THE BODY CONDITION SCORING SYSTEM OF DAIRY COWS (review)

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ABSTRACT
The body condition scoring system (BCS) is a means of accurately determining body condition of dairy cows, independent of body weight and farm size. The body condition scores represent a subjective visual or tactile (or both) evaluation of the amount of subcutaneous fat in a cow. The system is a useful method of evaluating body energy reserves and is used widely for evaluating nutritional status in dairy cows. Changes in BCS reflect both the body composition and energy balance, which in turn, are critical for metabolic stability, health and fertility. The objective of this study is to present the role of body condition scoring system in dairy management. The main focus is the impact of changing BCS on milk production, changing of body weight and reproduction. The advantage of the body condition scoring system of dairy cattle is that the grouping of stocks is easier with it and the deficiency of feeding and keeping system can be detected. The body condition scoring system is a little labour-intensive, but the application of the method will be returned in milk production. The use the method in the practice is worth considering based on economic and physiological criteria. The aim of this study is to present how useful the body condition score system for the farmers.

Keywords: body condition scoring system, milk production, energy reserve, nutritional management, reproduction management

INTRODUCTION

The Holstein-Friesian cow is the first among milking cows in the world nowadays. This type gives 97 percent of the controlled milking herd in our country. The Holstein-Friesian cattle are very sensitive to changes in their environment, which is particularly true for feeding. The cows have different needs compared to the feed consumed at the different stages of lactation. Care should be taken at the beginning of lactation, because it is difficult to satisfy the nutrition needs of the high production dairy cows, therefore the cows lose from their body reserves due to the high milk production. In most cases the excellently producing cows with ideal appearance get out of the production earlier than the others. The significant milk production yields are shown in the production parameters of the Hungarian stocks; in December 2010 the stock average ranked first place in Hungary was 33.38 kg (ATKFT, 2010).The breeders have to face many problems beyond the outstanding milk production. In recent decades the useful lifetime decreased, reproductive disorders and common metabolic disorders appeared, so infertility is common and, re-conception is delayed etc. (BERTA, 2010).It is because of these problems, among others, that Hungarian and international breeding management organisations have increased concern regarding the body strength and the useful lifetime of the animal in addition to milk production. The body condition scoring also has been part of the linear type classification in Hungary since 2007.The Hungarian (BRYDL, 1994; BÁDER ET AL., 2002; GERGÁCZ, 2009; TŐZSÉR ET AL., 1995) as well as the international (EDMONSON ET AL., 1989; HADY ET AL., 1994; RUEGG AND MILTON, 1995) literature refers to the advantages of the body condition scoring system. Using the body condition system in our country has been mainly adopted for meat type herds. This method is not widespread in farm practice, which is particularly true for dairy farms.

DISCUSSION

Relationship between BCS and daily milk yield

In practice, the grouping of cows in nutritional groups is based on milk production, reproductive cycle and body condition scoring. The cows are usually grouped monthly, after milk recording. The results of the relationship examination between body condition and milk production (DOMECQ ET AL., 1997; DILLON ET AL., 2003; WATHES ET AL., 2007) are different. A number of studies did not confirm relationship between body condition and milk production (MARKUSFELD ET AL., 1997; HEUER ET AL., 1999; BERRY ET AL., 2002). KADARMIDEEN (2004) found a negative (range, –0.50 to –0.39) genetic correlations of BCS with milk, fat and protein yield. Several authors (WALTNER ET AL., 1993; RUEGG AND MILTON, 1995; BEWLEY AND SCHUTZ, 2008) refer to the research by FROOD AND CROXTON (1978). Their publications confirmed that the cows lean at calving (with BCS <2) produced below their potential milk yield whereas those calving with BCS above 2.5 produced according to their expected potential milk yield. According to DOMECQ ET AL. (1997) an increase in BCS during the dry period resulted in an increase in milk yield and the milk -yield –acceleration after calving. Body condition score at calving and nadir as well as loss of body condition score between calving and nadir has significant effects on milk production, which also reflects in body weight change. (ROCHE ET AL., 2007). According to the study of PEDRON ET AL. (1993) and RYAN ET AL (2003) the cows with the higher BCS at calving had a higher milk yield in early lactation than those with the lower BCS. SAMARÜTEL ET AL. (2006) divided the cows into three groups based on their BCS at calving (thin: BCS <3.0; moderate= BCS 3.25-3.5 and fat: BCS >3.75). In they study it was found that the fat cow group had higher fat corrected milk (FCM) production during the 305-day lactation period. According to HORN (1961) the BCS at calving affects the fat and protein content of milk. Cows calving in better body condition produce milk with more fat content that cows calving in poorer BCS. MARKUSFELD ET AL. (1997) report that the effect of BCS at calving on milk fat content is most pronounced in the first 90 days of lactation. BERRY ET AL. (2007) observed that cows that lost more condition in early lactation produced more milk of greater fat and protein concentration. This process has not been confirmed when cows lost more than 1.5 to 1.75 BCS units. According to HOLTER ET AL. (1990) the milk fat concentration of cows underconditioned at calving will be lower, but the poor condition does not have any effect on the milk yield. The BSC and the changes in BCS during the dry period also affect milk yield. CONTRERAS ET AL. (2004) estimated the BCS at the end of the dry period, and they found that the cows with BCS ≤3.0 produce more milk than cows with BCS ≥3.5 during early lactation. GYÖRKÖS ET AL.(2002) examined the pre-calving BCS for first lactation heifers. Based on their hypothesis the effect of an undesirably excessive fat condition (BCS 4.1-5.0) causes lower milk yield in the first lactation, and further decreasing can be observed in the second lactation. STOCKDALE (2005) also observed in his experiment that the milk production was better and the milk fat content was higher in case of the cows with higher BCS at calving. The increased body fat reserves mobilisation in the lactation results in decreasing BCS, which is typically accompanied by high milk production (ROESCH ET AL., 2005; BINES, 1976; Hart ET AL., 1979). It is generally observed that the cows with high milk yield have a greater BCS loss during the lactation than the lower producers (GALLO ET AL., 1996; CUTULLIC ET AL., 2009). This process may be related to the fact that there are differences in energy intake and milk production during the lactation.

Relationship between body condition and reproduction

The reproduction of dairy cattle is a very complex trait. There is negative relationship between the increasing milk production and reproduction (BUTLER, 2000; HUSZENICZA ET

AL., 2003; PRYCE ET AL., 2004; GUTIERREZ ET AL., 2006). At the beginning of lactation, the milk production has a definite priority over the reproduction (FERGUSON, 2001). The declining fertility results have been verified during recent decades. BUTLER (1998) reported in his study that in the U.S.A. the proportion of cows pregnant in the first insemination was 65% in 1951 while it was only 40%.in 1996. In the UK ROYAL ET AL. (2000) analysed the changes of this very same parameter between 1975-1982 and 1995-1998, and found that the pregnancy rate to first service declined from 55.6% to 39.7%. The antagonism between the improving milk production and deteriorating reproduction may be partially explained by the changes in the genetic bases. The cumulative incidence of reproductive and other disorders as consequences of insufficient nutrition (especially lack of energy) due to the increased milk production is more important. According to LUCY (2001) the declining fertility is probably a combination of a variety of physiological and management factors that have an additive effect. The management, feeding, milk production and genetics are the main reasons of the declining reproduction parameters in modern dairy cattle (CHAGAS ET AL., 2007; TAMADON ET AL., 2011). The negative energy balance is a prominent risk factor for the low fertility (SAMARÜTEL ET AL., 2008). The extent and duration of the energy deficiency period after calving are associated with the low fertility after ovulation (KÁTAI ET AL., 2003; BUTLER, 2005). According to SZENCI (1999) the sooner the cows restore their EB, the sooner they will start cycling. The energy deficit is well controllable by the change of the condition. Body condition change from 50 to 80d after calving significantly affects the reproduction parameters. One unit or more loss of BCS (on a five-point scale) extend the dates of the first ovulation, the first recorded oestrus, and the first insemination. The proportion of pregnancy at first service is smaller and the fertility index is higher in these cows. HOEDEMAKER ET AL. (2009) showed that body condition loss in the dry period is related to the higher proportion of reproduction disorders. GILLUND ET AL. (2001) did not show correlation between reproduction and BCS at calving; however they claimed that the BCS change is a good indicator of fertility results. According to MEIKLE ET AL. (2004) the primiparous cows calving with a BCS < 3 have a late resumption of ovarian activity. SAMARÜTEL ET AL. (2006) also analyzed the relationship between the BCS at calving and the reproduction. In their work they analyzed the BCS of thin (BCS<3.0), medium (BCS=3.25-3.5) and fat (BCS>3.75) cows. The best results have been observed in the group of medium BCS. None of the fat cows became pregnant in the first insemination. In contrast, the first service conception rate were 17% and 23% for the groups with low and medium BCS, respectively. The interval from parturition to first insemination was the longest in case of the cows with low BCS. According to FEKETE (1993), cows that were over-conditioned at calving had several times more periparturient disorders than cows in thin condition. The loss of BCS in early lactation is unfavorably related to reproductive performance, particularly in high genetic merit animals than the change in BCS from wk 1 to wk 10 (PRYCE ET AL. ,2001). According to TAMADON ET AL. (2011) the level of BCS change after calving greatly affects the luteal activity in high-producing dairy cows. The loss of body condition between calving and first service should be restricted to below 0.5 BCS unit to avoid a detrimental effect on reproductive performance (BUCKLEY ET AL., 2003).

Relationship between body condition and live weight

The knowledge of the body weight of dairy cows is more important from several reasons (nutrition, culling, and heifers breeding).However, the measurement of body weight can cause extra work and an extreme moving of the stock. The professional processing of the weight data is not simple, efficiency is influenced by the significant differences between the weights of the cows within the stock. The body weight is affected by body size, skeletal development, and current nutritional status (gut fill), fatness, or thinness (ENEVOLDSEN AND KRISTENSEN, 1997). The results of the analyses between the BCS and BW are different, due to the

subjectivity of BCS and the variability of body weight. In their work ENEVOLDSEN AND KRISTENSEN (1997) examined the relationship between body condition and body weight in different breeds. The result in Danish Friesians breed was r = 0.53, in Danish Jersey (r = 0.34) and in Crossbred Jersey× Red Danish was 0.57. OTTO ET AL. (1991) analysed the relationship between the two parameters, in their calculation the r^2 value in U.S. Holstein-Friesian cows was 0.62. MEIKLE ET AL. (2004) studied the relationship between the two parameters by the number of lactation. A tight correlation was found between body weight and condition regardless of the lactation number (r = 0.76 in firs lactation and r = 0.74 in later lactation). In the study of TOSHNIWAL ET AL. (2008) the genetic correlation between the two parameters was r=0.6. In their opinion that the Body weight (as a complex trait) observations should be supplemented with BCS to estimate the body composition of daughters. The daily body weight measurement combined with BCS at specific lactation stages (such as calving and first insemination after calving) could provide accurate assessment of energy balance change during the lactation. The opposite result was observed in the work of SUTTER AND BEEVER, 2000 (in: HORAN ET AL.,2005). They concluded that body weight change is an inadequate index of body tissue mobilization in early lactation because the BW can be significantly increased by gut content and water consumption. One unit of change in BCS corresponds to some BW change (21-210 kg) (WRIGHT AND RUSSEL1984; CHILLIARD ET AL., 1991; OTTO ET AL., 1991; WALTNER ET AL., 1994; ENEVOLDSEN AND KRISTENSEN, 1997; KOMARAGIRI AND ERDMAN, 1997; KOMARAGIRI ET AL., 1998; JAURENA ET AL., 2005; BERRY ET AL., 2006). According to KOMARAGIRI AND ERDMAN, (1997) one unit of change in body condition score corresponds to about 40 kg of body fat loss. The body fat mobilization in the first two months of lactation is from 15 to 60 kg CHILLIARD ET AL. (1991). One unit change in body condition corresponds to 35 to 44 kg BW loss, this resulting in 21 to 29 kg mobilization of body fat. According to WALTNER ET AL. (1994) one unit change in BCS equate to either 35 kg of body fat or 5.3% of live BW change. In their work ENEVOLDSEN AND KRISTENSEN (1997) examined the relationship between BCS and BW, the result was 22 to 57 kg per unit of decrease in BCS. TRACHSEL ET AL. (2000) also observed a significant positive association between BW and BCS. However, the value was not constant to breed and season (depended on the breed and the season). Accordig to ROESCH ET AL. (2005) the lower live weight can result in lower milk production. HORAN ET AL. (2005) found that the lactation number (parity) is also affected by BCS and BW between the calving and nadir. In their study the second-parity cows had lower BW and BCS loss between calving and nadir (50.6 kg and 0.56 point) compared with the primiparous cows (63.5 kg and 0.63, point) and third-parity ones (57.8 kg and 0.69, point).

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