Best Time to Increase Bovine Calving Based on Dairy Indicators of Commercial Herds in Camagüey

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ABSTRACT

The best time to increase calving based on dairy production indicators was determined. Records from 2 036 Holstein x Zebu cows were evaluated monthly. This research took place between 2008 and 2014, within a five-year period as minimum, in the three kinds of dairy facilities (Basic Unit of Cooperative Production, Basic State Farm, and a farm). The variables used were births, total milk production, average milk liter/cow/day, and milking cows, which were decomposed according to season using a multiplication model. Seasonal behavior was observed in all the variables without a defined general pattern present in the total dairy production, and milk liter per cow/day (peaks from June to October), which coincided with the beginning of the pasture production peaks. Total milk production and milk liter average per cow/day are elements that can help set up the best moment to increase calving.

Key words: *milk production, births, seasonability, cattle*

INTRODUCTION

In countries with high seasonal dairy production, like New Zealand and Ireland there is also high pasture demand, as it guarantees most nutrients consumed by bovine herds (Burke *et al.*, 2010; Butler, Shalloo and Murphy, 2010); however, well-known international achievements owe to a very simple principle, consisting of concentrating over 90 % of parturition in a four to twelve-week period, starting a month before the onset of the rainy season. The goal is to match cattle dry matter (DM) peaks to top DM occurrence in the grasslands, and make it cost-effective.

Research on calving intensification at the beginning of the rainy season in Cuba by González (2003), in Ciego de Ávila, has proven that the two fifteen-day periods of May were comparatively better than the two corresponding periods in June. However, Loyola (2010), in Camagüey, proved that the first six weeks starting on April 1st had better dairy indicators than the other coming six weeks, with some local differences. Nevertheless, research on several locations have allowed to identify various seasonal birth behaviors, as reported by Bertot (2007) and Figueroa (2010), in Camagüey, and Ramírez *et al*., (2010), in Havana. Total milk production and milk liter per cow, per day were the elements used to establish the optimum time to intensify calving, due from a month before the onset of the dairy peak starting in May.

MATERIALS AND METHODS

Location and duration

This research included herds from three different dairy systems, located in the municipalities of Florida and Jimaguayu, in the province of Camagüey, Cuba. A total of 2 036 crossbred females Holstein x Zebu were distributed as follows, 753 at the Empresa Pecuaria Florida (Florida Cattle Company); 1 175 at El Caimito Basic State Farm; and 108 at the Juanita Farm.

Animals and general features of production systems

The genotype used was crossbred Holstein x Zebu females, with hand milking at different times, and artificial insemination. At Juanita, directed mating was practiced.

Nutrition

Nutrition relied on natural pasture (abundant in the areas studied), with a presence of Texan grass

(*Paspalum notatum*), cut grass (*Paspalum virgatum*), *camagüeyana* (*Bothriocloa pertusa)* and jaragua grass (*Hyparrhenia rufa*). Sugar cane stalks and king grass were additionally supplied during the dry season. Furthermore, the animals were given Norgold supplement on a daily basis, at rate of 0.5 kg per cow when production exceeded 3 kg of milk. On Juanita, the animals had a daily consumption of 0.4 kg of Norgold per cow. In the dry season milking cow feeds were administered, at a rate of 1 kg/cow.

Variable selection and statistical analysis

Births, total milk production, milk liter average per cow, per day and milking cows, were recorded over the 2006-2012 period. To isolate the series components, seasonal decomposition was made using a multiplication model, because all the variables showed clearly defined tendencies in the time series. The analyses were made through SPSS, version 15.0, for Windows (SPSS, 2006).

RESULTS AND DISCUSSION

Birth behavior

Different seasonal behaviors were observed in the three locations (Table 1), with the highest peaks in the first semester, at the Florida Cattle Company and Juanita Farm; whereas at EL Caimito Basic State Farm the peaks were scattered.

Interestingly, there was a seasonal behavior pattern for births, determined by Bertot (2007) on the Camagüeyan dairy companies (Triangulos), in the 1984-2005 period. Additionally, Figueroa *et al.* (2010), in a study (1994-2008) at Triangulo 4 Cattle Company, in the municipality of Najasa, Camagüey, observed multiple births over the first semester, with the highest peaks in March, April and May. Ramírez *et al.* (2010) in Havana, reported different seasonal behaviors in April-September, August-January, and May-August, in three dairy companies that not always had matching results, though births usually occurred in the first semester.

As can be observed, calving has different seasonal behaviors that respond to local characteristics, deriving from particular strategies and management, which is also corroborated in the different production forms evaluated, with increases from March to July, and a peak in May.

Behavior of production indicators

A seasonal behavior pattern for total milk production and the average of liter/cow/day on the three farms turned out to be similar, regarding the onset and duration (May to October), for the Florida company, and El Caimito Basic State Farm. It was also similar to reports by Mena *et al.* (2007), who found seasonal behaviors of milk production in Camagüey, from May to October.

Mena *et al.* (2007) reported a seasonal behavior of milk production in Camagüey, from May to October.

Dairy production is increased as a response to pasture availability in the rainy season, which has been recorded by several researchers in Camagüey, like Loyola *et al.* (2010), Guevara *et al.* (2010c), and Hernández and Armenteros (2011). In such terms, when calving occurs in the very dry season, nutritional restrictions over transition of dairy cows can bring about serious metabolic disorders, which eventually, not only compromise the dairy production peak observed between six to eight post-calving weeks (García, 2005; Djoković *et al.*, 2010; Vickers, 2011), but also the duration of lactation (Burke *et al.*, 2010; de Loyola, 2010). That explains how in the period of nutritional shortages, dairy peaks do not occur under the prevailing conditions, in the locations studied, though significantly high peaks of births occur.

The behavior of total milk production and the average of liters per cow, per day, had seasonal increases that coincided with the highest pasture availability period, which was critical to establish the best time for calving intensification.

The milking cows have undefined seasonal peaks in the four types of production. There is no coincidence with the pattern observed for total milk production and the milk liters per cow, per day. Accordingly, the milking cows indicator has no use in defining the optimum time to increase calving (Table 4).

Soto (2010) and de Loyola (2010) in seasonal production studies noted significant differences among the milking cows per cents (generally low), in different calving patterns. Several remarks were also made about the practical need to improve conditions to achieve 66%, at least. However, calving must be increased according to the local seasonal characteristics, because larger numbers of milking cows outside the pattern peaks of production indicators do not account for significant milk production increases.

Nutritional restrictions over the dry season keep the cows from the highest production levels; on

many occasions the cows are not ready for milking. Consequently, the birth peaks recorded did not represent milking cow replacement, or for the dairy production indicators studied. Thus, based on highly specialized seasonal milk production, reference is made about calving increases from a month before the onset of the rainy season, for these forms of production, 90% of calving must take place from May to June.

CONCLUSIONS

Total milk production and average of milk liter per cow, per day were elements used to set up the best moment for calving increase, in the forms of production studied, beginning a month before the production peak, from May on.

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Received: 7/10/2015
Accepted: 7/20/2015

Table 1. Behavior of seasonal factors for births, in the three forms of production

Months	Seasonal factors (%)		
	Florida Cattle Company	La Juanita Farm	El Caimito Basic State Farm
1	128.3	85.9	82.2
2	90.7	134.1	75.6
3	102.2	145.3	84.0
4	119.1	127.5	116.0
5	169.6	168.4	102.9
6	125.6	70.5	110.2
7	92.0	32.8	80.1
8	68.8	61.9	108.6
9	74.8	96.8	115.9
10	71.9	82.0	92.6
11	83.8	98.2	135.0
12	73.0	96.6	96.9

Values of 110 % or greater were considered maximum peaks, whereas 90 % or below, indicate minimum peaks

Table 2. Behavior of seasonal factors for the total milk production indicator, for the three forms of production

Months	Seasonal factors (%)		
	Florida Cattle Company	*La Juanita* Farm	*El Caimito* Basic State Farm
1	88.6	61.8	81.1
2	65.5	60.7	64.6
3	63.1	69.9	66.0
4	60.6	92.7	61.2
5	80.2	108.0	89.1
6	116.6	139.4	121.1
7	144.0	145.0	134.6
8	147.6	143.2	126.6
9	128.1	124.0	131.7
10	119.6	94.5	130.9
11	96.1	83.8	109.3
12	89.8	77.1	83.7

Values of 110 % or greater were considered maximum peaks, whereas 90 % or below, indicate minimum peaks

Tabla 3. Behavior of seasonal factors for the average milk liter per cow, per day indicator, in

the four forms of production

Months	*Florida* Cattle Company	*La Juanita* Farm	*El Caimito* Basic State Farm
1	92.1	76.3	79.4
2	78.9	67.8	73.4
3	73.7	75.5	70.9
4	71.6	89.1	69.6
5	87.4	99.6	93.2
6	114.8	120.3	125.8
7	128.2	125.7	132.7
8	133.8	133.8	136.7
9	120.9	118.6	118.7
10	108.7	105.7	112.1
11	96.8	97.2	102.9
12	92.9	90.3	84.5

Values of 110 % or greater were considered maximum peaks, whereas 90 % or below, indicate minimum peaks

Table 4. Behavior of seasonal factors for milking cows indicator, in the four forms of production

Months	*Florida* Cattle Company	*La Juanita* Farm	*El Caimito* Basic State Farm
1	95.5	81.9	104.0
2	91.5	91.3	97.7
3	85.0	90.1	89.6
4	88.1	105.6	85.6
5	93.6	111.0	91.9
6	103.6	115.3	109.0
7	111.8	118.1	102.1
8	108.8	112.4	93.7
9	114.3	107.2	101.7
10	109.3	90.1	111.9
11	101.3	89.5	104.9
12	97.4	87.7	108.0

Values of 110 % or greater were considered maximum peaks, whereas 90 % or below, indicate minimum peaks