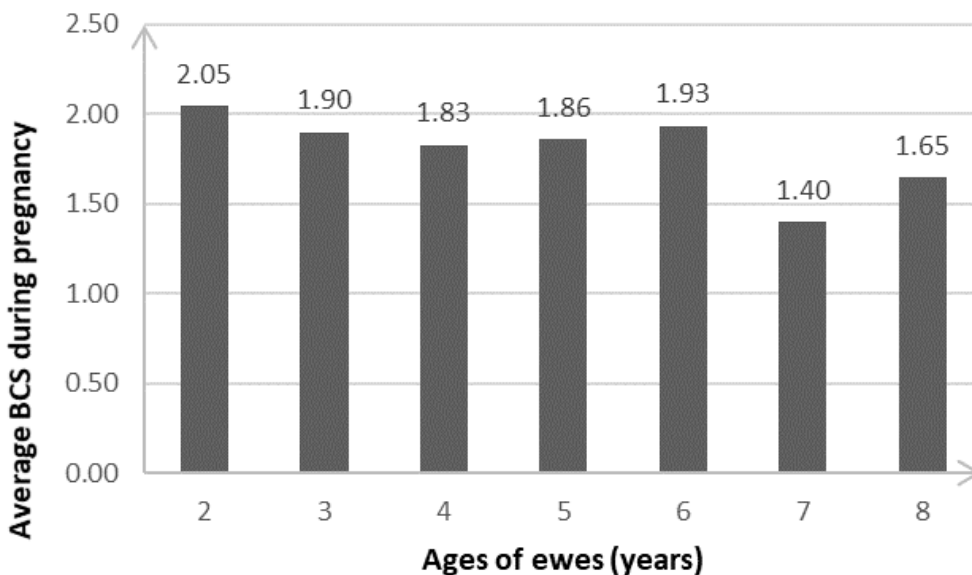


Figure 1. Average pregnancy body condition score depending on age of ewes

Compared to this, the values of 3-6 year old ewes decreased only slightly. However, the bodies of the 7- and 8-year-old animals were already more affected by pregnancy, so their condition score (BCS) was lower (1.40; 1.65). However, the statistical analysis did not reveal a significant

difference between BCS ($p < 0.05$).

The change in the number of offspring according to ewes of ages: Two-year-old ewes gave birth to an average of 1.84 lambs, and these values only slightly decreased from three to five years of age (Figure 2).

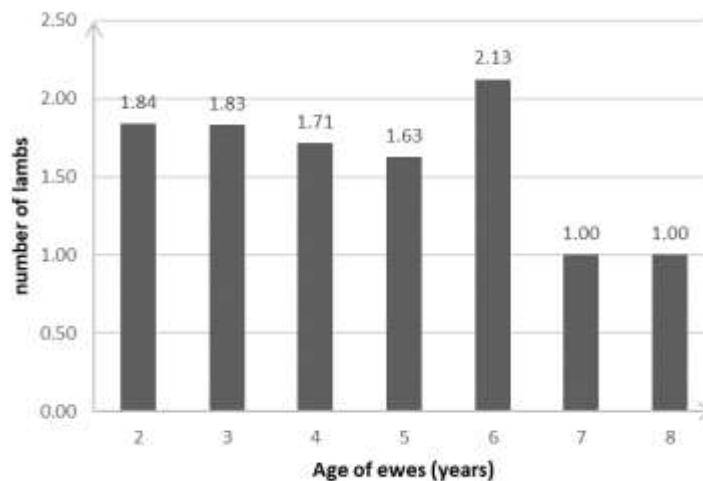


Figure 2. The number of offspring depending on age of ewes

However, we can see that the six-year-old animals gave birth to the most offspring (2, 13). On the other hand, the older, 7- to 8-year-old animals gave birth to only one lamb, which is significantly less than the values of the younger ewes ($P < 0.05$). Dickerson and Glimp, also found that the number of lambs per ewe is the highest at 6 years of age. But there can be significant differences between breeds: Suffolk at 1-5 years of age, Dorset at 6-9 years of age has the most lambs [12]. Ewes have the highest conception rate at 4-6 years of age.

Body condition at fertilization and lambing based on the number of offspring:

Examining the fertilization body condition, we can see (Figure 3) that the BCS of the ewes that gave birth to one lamb was the lowest (3.18). Those ewes that gave birth to two or three lambs had a higher BCS measured at fertilization (3.55; 3.57), although there was no statistically difference between the values.

According to Vatankhah et al, the optimal BCS of ewes is from 3 to 3.5 during the mating season, in this case the reproduction number and the profitability of the herd are the highest [13]. In our own study, the BCS at fertilization was also in this range in the case of one, two and three litters. However, the ewes with BCS 3 gave birth to only

one lamb, while those with a BCS of around 3.5 gave birth to two or three. It should be noted that the animals that gave birth to one lamb were old, 7-8 years old (Figure 2), so not only the body condition at fertilization is responsible for the number of offspring, but also the age of the ewes.

According to Boudreau et al. lean or very fat ewes have a low fertility rate and fewer mature follicles [14].

Meyer reported that low BCS has adverse effects on uterine function, ovulation rate and embryo yield [15]. In our study, the ewes that were thin at the time of mating gave birth to only one lamb. Yilmaz et al. found significant effects of BCS on pregnancy rate, lambing rate ($p < 0.05$) and fecundity ($p < 0.05$). The BCS for the highest pregnancy, lambing rate, and fecundity was determined between 2.01 and 3.00, while the lowest rates for these traits were ≤ 1.50 [16].

So, according to them, lower BCS values were ideal.

The relationship between the body condition and the number of offspring at lambing shows (Figure 3) that the BCS values of one- and two-lambing ewes are practically the same (1.55; 1.58) and low. Ewes that gave birth to three were in much better condition (2.29) at lambing. These values

are different from the expected results, as we would think that the development of the three lambs takes the most nutrients from the mother's body, so her BCS will be the lowest by the end of the pregnancy. However, the BCS values of ewes with three lambing were significantly higher compared to the BCS of animals with one and two lambing. In all three groups, the values of the lambing BCS are significantly lower than the results measured at fertilization. The biggest difference in the body condition points was in the

case of the one and two lambing sheep (1.63; 1.97). At the end of the pregnancy, the BCS of ewes that gave birth to three fell by only 1.28. This result also shows that the body of the ewes that gave birth to three tolerated the pregnancy the best. Probably because they were in much better body condition at fertilization than the other two groups and they kept this better BCS during pregnancy. The mothers that gave birth to one and two were thin (BCS 1.55; 1.58) at the time of lambing.

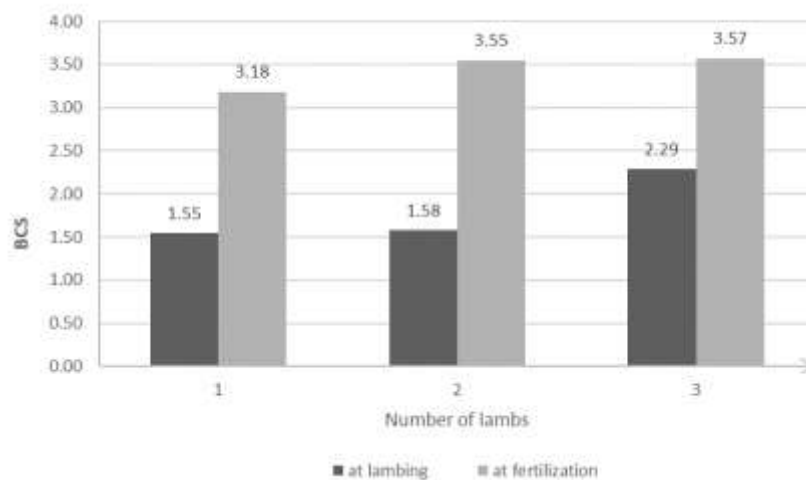


Figure 3. Body condition at fertilization and lambing based on the number of offspring

Changes in body condition according to the number of lambs during pregnancy:

The ewes with one lamb had the lowest BCS at the beginning of pregnancy (2.5) and their body condition continuously decreased during pregnancy. At the end of pregnancy, the animals were already very thin (BCS 1.0). The BCS values of ewes with two and three lambs developed similarly during pregnancy (Figure 4).

The BCS was lowest in the middle of pregnancy (1.7), and then increased at the end significantly compared to ewes with one lamb. However, the BCS of ewes with three lambs improved more significantly than ewes with two lambs. The BCS of ewes with three ewes was 2.9 at the beginning

of pregnancy, 1.7 in the middle, and 2.5 at the end, in the case of Hungarian merino sheep.

Correlation between body condition and reproduction number:

In the relationship between body condition and the number of offspring, there was a loose, positive correlation, both at fertilization ($r=0.206$) and at lambing ($r=0.265$). However, the correlation value between BCS at lambing and offspring number showed a stronger correlation ($p<0.05$). Kleemann et al. [17] and Saul et al. [18] in a herd analysis with Merino ewes, Newton et al. [19] with Masham ewes all reported that the BCS of the ewes during mating and/or mid-pregnancy showed a positive correlation with the number of lambs chosen.

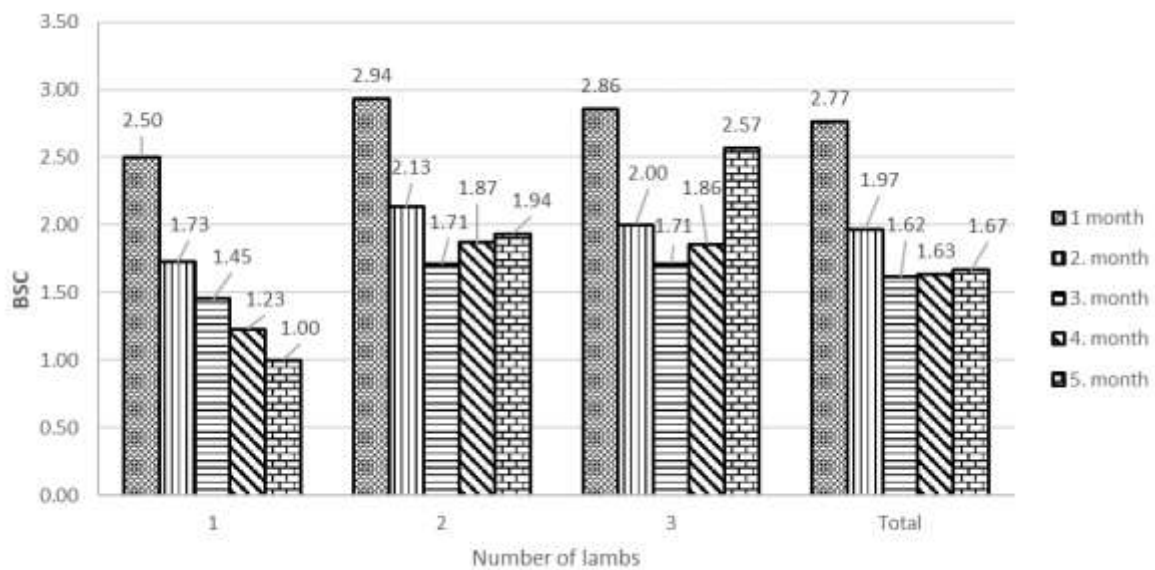


Figure 4. Changes in body condition according to the number of lambs during pregnancy

4. Conclusions

Based on our results, we can conclude that in order to have a higher reproduction number and more triplets, the appropriate body condition point (BCS) for mating is 2.3, and at lambing 3.6 in Hungarian merino sheep. The ideal BCS is 2.9 at the beginning of pregnancy, 1.7 in the middle and 2.5 at the end it. The reproduction number of 2 years old ewes was 1.84, but the highest number of offspring was achieved 6 years old animals (2.13). The ideal age is 2-6 years, based on the number of offspring. The old (7-8 years old) ewes gave birth to only one lamb, their body condition was poor both at fertilization (1.55) and at lambing (3.18) compared to those that gave birth to more. The result shows that age also plays a significant role in the development of the number of offspring. Ewes with three lambs had the easiest the pregnancy. Probably, because this group had the highest fertilization condition (2.3) and due to their age, they were at the peak of their reproductive capacity. The BCS values at parturition were significantly lower in the groups with one, two and three litters than the results measured at fertilization. Equally, the BCS values at lambing were significantly lower in the groups with one, two and three litters than the results measured at fertilization. In the relationship between body condition and the number of offspring, there was a loose, positive correlation,

both at fertilization ($r=0.206$) and at lambing ($r=0.265$).

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