*Rev. prod. anim.*, 26 (3): 2014

# Effect of Concentrated Calving on Commercial Dairies in Ciego de Ávila Province. II. Case Study

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## ABSTRACT

The bio-economic behavior of 10 commercial dairies was assessed as to forage production, and annual calving patterns. Dairy No. 3 was used as a comparison model in a case study, based on in previous studies results (2011) where it stood out from the rest, with 86 % calving pattern in the April-August period. To determine the influence of the calving pattern oriented to the rainy season, on the production and bio-economic efficiency indicators, the behavior of dairy no. 3 in 2011 was compared with its mean values for the previous years; the means of dairies grouped in patterns I and II, and the mean of dairies in pattern III, without the case study unit. The results indicated that dairy No. 3 reached higher gross profits than the rest, concerning productive efficiency (1 298 kg of milk/ha and 32 975 kg of milk/worker or working unit (UT)), with higher income from milk sales, income-expenses, and lower costs of milk production (0.84 CUP/kg of milk). These results are linked to a more favorable calving pattern this year.

**Key Words:** *calving, concentration pattern, bio-economic efficiency, milk production*

## INTRODUCTION

It has been demonstrated in Cuba that when calving is concentrated in the early rainy season, improvements are observed in the productive and economic indicators. This has been proven by research done in the province of Ciego de Ávila (González, 2003) and Camagüey (Del Risco *et al*., 2007; Loyola *et al*., 2010 and Soto, 2010).

Ciego de Ávila is a Cuban province with acceptable cattle raising levels, and in consequence, its contribution to the sector is significant. However, major cattle raising enterprises in the area, basic production cooperatives (UBPC), credit and services cooperatives (CCS), state-owned farms (GE), and private producers (PP), demanded appropriate policies for animal recovery and handling; as well as the natural resources available that guarantee productive increases that cause no major environmental damages (Mazorra *et al*., 1994).

Definitely, to achieve an efficient, cost-effective, competitive, sustainable and low-risk milk production system, several aspects should be taken into account, such as, ensuring a good working team; using animals with genetic potential, according to their feeding behavior; producing less costly and more efficient feedstuffs; applying a nutritional scheme according to the goals of the enterprise, with simple and controlled execution of diet handling; monitoring health in animals of all categories; and improving the reproductive efficiency of the system (Dick, 2012).

The purpose of this research was to assess the bio-economic behavior of a case study dairy, in terms of its forage production and annual calving pattern oriented to the April-August period.

## MATERIALS AND METHODS

A previous study in dairies of *Ruta Invasora* cattle raising Enterprise, in Ciego de Ávila, Cuba, aimed at assessing the productive behavior of commercial dairies concerning their forage production and annual calving pattern. Three calving patterns were established in the April-August period: pattern I (51-63 %), pattern II (64-75 %) and pattern III (76-86 %). Of the ten dairies assessed, number 3 stood out in 2011, its best year. It was used as a comparison pattern for a case study, where variant P III was applied.

*Characterization of the unit*

In dairy no. 3 there were 131 units of cattle (UGM) in an area of 97.2 ha, with soil, climate and exploitation conditions similar to the units in

the previous study. Herd natality was 67 %, and average lactation lasted 255 days. The crossbred (Holstein x Zebu) calves were brought up with restricted suckling, in rotational grazing, supplemented with sugar cane and Norgold (less than 0.35 kg MF/cow/day annual mean). The dairy had the lowest population of improved grass (7.9 %), low percent of woody species (3.1 %). Sugar cane covered 13.2 % of the total area, and native grass covered 79 % of the land. Forage balance for either season of the year resulted in a superavit in the rainy season, with 34 t of dry matter MS, and a deficit in the dry season, with 58 t MS.

*Work methodology*

Dairy number 6 was compared, taking the data from 2004-2005, to determine the influence of the calving pattern in the April-August period on production, dairy and nutritional yields, and efficiency of finances.

Dairy no. 3 was compared with the means of patterns I and II; the mean of pattern III without the case study dairy and its best year, using the following indicators as references: total production; production of milk/ha/year; production of milk/kg/work unit (ut); fertility rate (%); as well as economic indicators (cup), like total income, total expenses, income-expenses, cost-effectiveness and cost/kg of milk produced.

## RESULTS AND DISCUSSION

Table 1 shows how the behavior of the atypical year (2011) for unit 3 is superior regarding the mean of the other four years assessed in the same place. In both cases, the results are much better than the ones shown by P III. The high calving concentration effect on the total production per year, hectare, work unit and cow a day, provides a concluding response on how important it is to concentrate calving and grassland use in the early rainy season, since productive indicators are increased, and consequently, their yields, which corroborates the findings by Mena *et al.* (2007) and Soto *et al.* (2010).

Likewise, Table 2 shows similar superiority results in dairy no. 3, regarding the main economic indicators, which in general terms, stand for higher efficiency levels during production.

The total expenses were higher for unit no. 3, both for the five-year mean and in its best year of productive behavior, regarding the other two patterns. The rationale lies in that salaries have been raised according to increased productive behavior similar to the other patterns. This cause, in its turn, determined an increase of their total income, and makes the income-expense and cost effectiveness relationship reach its best, taking into account the calving patterns assessed.

These results match the criteria of Fowley (2003), about the suitability of maximizing grassland use as a less costly source of nutrients in the best season for growing. This is clearly observed when the dairies have limited contribution in relation with the animal needs.

The above also corresponds with information in Fig. 1, where dairy no. 3 is used as a model to prove that it is possible to cut down milk production costs when calving increases in the April-August period.

It also coincides with Agüero *et al*. (2005), and Guevara *et al*. (2005) who found lower costs/kg of milk values ($ 0.61), when the herds concentrated calving in the early rainy season; and Soto *et al*., (2010), with 0.59 kg of milk produced during validation studies with high calving concentrations in the April-August period, in the province of Camagüey.

The most important fact deriving from the studies is that low-cost productions can be achieved, as a way to contribute with the system´s sustainability, as indicated by Galetto (1998) and Guevara and Guevara (2001).

Cowan (2001), Best (2004) and Fowley (2003) reported positive benefits from this low-cost operational milk producing philosophy. Holmes (2006) points out that the high efficiency reached in the seasonal dairy system in New Zealand, relies on its simplicity during operation: it allows lactations of more than 3 500 kg/cow, and more than 10 000 kg of milk/ha/year, with 9-16 cents per kg of milk and less than NZ $ 3.00 per solid dairy kilogram produced with the top quality.

Generally speaking, improvements in traditional supplying chains may help reduce losses, decrease prices and increase diversity of choice for the beneficiaries (FAO, 2013), which means improved sustainability of the whole production chain, industry and customers.

The findings of the study in dairy no. 3 consolidate the results of this work, regarding an increase of economic bio-efficiency in the milk production process when high calving concentrations take effect in the April-August period, a seasonal dairy model in the tropical weather conditions, defined

in two seasons, in similar scenarios in Ciego de Ávila.

## CONCLUSIONS

The case study demonstrated that during the highest calving concentration in the April-August period, when grass grows at its top, significant bio-economic efficiency in milk production is produced in state-owned dairies in Ciego de Ávila.

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Received: 12-6-2014
Accepted: 21-6-2014

**Table 1. Behavior of productive indicators (kg) for the case study**

| Variables | Mean P I y II | P III | Dairy 3 | Dairy No. 3 Best year | Dif. dairy. 3/best year |
|---|---|---|---|---|---|
| Total annual milk production | 104 371 | 112 365 | 124 986 | 138 866 | +13 879 |
| Prod M/ha/year | 863 | 950 | 1 206 | 1 298 | +91 |
| Prod. M/UT/year | 16 897 | 21 573 | 26 574 | 32 975 | +6 400 |
| Prod. M/cow/day | 3.73 | 3.91 | 4.59 | 6.06 | +1.47 |

**Table 2. Behavior of economic indicators for the case study (CUP)**

| Variables | Mean P I y II | P III | Unit 3 | Unit 3 Best year | Dif. dairy. 3/best year |
|---|---|---|---|---|---|
| Total income | 101 543 | 110 694 | 182 702 | 194 343 | +11 640 |
| Total expenses | 81 376 | 86 878 | 100 466 | 122 633 | +22 167 |
| Income-expenses | 19 346 | 28 798 | 81 732 | 103 219 | +11 487 |
| Cost-effectiveness | 0.24 | 0.29 | 0.75 | 0.84 | +0.09 |

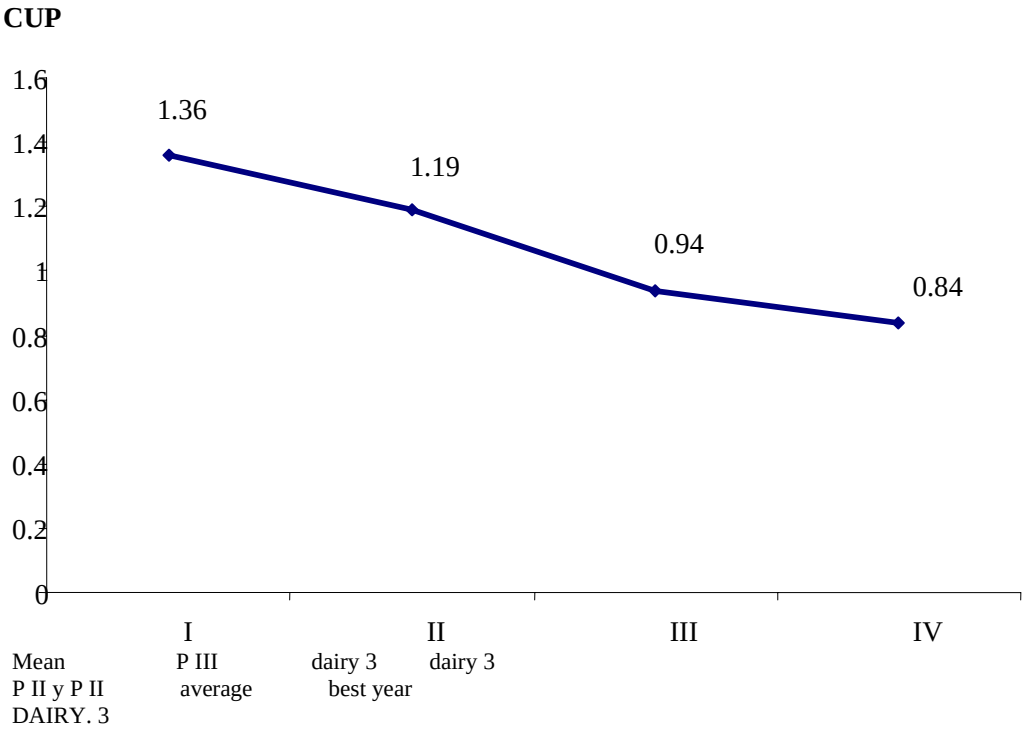


Fig. 1 Behavior of cost (CUP) per milk kilogram for the case study