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PRODUCTIVE INDICATORS OF A DAIRY FARM IN THE CENTER-WEST OF THE PROVINCE OF CHACO-ARGENTINA

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ABSTRACT: *The objective of the work was to generate productive indicators of a dairy system in the centre-west of the province of Chaco-Argentina. The work was carried out between December 2021 and December 2022 on a dairy farm belonging to the U.E.G.P. School. N°40-Agrotechnical High School, located in the town of Coronel Du Graty, department of Mayor Luis Jorge Fontana, province of Chaco, Argentina. The averages and standard deviations of productive variables were obtained. The aggregate indicators showed a milking cow/dry cow ratio of 60/40, the conversion efficiency of pasture in the milk of 0.938 milk per kg of DM and 1719 litres/ha/adjusted year. The values obtained make it possible to start having own and zonal data that will allow a constant evaluation as the data record is consolidated over time. The information obtained will be a tool that, in the medium term, will indicate the productive floor or ceiling of the analysed system and, based on this, be able to plan. It is concluded that productive indicators were generated showing the potential of the analysed region, and these should serve as a basis to implement programs to increase the adoption of input and process technologies in the bovine dairy sector of the centre-west of the province of Chaco- Argentina.*

KEYWORDS: Dairy Cow, Efficiency, Indicators, Subtropics

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INTRODUCTION

The primary sector of the economy of the province of Chaco-Argentina bases its livelihood on the production of cotton, soybeans, cattle and the extraction of wood (Pérez and Schorr, 2020). Dairy isn't considered a sector that contributes to the provincial economy. Dairy in the subtropics is and should be considered differently from other environments in our country. In general, an attempt has always been made to transfer the elements that make up the system separately (breeds of cows, management methods, individual productions, types of fodder, diets, scale, structure, etc.) of the dairy systems of the humid pampas, which over time don't end up working or if they do, it's inefficiently (Marini, 2022). It's imperative to make visible the characteristics of existing dairy systems in the province of Chaco-Argentina through efficiency indicators. The information obtained should adequately reflect what happens in the system and be used as a reference to know where each establishment is located at any given time.

The indicators intend to show in a simple and didactic way the achievements that are proposed in a dairy so that they can be easily understood and evaluated (Piccardi, 2014; Carstensen, 2013) while helping to understand where it's, where it's going and how much it's far from the proposed goals. These indicators would serve as a starting point and show the feasibility of dairying in the subtropics. A work by Cheij *et al*. (2022) identified and characterised the dairy establishments in the centre-west of the province of Chaco, demonstrating that dairy production exists in the region and that this commits to generating care policies for them.

The objective of the work was to generate productive indicators of a dairy system in the centre-west of the province of Chaco-Argentina.

MATERIALS AND METHODS

The work was launched between December 2021 and December 2022 on a dairy farm belonging to the U.E.G.P. School No. 40-Agrotechnical High School, located in the town of Coronel Du Graty, department of Mayor Luis Jorge Fontana, province of Chaco, Argentina (Latitude: -27.6822, Longitude: -60.9044 27°40'56'' South, 60°54'16'' West). A work team involved milkers, teachers, directors and students from ambassador institutions through a Resol Agreement. CS No 493/2021 facilitated the constant monitoring of the system and human resources.

The farm has 26 ha dedicated to milk production. The dairy herd consisted of 17 dairy cows (milking cows + dry cows) of the Holstein breed, six heifers, nine calves and one bull of the same breed.

Management and feeding

Mechanical milking was performed twice a day (6 a.m. in the morning and 6 p.m. in the afternoon), with only one milker on each shift. The average diet used was: 6 kg of maise per day, 1 kg of cottonseed, 2 kg of alfalfa roll per day and 7 kg of grazing alfalfa. Monthly reproductive checks were carried out to determine the pregnancy of the cows. A centralised data record was carried out (daily part), and the monthly milk control and milk and water samples were analysed. The climate

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generally responds to a sub-humid subtropical, with a dry season. The average yearly rainfall is between 800 and 1000 mm from west to east. Spring and summer are rainy, and autumn and winter are dry, with well-defined seasons. An average annual temperature of 24°C is observed, with maximum temperatures of 46°C and minimum temperatures of -5°C. Early frosts occur in 80% of cases between May and June; late frosts are common until August. The soils are mollisol types with variable organic matter content with capacity for use II, III and IV. Its current use is mainly for agriculture, forestry and livestock, with potential use for silvopastoral agriculture (Ministry of Production, 2016).

Variables analysed

Number of milking cows' live weight of the cow (in kg).

Productive indicators:

Days in completed lactation (DLACT): Drying date – calving date, in days.

Total milk production at the first lactation adjusted to 305 days (PLaj) in litres.

Litres per day (LD): PLT / DLACT, in litres.

Total litres in the year (LT): monthly ∑ PLT, in litres.

Dry cows days (VS): Second calving date – dry date, in days.

Average days of lactation (DLACP): ∑ calving date – date of the day that the evaluation is carried out / number of cows.

Reproductive indicators:

Calving-calving interval (IPP): Age at second calving – age at first calving in days.

Calving-conception interval (IPC): Date of pregnancy – date of calving, in days.

Added indicators:

Milking cow / dry cow ratio (VO/VS) in %.

Litres of milk per kg of dry matter consumed per cow (litres/kg DM) in litres.

Litres of milk/ha / adjusted year (litres/ha/adjusted year) in litres.

Statistics analysis

A descriptive analysis was made. The means and standard deviations of the variables used were estimated.

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RESULTS AND DISCUSSION

The results observed in Table 1 show that it's a small-scale establishment with a total production per day according to the number of cows and that the live weight of the cows is below the values of Holstein cows of 730 kg shown by Vallone *et al*. (2018), surely these analysed cows suffered environmental effects (nutritional + management) that didn't allow the maximum adult weight capacity to be achieved. These effects directly affect animal welfare and production indices, such as daily weight gain, daily milk production, feed conversion, and pregnancy rate (Arias *et al*., 2008).

Table 1: Means and standard deviations of annual productive and reproductive variables

Milking cows	10 ± 2
Live weight (kg)	557,1 ± 22,5
Milk production per day total (litres)	150 ± 27
Production per cow per day (litres)	15 ± 2
Production per cow adjusted to 305 days	4575 ± 167
Total litres produced in 12 months	54994
Completed lactation (days)	228 ± 20
Average lactation days	128 ±16
Dry period (days)	131,5 ± 3
Calving-conception interval (days)	88 ±10
Calving-calving interval (days)	367,3 ± 15

The production per cow adjusted to 305 days is below if we compare them with the values presented by Gomez *et al*. (2015), who obtained records of lactation completed at 305 days with an average of 5075 ± 1709 kg milk/l/year. Although superior to those presented by Martinez *et al*. (1983) for pure Holstein under tropical conditions in Tabasco, managed with two milkings, in rotational grazing and supplemented with molasses-urea, reaching a production of 3075 kg and also those reported by Carvajal-Hernandez *et al*. (2002) for production adjusted to 305 days with an average of 2635 ± 51.9 kg. The litres per day reported in this work are below the 23.8 litres shown by Carvajal-Hernandez *et al*. (2002) and 23.5 litres cited by Vallone *et al*. (2018). The results of the duration of lactation completed in days found in this work are far from the theoretical optimum of 305 days, although similar to those reported by Gonzales-Blanco and Ching-Jones (2018) of 187.8 days of lactation. However, Carvajal-Hernandez *et al*. (2002) found in Holstein cows that the means and standard errors for lactation duration were 305 ± 6.4 days. Table 1 also shows reproductive indicators that show the optimal behaviour of one birth per year. Below those presented by Gonzales-Blanco and Ching-Jones (2018) with values of a calving-calving interval of 434.5 days calving-conception interval of 141.3 days, and also the 208 ± 96 days found by Vallone *et al*. (2018) in Holstein cows.

Table 2 shows the efficiency indicators chosen to evaluate, showing that the milking cow/dry cow ratio isn't ideal. Showing what was observed in Table 1, the cows get pregnant in time for a calving per year, but it isn't accompanied by milk production, so they dry up before completing 305 days

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of lactation. The efficiency of converting grass into milk is below what should be achieved in grazing systems close to 1.4 litres of milk per kg of DM consumed on average for the three stages of lactation (Fernandez-Mayer, 2019). The efficiency indicator litres of milk/ha/adjusted year was below those cited by Gastaldi *et al*. (2007), which was an average of 4429 litres of milk/ha/year in areas with edaphic and climatic restrictions. These differences found are due to several system factors (stocking rate, land use, cow weight, lactation duration, etc.) that should deepen monitoring.

Table 2: efficiency indicators	
Milking cow/dry cow ratio	60/40
Litres of milk/kg dry matter consumed per cow	0,938
Litres of milk/ha/year adjusted	1719

The values obtained in both tables make it possible to start having own and zonal data that will allow a constant evaluation as the data record is consolidated over time. The information obtained will be a tool that, in the medium term, will indicate de productive floor or ceiling of the analysed system and, based on this, be able to plan. These results should serve as a basis for implementing programs to increase the adoption of input and process technologies in the dairy cattle sector of the centre-west of the province of Chaco-Argentina. Also, the results obtained allow it to be positioned as a model to be replicated in the central-western basin of the province of Chaco. Easy to adopt, low inputs and the possibility of combining it with other productions, allowing the diversification of the productive system.

CONCLUSION

It’s concluded that productive indicators were generated showing the potential of the analysed region, and these should serve as a basis for implementing programs to increase the adoption of input and process technologies in the bovine dairy sector of the centre-west province of Chaco-Argentina.

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