

THE SEASONAL EFFECT ON THE BODY CONDITION OF DAIRY COWS IN EASTERN ALGERIA

Reçu le 28/09/2014– Accepté le 15/05/2016

L. Ghoribi¹, A. Beghriche, C. Bensari, I. Djaaleb, F. Riachi, H. Djaaleb, EH. Bererhi, O. Bouaziz

Mentouri brothers Constantine 1 University, Institute of Veterinary Sciences El Khroub Algeria¹.
loutfiveto@yahoo.fr¹

Résumé

L'objectif de cette étude est d'évaluer l'état d'embonpoint de vaches laitières à différentes étapes de la lactation et l'analyse de l'effet des saisons sur l'état corporel. De 2011 à 2015, nous avons réalisé 1210 notations, sur 564 lactations d'un effectif de 656 vaches laitières. Les valeurs moyennes sont faibles, elles sont de $2,1 \pm 0,4$ à $2,7 \pm 0,4$ au tarissement et au vêlage, de $1,2 \pm 0,4$ à $1,4 \pm 0,4$ en début de lactation et de $1,7 \pm 0,5$ à $2,2 \pm 0,5$ en milieu de lactation. Les différences dans l'état corporel entre les saisons printemps-été et automne-hiver sont hautement significatives ($P < 0,01$) au milieu de la lactation, et significative ($P < 0,05$) au début de lactation. Ces résultats montrent la nécessité de la mise en place de suivi de l'état corporel et des rations en rapport avec l'état physiologique des vaches pour améliorer la performance de la production laitière.

Mots clés: Etat d'embonpoint, bovins laitiers, saisons.

Abstract

The aim of this study is to evaluate the body condition of dairy cows at different stages of lactation and analysis of the effect of the seasons on the body condition. From 2011 to 2015, we realized 1210 scoring on 564 lactations of 656 dairy cows. The average values are low; they are between 2.1 ± 0.4 to 2.7 ± 0.4 in the dry and calving periods and 1.2 ± 0.4 to 1.4 ± 0.4 in early lactation and 1.7 ± 0.5 to 2.2 ± 0.5 in mid-lactation. The differences in body condition scoring between seasons spring-summer and fall-winter are highly significant ($P < 0.01$) in the middle of lactation, and significant ($P < 0.05$) in the early lactation. These results show the need for the establishment of a monitoring body condition and fed rations related to the physiological state of cows to improve the performance of milk production.

Keywords: Body conditions, dairy cattle, seasons.

ملخص

الهدف من هذه الدراسة هو تقييم الحالة الجسدية للأبقار في مراحل مختلفة من الرضاعة، التجفيف والولادة. وتقييم تأثير المواسم علي الحالة الجسدية. من عام 2011 إلى عام 2015، سجلنا 1210 حالة، منها 564 حالة رضاعة علي 656 بقرة حلوب. القيم المتوسطة منخفضة، فهي تتراوح بين (2.1 ± 0.4) و (2.7 ± 0.4) في التجفيف والولادة، من (1.2 ± 0.4) الي (1.4 ± 0.4) في أوائل الرضاعة و من (1.7 ± 0.5) الي (2.2 ± 0.5) في منتصف الرضاعة. الاختلافات في حالة الجسم بين موسم الربيع/الصيف، والخريف/الشتاء معتبرة جدا ($P < 0.01$) في وسط الرضاعة و معتبرة ($P < 0.05$) في بداية الرضاعة. هذه النتائج تبين ضرورة متابعة الحالة الجسدية للبقرات و الحصص الغذائية بالموازات مع الحالة الفزيولوجية للأبقار لتحسين الأداء و إنتاج الحليب.

الكلمات المفتاحية: الحالة الجسدية، بقرة حلوب، المواسم

Algeria is among the largest importers of milk powder, it is classified as third largest importer of skimmed milk powder and second largest importer of whole milk powder in 2014 (Onfaa 2014). Despite the measures taken by the public authorities for the recovery of milk production, Algeria remains dependent on external market. National milk production covers about 40% of needs (Kadi et al 2007).

All players in the dairy industry agree on the need to develop milk production at the farm level. On the other hand, several studies related to reproductive performance were discussed in dairy cattle, and most agree on infertility that characterizes our farms (Ghoribi 2000, Ghozlane et al 2003, Bouzebda et al 2006). Some authors have reported the low reproductive performance to a lack of control of reproduction (Ghozlane et al 2010, Ghoribi 2011), while others have focused on the lack of forage resources (Ghozlane et al 2003, Kadi et al 2007, Guerra 2008, Belhadia et al 2009). The weight and body condition score possibly inaccurate or subjective, are indicators of the energy status and reproductive performance after calving (Keown 2005).

MATERIALS AND METHODS

This study was carried out in dairy cattle farms in the North East of Algeria, from October 2011 to September 2015. In the study area, the climate is temperate, characterized by hot and dry summers, and mild and wet winters. This work was focused on 1210 ratings body condition and 564 lactations of 656 dairy cows. The selection of farms was done on the profile of the dairy speculation and availability of farmers to cooperate in this study. Cows are scored on a scale of 1 to 5, respectively for a state of emaciated: 1, thin: 2, medium: 3 fatty 4 and obese: 5 according to the method described by Wildman et al (1982).

To refine scores, particular attention was paid to the appearance of certain areas of the body. The changes in these regions may indicate specific categories of scores, rather than integrated description of all regions for a given body score (Ferguson et al 1994). The specific regions include the spinous and transverse processes of the lumbar vertebrae, the ileal (hook bone) and ischeal (pine bone) tuberosities, the ileo-sacral and ischeal-coccygeal ligaments, the tail head, and the thurl region. Fat deposits are estimated by palpation, visual inspection, or both. The cows are noted at each quarterly visit conducted during the months of March, June, September and December of campaigns being evaluated. The scoring of cows is carried out according to the following physiological stages:

- Drying (60 days before calving)
- Early lactation (0 and 90 days of lactation)
- Mid-lactation (91 and 180 days of lactation).

The cows are fed total mixed rations based on dry forage, straw, concentrate and green fodder. The statistical treatment was performed using the software MINITAB (1998). Comparisons of body condition scores of calving and drying period, early and mid-lactation between season's spring-summer and fall-winter were performed using analysis of variance (ANOVA).

RESULTS

THE BODY CONDITION AT DIFFERENT STAGES

The mean values of body condition scores of the drying and calving period are below the desired standards, they are between 2.1 ± 0.4 and 2.7 ± 0.4 , which is far from an objective between 3.50 and 4.00 (Kellogg 2010). The average scores of the early lactation does not exceed the score of 1.4 ± 0.4 , these values are lower than reported by Kellogg (2010) and Keown (2005), which are 2.50 to 3.00 and 1.50 to 2.00 respectively. The mean scores recorded for the middle lactation ranging from 1.7 ± 0.5 to 2.2 ± 0.5 are low compared to those (3.00) reported by Kellogg (2010). The minimum values are very low (0.5 to 1) in cows that normally are in the process of positive energy balance. Note that the lowest scores for the three phases are recorded during the campaign 2007 (Table 1).

THE BODY CONDITION AT DIFFERENT STAGES PER SEASONS

Although the average scores of the drying and calving phases observed for the fall-winter season are higher than the spring-summer season, analysis of variance showed no significant differences. Despite very similar averages, the differences are significant ($P < 0.05$) for the early lactation period through five campaign (2011-2015).

For the middle lactation, the average scores are better during the spring-summer than fall-winter seasons, with highly significant differences ($P < 0.01$). Although the mean scores of body condition are below recommended standards, the influence of the seasons begins training in early lactation, but it is more pronounced in mid-lactation (Tables 2, 3, 4).

Table 1: Body condition scores at different stages

Dry period and calving					
Years	2011	2012	2013	2014	2015
N*	26	59	76	72	66
Mean and Sd	2,1 ± 0,4	2,5 ± 0,4	2,7 ± 0,4	2,6 ± 0,6	2,5 ± 0,6
Min.	1,5	2,0	2,0	1,0	1,0
Max.	3,0	3,5	3,5	3,5	3,5
Early lactation					
N*	61	109	136	146	112
Mean and Sd	1,2 ± 0,5	1,2 ± 0,4	1,4 ± 0,4	1,3 ± 0,4	1,3 ± 0,4
Min.	0,5	0,5	1,0	1,0	1,0
Max.	3,0	2,5	2,5	2,5	3,0
Middle lactation					
N*	30	72	82	81	82
Mean and Sd	1,7 ± 0,5	1,8 ± 0,6	2,0 ± 0,5	2,0 ± 0,5	2,2 ± 0,5
Min.	1,0	0,5	1,0	1,0	1,0
*Max.	2,5	3,0	3,0	3,0	3,5

Table 2: Body condition scores during fall-winter seasons

Dry period and calving					
Years	2011	2012	2013	2014	2015
N*	4	21	23	15	28
Mean and Sd	2,8 ± 0,3	2,7 ± 0,4	2,9 ± 0,3	2,8 ± 0,4	2,4 ± 0,8
Min.	2,5	2,0	2,5	2,5	1,0
Max.	3,0	3,5	3,5	3,5	3,5
Early lactation					
N*	19	45	60	59	27
Mean and Sd	1,3 ± 0,5	1,2 ± 0,4	1,3 ± 0,4	1,4 ± 0,5	1,3 ± 0,5
Min.	1,0	0,5	1,0	1,0	1,0
Max.	2,5	2,5	2,5	3,0	3,0
Middle lactation					
N*	12	42	48	43	34
Mean and Sd	1,4 ± 0,4	1,7 ± 0,5	1,8 ± 0,5	1,8 ± 0,5	2,1 ± 0,4
Min.	1,0	0,5	1,0	1,0	1,0
Max.	2,0	2,5	3,0	3,0	3,0

Table 3: Body condition scores during spring-summer seasons

Dry period and calving					
Years	2011	2012	2013	2014	2015
N*	22	38	53	57	38
Mean and Sd	2,1 ± 0,4	2,4 ± 0,4	2,6 ± 0,5	2,5 ± 0,6	2,5 ± 0,4
Min.	1,5	2,0	2,0	1,0	2,0
Max.	3,0	3,5	3,5	3,5	3,5
Early lactation					
N*	42	64	76	87	85
Mean and Sd	1,1 ± 0,4	1,2 ± 0,3	1,4 ± 0,4	1,3 ± 0,4	1,3 ± 0,4
Min.	0,5	0,5	1,0	1,0	1,0
Max.	3,0	2,0	2,5	2,5	3,0
Middle lactation					
N*	18	30	34	38	48
Mean and Sd	1,9 ± 0,5	2,1 ± 0,6	2,2 ± 0,4	2,2 ± 0,5	2,2 ± 0,6
Min.	1,0	1,0	1,5	1,0	1,0
Max.	2,5	3,0	3,0	3,0	3,5

N*: Number of observations

Table 4: Overall means for fall-winter and spring-summer seasons

Dry period and calving			
Seasons	fall-winter	spring-summer	Degree of significance
N*	91	208	
Mean ± Sem	2,7 ± 0,28	2,5 ± 0,17	P < 0,01
Min.	1,0	1,0	
Max.	3,5	3,5	
Early lactation			
N*	210	354	
Mean ± Sem	1,3 ± 0,09	1,3 ± 0,07	ns*
Min.	0,5	0,5	
Max.	3,0	3,0	
Middle lactation			
N*	179	168	
Mean ± Sem	1,8 ± 0,13	2,2 ± 0,17	P < 0,01
Min.	0,5	1,5	
Max.	3,0	3,5	

DISCUSSION

Many authors agree that the body condition scores in dry period should be between 3 and 4, and maintained until calving, avoiding excessive gain or loss of weight (Keown 2005, and Chagas et al 2007, and Kellogg 2010). The management strategy of body condition score in early lactation is to ensure that the cows do not lose a reasonable amount of body condition during this period. Cows in the recommended scores maintain the best performance (Bewley et al 2008, Encinias et al 2000).

In our study, scores recorded at drying and calving periods are low, and the difference can exceeds 1 point, compared with recommended scores. This is not without consequences for the performance of reproductions. Body condition at dry period is strongly correlated with the calving first service interval ($p = 0.012$; $r = .61$). In addition, lean females have lower performance with a calving first service interval of 131 days and a calving conception interval of 150 days (Moffouk 2012). Indeed, Baali (2009) found that 71.5% of cows with a body condition score less than 3 (5 points scale) have a long calving first service interval (> 70 days) and 43% of cows have calving conception interval of more than 110 days.

The low scores observed are the result of poor power management. Food behavior of dairy cows as practiced, coupled with insufficient forage cause a constraint to the development of milk production. Farmers use concentrates improperly, which can lead to metabolic disorders (Kadi et al 2007). Low body condition score at calving is associated

with a reduction in early lactation the dry matter intake and increased risk of metabolic disorders (Roche et al 2009).

The use of silage is absent in almost of all farms (98.75%). In most herds, the dry period is not controlled and farmers do not seem measure its importance. In a quarter of farms, cows are fed the same way before and after dry period (Kadi et al 2007). The cows are fed the same ration, regardless of their level of production, physiological stage and sometimes even during the dry period (Kayoueche 2000). A new feeding strategy based on low energy : high fiber ration (9 MJ metabolisable energy and 130 g crude protein / kg ration dry matter) containing high levels of chopped straw and offered ad libitum as total mixed ration throughout the whole dry period is proposed by Beever et al (2006).

The influence of the seasons on the body condition may be related to the availability and quality of forage. Ghazlane et al (2003) reported that food systems depend on the forage production that is itself dependent on weather conditions. The body condition score can be a valid indicator of animal welfare (Roche et al 2009). There is a positive within-herd effect of summer grazing on the dairy cow welfare, based on an improved access to water and food (Burow 2012). So, Mouffok (2012) observed better performance in cows calving in summer than winter.

There is a strong link between nutrition and fertility, where nutrient partitioning to the mammary gland in early-lactation, when dry matter intake is reduced, results in negative energy balance and many associated disorders. Research has demonstrated that a myriad of nutritional, health and management factors (such as sub-clinical

hypocalcaemia and ketosis, endometritis and retained placenta, and lameness) will all complicate the simple picture of negative energy balance induced infertility (Alex, 2006).

CONCLUSION

The results of the assessment of the body condition at different stages show that the average scores of calving and dry periods, early and mid-lactation are lower compared to the recommended standards. This is probably the result of poor or lack management of feeding cows. The average scores of early and mid-lactation in spring-summer season are better than those of the fall-winter season. This may be related to the availability and quality of food in the spring and summer seasons.

Under the current conditions of our farms, it would be better to set up a monitoring body condition and management of feed related to the physiological state of cows. The practice of rationing must not only meet the nutritional needs of animals, but be at a lower cost.

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