J. Dairy Sci. 98:3887–3895
http://dx.doi.org/10.3168/jds.2014-9098

Effect of automatic cluster removers on milking efficiency and teat condition of Manchega ewes

J. Bueso-Ródenas,* G. Romero,* R. Arias,† A. M. Rodríguez,‡ and J. R. Díaz*[1]
*Departamento Tecnología Agroalimentaria, Universidad Miguel Hernández (UMH), 03312 Orihuela, Spain
†Centro Regional de Selección y Reproducción Animal (CERSYRA), Consejería de Agricultura y Medio Ambiente de Castilla-La Mancha, Valdepeñas, Spain 13300
‡Asociación Nacional de Criadores de Ganado Ovino Selecto de Raza Manchega (AGRAMA), Instalaciones del ITAP, 02006 Albacete, Spain

ABSTRACT

Milking operations represent more than 50% of the work on a dairy ewe farm. The implementation of automatic cluster removers (ACR) is gaining popularity, as it allows the operator to avoid manual cluster detachments, simplifying the milking routines. The aim of this study was to discover the effect on the milking of Manchega ewes over an entire lactation period by using this type of devices, set up with 2 different combinations of milk flow threshold (MF) and delay time (DT) and comparing them with the traditional method using manual cluster removal. During a 15-d pre-experimental period, the animals were milked without ACR and sampling was performed to select 108 ewes and distribute them into 3 groups of similar characteristics according to their parity, milk yield, milking duration, and mammary gland sanitary status. Later, each group was milked for a duration of 4 mo in 3 different conditions: 1 with manual cluster removal, the second setting the ACR at MF 150 g/min and DT 20 s, and the third setting the ACR at MF 200 g/min and DT 10 s. Samplings of milking fraction, milking duration, milk composition, mammary gland sanitary status, teat-end status, and vacuum level in the short milk tubes during milking were performed. The use of ACR limited the vacuum drops in the short milk tubes and the edema in the teat end after milking, although no reduction in the number of new cases of mastitis was observed and the milk composition did not change. Moreover, it was noted that the use of ACR set with MF 150 g/min and DT 20 s was more efficient than the manual cluster removal, as it obtained a similar amount of extracted milk but took less time. Conversely, the use of ACR set with MF 200 g/min and DT 10 s involved a higher reduction in individual milking duration and the milking duration of groups of animals but reduced milk extracted.

Key words: automatic cluster remover, Manchega ewe, milking fractioning, milking duration

INTRODUCTION

Milking operations constitute more than 50% of the work on a dairy ewe farm (Olechnowicz, 2012). With the aim of reducing the time spent on these tasks, several studies on the simplification of milking routines have been carried out (Labussière, 1988; Molina et al., 1989; Knight and Gosling, 1995). Complex routines including double cluster attachments, intense stimulation of the udder, and hand stripping were substituted by simpler routines, such as cluster attachment, brief machine stripping, and cluster detachment. Moreover, the elimination of the machine-stripping phase has been proposed in those particular breeds selected for their milkability. Thus, in studies conducted in Sarda and Lacaune breeds, elimination of the machine stripping in animals with a large milk storage capacity reduced the milking duration, whereas milk yield was not affected (Labussière, 1988). In Poll Dorset breed ewes, no significant differences in milk yield were found among animals that were machine stripped and animals milked following routines that only included cluster attachment and cluster detachment (Knight and Gosling, 1995). In Manchega breed ewes, according Molina et al. (1989), the elimination of one or both daily machine strippings in ewes with bimodal (2 peaks) milk emission flow only represented losses from 3 to 9%, respectively; those authors suggested that such animals should not be machine stripped. McKusick et al. (2003) added that the elimination of machine stripping in East Friesian ewes reduced the milk yield by 14%, but allowed a reduction in working times. Thus, in farms of these breeds, if these simple routines are applied, the implementation of automatic cluster removers (**ACR**) could be an interesting choice. The use of ACR adjusted with optimal levels of their operating parameters [switch point or

Received November 12, 2014.
Accepted March 4, 2015.
[1]Corresponding author: jr.diaz@umh.es

milk flow threshold (**MF**) and delay time from which MF is reached (**DT**)] has been very suitable in dairy cows to reduce the milking duration while maintaining the income from milk quantity and quality (Rasmussen, 1993; Reid and Stewart, 1997; Magliaro and Kensinger, 2005; Edwards et al., 2013).

In milking parlors for small ruminants where ACR are present, usually only automatic vacuum cutting devices (**AVCD**; a component of ACR that interrupts the vacuum but does not remove the milking unit) are implemented. In dairy goats, the use of AVCD reduces the need for staff during the milking procedures, which is related to better profitability of the farm (Tangorra et al., 2007). According to Tangorra et al. (2010), the use of these devices reduces the risk of over-milking, which improves the sanitary status of the mammary gland (Peris et al., 2003). In a previous experiment carried out by our research group (Bueso-Ródenas et al., 2014a), it was concluded that the optimal settings for the AVCD in milking Murciano-Granadina goats was the combination of MF between 100 and 150 g/min and DT 10 s. The use of higher MF required more frequent second cluster attachments and, consequently, significantly increased milking duration. Moreover, when DT was higher than 10 s in a concrete MF, milking duration and mean vacuum drop in the short milk tube increased but machine milk fraction was not improved. In a later study developed on Murciano-Granadina goats [J. Bueso-Ródenas, G. Romero, M. P. Gascó (Universidad Miguel Hernández), and J. R. Diaz, unpublished data], the use of AVCD set at MF 100 or 150 g/min and DT 10 s did not affect the results of milking fractioning and individual milking duration of the animals when compared with manual cluster removal. Although no differences in the sanitary status of the mammary gland and milk composition were observed, the milking with manual cluster removal caused a higher teat-end edema and increased the mean vacuum drops in the short milk tube. It was concluded that the implementation of AVCD and its use with the given MF and DT was as effective as milking with cluster removal performed by an experienced milker [J. Bueso-Ródenas, G. Romero, M. P. Gascó (Universidad Miguel Hernández), and J. R. Diaz, unpublished data].

Along similar lines, the implementation of AVCD in milking parlors for dairy ewes is an increasingly popular choice. In Manchega ewes, Bueso-Ródenas et al. (2014b) carried out a short-term study in 2 different AVCD with different MF and DT; the main conclusions were that, when AVCD were installed in a high-line milking machine, the combination of MF 150 g/min and DT 20 s achieved the best milking fractioning values and the combination of MF 200 g/min and DT 10 s achieved the smallest values for milking duration. Conversely, regarding an AVCD installed in a low-line milking machine, the use of MF 100 g/min did not improve the milking fractioning and the use of MF 250 g/min did not reduce the milking duration. Thus, it was concluded that the optimal setting was the combination of MF and DT between 150 g/min and 20 s and 200 g/min and 10 s, with a balance existing between both combinations between milk yield and milking duration. Moreover, in both experiments the milking routine was not affected by the AVCD settings and the vacuum drops were deeper when high MF and DT were employed.

In dairy ewes, a lack of studies exist that compare milking with this kind of device and milking with manual cluster removal. The aim of the present study was to assess the effect of the AVCD on the milking of Manchega ewes during 1 lactation in terms of milk yield and milking fractioning, milking duration (individual and per groups of animals), milk composition, mammary gland health status, vacuum level in the short milk tubes, and teat-end status, comparing the parameters that obtained the best results in the previous short-term experiment (Bueso-Ródenas et al., 2014b: MF 150 combined with DT 20 s and 200 g/min combined with DT 10 s) with conventional milking (manual cluster removal).

MATERIALS AND METHODS

Facilities and Animal Handling

The experiments were performed at the facilities of the Manchega Ewe National Herd, located in Valdepeñas, Spain, managed by Asociación Nacional de Criadores de Ganado Ovino Selecto de Raza Manchega (National Manchega Ewe Breeders Association). The animals were fed twice a day with the same ration (mixture of cereal grains and alfalfa hay) and water was offered ad libitum. Milking was practiced twice a day, at 0800 and 1700 h, as is routine on Manchega ewe farms. This farm has a DeLaval (Tumba, Sweden) high-line milking machine installed in a 2 × 18 × 18 Casse type milking parlor. The milking machine was equipped with AVCD (DeLaval SG) placed in the collector and linked to an electronic milk meter (mm25, DeLaval). The milk meters were connected through a long milk tube 2.5-m long to the teat cups (Almatic G50+, DeLaval). The pulsation parameters used were 180 pulses/min and a pulsation ratio of 50%; the vacuum level was 40 kPa.

Experimental Design

Pre-Experimental period. A pre-experimental period of 15 d was implemented to select the animals to